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Les parcours de soins des personnes victimes d'AVC

Bibliographie thématique

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Marie-Odile Safon
Véronique Suhard

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Sommaire

Introduction :

L'Accident vasculaire cérébral (AVC) se manifeste par la perte d'une ou plusieurs fonctions du cerveau liée à un arrêt soudain de la circulation du sang. C'est la première cause de décès chez les femmes et la troisième chez les hommes, et un grand pourvoyeur de handicap. Le Plan d'actions national AVC 2010-2014 avait pour but notamment d'améliorer le parcours de soins des patients, lors de la phase aiguë par l'accès facilité à l'imagerie diagnostique (IRM et scanner) et le développement d'unités hospitalières spécialisées, les Unités neurovasculaires (UNV), et ensuite lors de la phase de rééducation et réadaptation, afin d'éviter décès et pertes de chance de récupération des séquelles. En 2012, sur les 134 000 patients de 18 ans ou plus hospitalisés pour primo-AVC, 99 000 ont fait un AVC constitué, avéré.[1]

Focus sur le Plan AVC 2010-2014

Ce plan complète les dispositifs prévus par les circulaires du 3 novembre 2003, relative à la prise en charge des AVC[2], et du 22 mars 2007, relative à la place des Unités NeuroVasculaires (UNV)[3] dans la prise en charge des patients présentant un AVC ou un AIT (Accident ischémique transitoire)

En 2009 , un rapport sur la prévention et la prise en charge des accidents vasculaires cérébraux en France remis au ministre de la santé a permis un état des lieux sur cette problématique

Le plan AVC 2010-2014 comprend 3 volets :

- > un document stratégique « **Stratégie AVC 2010-2014** » qui présente les objectifs stratégiques du plan, qu'ils soient généraux (partagés notamment avec d'autres plans) ou spécifiques à ce plan un programme d'actions opérationnelles
- « **Programme d'actions nationales et régionales** », dont les actions relèvent soit de l'échelon national (Etat, agences, institutions nationales), soit des agences régionales de santé. Ces actions, au nombre de dix-sept (dont onze comprennent 31 sous actions), sont véritablement concrètes.-
- une « **boîte à outils »** comprenant des éléments de méthodes pour les acteurs (réglementation le cas échéant, référentiels de bonne pratique, guides, etc.), éléments qui existent ou dont la création peut être le résultat d'une action spécifique du plan. Les dispositions de gouvernance, de suivi et d'évaluation du plan y sont incluses. A noter que les indicateurs (de suivi ou d'évaluation) peuvent être différents selon le niveau, leurs destinataires et l'utilisation attendue de leurs résultats.

Ce plan s'est traduit par la circulaire du 6 mars 2012 qui décline trois objectifs majeurs du plan en termes d'offre de soins

[1] Com-Ruelle, et al. (2018). Parcours de soins des personnes hospitalisées pour un accident vasculaire cérébral. Premiers résultats. Questions d'Economie de la santé (234).
[2] http://www.circulaires.gouv.fr/pdf/2009/04/cir_7243.pdf
[3] http://www.circulaires.gouv.fr/pdf/2009/04/cir_14512.pdf

1- la structuration d'une filière de soins coordonnés « filière AVC » qui est constituée de l'ensemble des acteurs et structures hospitalières concourant à la prise en charge du patient victime d'AVC
2- la structuration du développement de la télémédecine et des systèmes d'information.
3- L'organisation de la prise en charge de l'AVC de l'enfant

L'objectif de cette bibliographie est de rassembler des références concernant les caractéristiques des personnes victimes d'AVC et de leurs parcours de soins. Il s'agit également de pointer la problématique des variabilités territoriales sur les deux aspects évoqués ci-dessus.

Eléments de cadrage : données épidémiologiques, économiques et politique

En France

Béjot, Y., Duloquin, G., Graber, M., et al. (2021). "Current characteristics and early functional outcome of older stroke patients: a population-based study (Dijon Stroke Registry)." Age Ageing **50**(3): 898-905.

> BACKGROUND: the ongoing growing and ageing population is associated with an increase in older patients suffering a stroke. We aimed to assess the current profile of these patients in a population-based setting. METHODS: all patients with acute stroke were prospectively identified among residents of Dijon, France, between 2013 and 2017, using a population-based registry. Characteristics and early outcome of patients were compared according to age groups. RESULTS: 1,288 stroke cases were recorded (median age: 81.1 years, interquartile range: 66.1-86.7, 54% women). Patients aged 75-85 years and those >85 years accounted for 27.6 and 33.9% of overall cases. Increasing age was associated with a greater prevalence of vascular risk factors, pre-existing cognitive impairment and handicap, higher initial severity, more frequent cardioembolic ischemic stroke, post-stroke pulmonary infection and delirium. Only 41% of patients aged 75-85 years and 18% of those aged >85 years had a good early recovery. Compared with patients aged <75 years, patients aged 75-85 years [adjusted odds ratio (OR) = 2.61; 95% confidence interval (CI): 1.74-3.93, P < 0.001] and those aged >85 years (adjusted OR = 7.18; 95% CI: 4.58-11.3, P < 0.001) had an increased risk of poor post-stroke functional outcome. Among survivors, the proportion of patients discharged to home was 60% in age group <75 years, compared with 49% in patients aged 75-85 years and 29% in those aged >85 years. Thirty per cent of patients >85 years old required a long-term care institution. CONCLUSION: the increasing burden of stroke in older people has major implications for future treatment strategies and need for dedicated care facilities.

Gabet, A., Grimaud, O., de Peretti, C., et al. (2020). "Déterminants de la létalité à la suite d'une hospitalisation pour un accident vasculaire cérébral en France, 2010-2015." Bull Epidemiol Hebd(5): 98-107.

> L'objectif de cette étude était de décrire la létalité précoce et tardive suite à un accident vasculaire cérébral (AVC) en France, d'en étudier les évolutions entre 2010 et 2015 et d'en étudier les déterminants.

Gabet, A., Houot, M., Mas, J. L., et al. (2020). "Connaissance de l'accident vasculaire cérébral et de ses symptômes en France en 2019." Bulletin Epidémiologique Hebdomadaire (Beh)(28): 554-561. https://www.santepubliquefrance.fr/docs/bulletin-epidemiologique-hebdomadaire-27-octobre-2020-n-28

Grave C., Houot,M., Mounier-Vehier, C., et al.(2020). Connaissance de la population française sur les symptômes d'infarctus du myocarde et sur l'appel du 15 lors d'une crise cardiaque ou d'un accident vasculaire cérébral : Baromètre de Santé publique France 2019. Bulletin épidémiologique hebdomadaire (24) : 480-489
http://beh.santepubliquefrance.fr/beh/2020/24/index.html

Guilloteau, A., Binquet, C., Bourredjem, A., et al. (2020). "Social deprivation among socio-economic contrasted french areas: Using item response theory analysis to assess differential item functioning of the EPICES questionnaire in stroke patients." Plos One **15**(4): e0230661.

BACKGROUND: Multiple approaches have been proposed to measure low socio-economic status. In France the concept of precariousness, akin to social deprivation, was developed and is widely used. EPICES is a short questionnaire that was developed to measure this concept. This study aimed to evaluate Differential Item Functioning (DIF) in the EPICES questionnaire between contrasted areas: mainland France, French West Indies (FWI) and French Guiana (FG).

Sika-Kossi, D. et Bricard, D. (2020). "Déterminants des dépenses de santé post-phase aiguë de l'accident vasculaire cérébral en France." Revue d'Epidémiologie et de Santé Publique **68**: S34. http://www.sciencedirect.com/science/article/pii/S0398762020300833

Introduction En France, 75 % des victimes d'accident vasculaire cérébral (AVC) gardent des séquelles importantes nécessitant des soins de longue durée dont le montant a été estimé à 2,4 milliards d'euros en 2013. Les objectifs de cette étude sont d'estimer les dépenses de soins post-AVC et d'identifier leurs déterminants.

Béjot, Y., Bailly, H., Graber, M., et al. (2019). "Impact of the Ageing Population on the Burden of Stroke: The Dijon Stroke Registry." Neuroepidemiology **52**(1-2): 78-85.

BACKGROUND: We aimed to evaluate the impact of the ageing population on temporal trends in burden of stroke and to provide projections for the coming years. METHODS: Stroke cases (ischemic strokes, spontaneous intracerebral hemorrhages, or undetermined strokes) were prospectively identified between 1987 and 2015 in Dijon, France, using a population-based registry. Age-standardized incidence rates of first-ever and recurrent stroke were calculated, and their temporal trends were assessed using age- and sex-adjusted annual incidence rate ratios (RR).

Cnam (2019). Rapport sur les charges et produits de l'assurance maladie pour 2020 : Améliorer la qualité du système de santé et maîtriser les dépenses : propositions de l'Assurance Maladie pour 2020. Paris Cnam
https://www.ameli.fr/l-assurance-maladie/statistiques-et-publications/rapports-et-periodiques/rapports-charges-produits-de-l-assurance-maladie/rapports-charges-et-produits-pour-2018-a-2021/rapport-charges-et-produits-pour-l-annee-2020.php

Chaque année, l'Assurance Maladie présente au Gouvernement et au Parlement ses propositions relatives à l'évolution des charges et produits au titre de l'année suivante et aux mesures nécessaires pour atteindre l'équilibre prévu par le cadrage financier pluriannuel des dépenses d'assurance maladie. À partir d'analyses réalisées sur l'évolution des dépenses et des pratiques, et en s'appuyant sur les recommandations françaises et internationales, le rapport Charges et produits pour l'année 2020 présente des propositions et des pistes de réflexion visant à améliorer la qualité et l'efficience des soins, et à optimiser les dépenses de santé.

Fraticelli, L., Freyssenge, J., Claustre, C., et al. (2019). "Sex-Related Differences in Management and Outcome of Acute Ischemic Stroke in Eligible Patients to Thrombolysis." Cerebrovasc Dis **47**(3-4): 196-204.

Literature has highlighted sex-based differences in the natural course of stroke and in response to treatment with intravenous tissue plasminogen activator (tPA). OBJECTIVES: We aimed to compare the management and outcome of acute ischemic stroke (AIS) among women and men on a French registry based on a federated network of emergency physicians and neurologists.

Leandre, C. et Com-Ruelle, L. (2019). Repérer les facteurs de risque des patients hospitalisés pour un premier épisode d'Accident vasculaire cérébral (AVC) et analyser les déterminants de sa gravité : l'apport des bases médico-administratives. Rapport Irdes ; 570 Paris Irdes**:** https://www.irdes.fr/recherche/rapports/570-reperer-les-facteurs-de-risque-des-patients-hospitalises-pour-un-premier-episode-d-accident-vasculaire-cerebral-avc.pdf

Le but de l'étude est d'identifier les facteurs de risque des patients adultes hospitalisés en court séjour (MCO) pour un premier épisode d'AVC constitué, et d'analyser les différences entre les patients passés en réanimation et les autres.

Leandre, C. et Com-Ruelle, L. (2019). "Les facteurs de risque des patients hospitalisés pour un premier épisode d'accident vasculaire cérébral en France." Questions d'Economie de la Santé (Irdes)(240) http://www.irdes.fr/recherche/questions-d-economie-de-la-sante/240-facteurs-de-risque-des-patients-hospitalises-pour-un-premier-episode-d-accident-vasculaire-cerebral-en-france.pdf

La fréquence des accidents vasculaires cérébraux en France et leurs conséquences majeures en termes de létalité et de handicap lié aux séquelles les érigent en véritable enjeu de santé publique. Afin d'améliorer la prise en charge des patients, le Plan d'actions national Accidents vasculaires cérébraux (AVC) 2010-2014 préconise notamment de développer la prévention de l'AVC en déployant des actions de prévention et de dépistage des facteurs de risque sources d'AVC. Si les facteurs de risque sont bien identifiés par les cliniciens et mesurés dans certaines études sur échantillons, qu'en est-il sur le plan national ou régional ? Le Système national des données de santé (SNDS) offre la possibilité d'analyser la population exhaustive des AVC sur le territoire français à partir des données d'information médicale et de consommation de soins hospitaliers et de ville qui y sont intégrées. Une série de cohortes françaises en est extraite, incluant les victimes d'un primo AVC survenu de 2010 à 2019 (à terme) ; elles englobent le suivi médical des 24 mois d'amont et autant en aval. Afin de repérer et quantifier les facteurs de risque d'AVC, une méthode a été mise au point et testée sur la cohorte 2012 d'adultes. Ainsi, les prévalences des facteurs de risque liés à des pathologies sont estimées à 51 % pour l'hypertension artérielle, à 37 % pour la dyslipidémie, à 20 % pour le diabète, à 16 % pour la fibrillation auriculaire et à 20 % pour la dépression. Elles sont situées dans les fourchettes cliniques nationales et internationales et apportent des informations nouvelles utiles en termes de prévention de l'AVC et de bonne prise en charge des malades. En revanche, le SNDS ne s'avère pas adapté au repérage des facteurs de risque liés aux habitudes de vie et au comportement de l'individu tels que l'obésité, le tabagisme et l'alcoolisme, soulignant le besoin d'être complété par d'autres études incluant des données cliniques.

Meirhaeghe, A., Cottel, D., Cousin, B., et al. (2019). "Comparaison des taux d'attaque, d'incidence et de mortalité de l'accident vasculaire cérébral entre les hommes et les femmes de 35 ans et plus : registre des AVC de Lille." Bulletin Epidémiologique Hebdomadaire(2): 18-24.

Introduction : l'objectif de ce travail était de mesurer les effets de l'âge et du sexe sur les taux d'attaque, d'incidence et de mortalité à 28 jours des accidents vasculaires cérébraux (AVC) dans la population de Lille âgée de 35 ans et plus.

Muehlemann, N., Jouaneton, B., de Léotoing, L., et al. (2019). "Hospital costs impact of post ischemic stroke dysphagia: Database analyses of hospital discharges in France and Switzerland." PLoS One **14**(1): e0210313.

Oropharyngeal dysphagia is frequent in hospitalized post-stroke patients and is associated with increased mortality and comorbidities. The aim of our analysis was to evaluate the impact of dysphagia on Length of Hospital Stay (LOS) and costs. The hospital perspective was used to assess costs.

Ohannessian, R., Dhote-Burger, P., Chauvin, F., et al. (2019). "Health policy for telestroke in France: A retrospective description from 2003 to 2016." Rev Neurol (Paris) **175**(6): 390-395.

Stroke is a public health priority in France. The use of telemedicine for stroke known as telestroke, is a safe and effective practice improving access to acute stroke care including thrombolysis. Telestroke is currently being implemented in France. The objective was to describe the public health policy supporting telestroke implementation in France.

Cour des comptes (2018). La lutte contre les maladies cardioneurovasculaires : une priorité à donner à la prévention et à la qualité des soins. Paris Cour des Comptes**:** 209-246, www.ccomptes.fr/fr/publications/securite-sociale-2018

Pour l'année 2015, la Cnam estime ainsi à 4,5 millions le nombre de patients atteints d'une maladie cardio-neurovasculaire diagnostiquée et traitée. Le coût de ces prises charge, soit 16,1 Md€ pour l'ensemble des régimes d'assurance maladie en 2016, augmente plus rapidement que la moyenne des dépenses de santé. Il va continuer à s'accroître : selon la Cnam, le nombre de patients pourrait atteindre 5,1 millions en 2020. Au-delà de leurs conséquences sur la santé humaine, les maladies cardio-neurovasculaires présentent ainsi un important enjeu pour la soutenabilité des dépenses d'assurance maladie. Or, malgré certains progrès, ce dernier est encore insuffisamment pris en compte dans les objectifs et l'organisation de notre système de santé. Sous l'effet d'une hausse préoccupante de leur prévalence, les maladies cardio-neurovasculaires représentent un coût élevé et croissant pour le système de santé français. Après les progrès partiels intervenus dans l'organisation de la prise en charge des accidents vasculaires cérébraux (AVC), l'ensemble des soins à l'hôpital devraient être réorganisés afin d'en accroître les bénéfices individuels pour les patients. Au-delà, la gravité de la situation sanitaire liée aux maladies cardio-neurovasculaires appelle la mise en œuvre d'actions convergentes, notamment en matière de prévention, afin d'améliorer les chances de chacun, dès avant comme à tous les stades de l'évolution de ces pathologies.

Haute Autorité de santé (2018). Prévention vasculaire après un infarctus cérébral ou un accident ischémique transitoire : recommandation de bonne pratique. Actualisation des recommandations de 2014. Paris HAS
www.has-sante.fr/portail/jcms/c_1252051/fr/prevention-vasculaire-apres-un-infarctus-cerebral-ou-un-accident-ischemique-transitoire

Ces recommandations ont pour objectif d'améliorer la prise en charge des facteurs de risque et la réalisation du traitement spécifique, en fonction de l'étiologie, après un infarctus

cérébral ou un AIT, en vue d'éviter les événements vasculaires : récidive d'AVC, infarctus du myocarde et décès de cause vasculaire. Elles prennent en compte les avis de la commission de la transparence sur les médicaments anticoagulants oraux non AVK (ou anticoagulants oraux d'action directe). Elles mettent à jour les recommandations publiées en 2014.

Lecoffre, C., Olie, V., Bejot, Y., et al. (2017). "Mortalité par accident vasculaire cérébral en France en 2013 et évolutions 2008-2013." Bulletin Epidémiologique Hebdomadaire(5): 95-100. https://www.santepubliquefrance.fr/maladies-et-traumatismes/maladies-cardiovasculaires-et-accident-vasculaire-cerebral/accident-vasculaire-cerebral/documents/article/mortalite-par-accident-vasculaire-cerebral-en-france-en-2013-et-evolutions-2008-2013

Introduction : en France, l'accident vasculaire cérébral (AVC) est la première cause de mortalité chez les femmes. Les taux de mortalité par AVC ont cependant diminué entre 2000 et 2006. Dans un contexte de changements importants de sa prise en charge, cette étude décrit les évolutions des taux de mortalité par AVC depuis 2008.

Salles, N., Hervieu-Begue, M., Zambrowski, et al. (2017). "Les apports de la télémédecine aux prises en charge existantes." Actualité Et Dossier En Santé Publique(101): 19-31.

La télémédecine permet de faciliter l'accès aux soins, de corriger les disparités géographiques et au final de réduire les pertes de chance. La télémédecine a démontré sa capacité à apporter une réponse à ces problèmes en développant des téléconsultations spécialisées dans les hôpitaux généraux mais aussi dans les services de soins de réadaptation, les longs séjours, les Ehpad, les maisons de retraite, sans oublier les maisons d'arrêt. Pour les hôpitaux dépourvus de neurologues et recevant les AVC, le télé-AVC s'est imposé comme l'outil permettant à tous les urgentistes d'effectuer la fibrinolyse intraveineuse grâce à une téléconsultation avec le neurologue de garde à l'unité neurovasculaire (UNV).

Simon, P. et Gayrard, P. (2017). "Télémédecine : des pratiques innovantes pour l'accès aux soins." Actualité Et Dossier En Santé Publique(101): 10-55

La télémédecine regroupe des pratiques médicales à distance : téléconsultation, télé-expertise, télésurveillance médicale, téléassistance médicale et régulation. Elle est une réponse aux défis auxquels est confrontée l'offre de soins aujourd'hui. Elle permet la prise en charge au plus près du lieu de vie des patients. C'est un moyen de réorganiser l'offre de soins en en améliorant l'accès et la qualité. La Stratégie nationale de santé 2018-2022 donne une nouvelle impulsion à la télémédecine et des financements sont mis en œuvre pour favoriser son développement. Ce dossier spécial de l'ADSP fait un bilan sur le déploiement, les enjeux et les perspectives de la télémédecine en France avec un aperçu sur les expériences étrangères.

Béjot, Y., Daubail, B. et Giroud, M. (2016). "Epidemiology of stroke and transient ischemic attacks: Current knowledge and perspectives." Eur J Neurol **172**(1): 59-68.

Because of the growing size and aging of the world's population, the global burden of stroke is increasing dramatically. Current epidemiological data indicate that 16.9 million people suffer a stroke each year, which represents a global incidence of 258/100,000/year, with marked differences between high- and low-income countries, and an age-adjusted incidence 1.5 times higher in men than in women. Although primary prevention has contributed to a

decrease in stroke incidence in high-income countries, the so-called 'epidemiological transition' has led to an increase in incidence in middle-to-low-income countries as well. In addition, the incidence of ischemic stroke in young adults is on the rise, suggesting a need for specific preventative interventions in that age group. The number of stroke survivors almost doubled between 1990 and 2010, and has now reached 33 million people. According to epidemiological projections, this number will rise to 77 million by 2030. In France, the number of hospitalizations for an acute cerebrovascular event was about 138,000 in 2009, accounting for 3% of the total national health expenditure. Outcomes after stroke are frequently impaired by complications, including motor handicaps, dementia, depression, fatigue, and a high risk of early rehospitalization and institutionalization, with adverse consequences in terms of socioeconomic costs. In addition, there are 5.9 million stroke-related deaths worldwide every year. Finally, although many analytical epidemiological studies have considerably increased our knowledge of risk factors for stroke, the recent INTERSTROKE study provided evidence that 10 risk factors alone accounted for 88% of all strokes. Many of these risk factors are modifiable, which suggests that efforts should be made to promote interventions that aim to reduce the risk of stroke. A new 'mass approach' aiming to reduce the level of stroke risk factors in all people in a region, regardless of any given individual's level of risk, is currently still being developed. This interesting and innovative way to spread stroke awareness is based on the use of an internationally validated mobile-phone application that can calculate the risk of stroke for any given individual, and contains a section to educate people on stroke warning symptoms and signs.

Béjot, Y., et al. (2016). "Comparaison des taux d'accidents vasculaires cérébraux entre les femmes et les hommes : apports des Registres de Dijon, Brest et Lille, 2008-2012." Bulletin Epidémiologique Hebdomadaire(7-8): 109-117.
http://beh.santepubliquefrance.fr/beh/2016/7-8/2016_7-8_2.html

(2016). "Comparaison des taux d'accidents vasculaires cérébraux entre les femmes et les hommes : apports des Registres de Dijon, Brest et Lille, 2008-2012." Bulletin Epidémiologique Hebdomadaire(7-8): 109-117.
http://beh.santepubliquefrance.fr/beh/2016/7-8/2016_7-8_2.html

Bejot, Y., Giroud, M., Durier, J., et al. (2016). "Les accidents vasculaires cérébraux de la personne jeune : une pathologie émergente chez la femme comme chez l'homme. Apports du Registre dijonnais des AVC (1985-2011)." Bulletin Epidémiologique Hebdomadaire(7-8): 118-125.
http://beh.santepubliquefrance.fr/beh/2016/7-8/2016_7-8_3.html

(2016). "Erratum. Les accidents vasculaires cérébraux de la personne jeune : une pathologie émergente chez la femme comme chez l'homme. Apports du Registre dijonnais des AVC (1985-2011)." Bulletin Epidémiologique Hebdomadaire(10): 196-.

De Pouvourville, G. (2016). "Coût de la prise en charge des accidents vasculaires cérébraux en France." Archives of Cardiovascular Diseases Supplements **8**(2): 161-168.
https://www.sciencedirect.com/science/article/pii/S1878648016303305

Giroud, M., Quantin, C., Bejot, Y., et al. (2016). "Évaluation de la qualité métrologique des données du PMSI concernant l'accident vasculaire cérébral en France." Bulletin Epidémiologique Hebdomadaire(1): 8-15.
http://beh.santepubliquefrance.fr/beh/2016/1/2016_1_2.html

Grimaud, O., Roussel, P., Schnitzler, A., et al. (2016). "Do socioeconomic disparities in stroke and its consequences decrease in older age?" Eur J Public Health **26**(5): 799-804.

BACKGROUND: Overall decreased socioeconomic status (SES) has been linked to increased stroke incidence and mortality. Questions remain regarding whether these relationships persist into older age and apply to stroke sequelae. It is also unknown whether the influence of SES on absolute risk-the metric of most importance for population health-differs by age. METHODS: A nationally representative cross-sectional survey conducted in 2009 in France involved 26 000 participants, 1653 of whom declared previous stroke. We identified stroke with sequelae and stroke with dependency. SES was characterized as low, medium or high education. We compared the prevalence of stroke outcome across education within age groups (40-59, 60-79 and 80+). RESULTS: Prevalence of stroke was 23.8 per thousand. 65.1% of patients had sequelae and 19.6% were dependent. Variations in the prevalence of stroke and of stroke sequelae were statistically significant only in the youngest generations. A significant education gradient for stroke with dependency was apparent in all three generations, although the prevalence ratio (PR) was highest in the 40-59 (low to high education PR = 8.4, P < 10(-3)) compared with that in the 80+ (PR = 2.5; P < 10(-3)); conversely, the absolute difference was of much greater magnitude in the oldest vs. youngest generation (prevalence differences, respectively, 22.8 vs. 1.3 per thousand). CONCLUSIONS: SES disparities in the older age group were significant and large in absolute terms when considering more severe outcomes such as stroke dependency. These findings question the ability of universal health care systems to answer equitably the need of the aging population.

Lecoffre, C., Olie, V. et Decool, E. (2016). "Hospitalisations pour maladies cardio-neuro-vasculaires et désavantage social en France en 2013." Bulletin Epidémiologique Hebdomadaire(20-21): 359-366. http://beh.santepubliquefrance.fr/beh/2016/20-21/2016_20-21_2.html

Introduction : la survenue de nombreuses maladies chroniques est inversement associée à la position socioéconomique. Cet article décrit l'association entre le taux de patients hospitalisés et le désavantage social pour l'infarctus du myocarde (IdM), l'accident vasculaire cérébral (AVC), l'insuffisance cardiaque (IC) et l'embolie pulmonaire (EP), en France métropolitaine en 2013.

Lecoffre, C., Olie, V. et Decool, E. (2016). "Mortalité cardio-neuro-vasculaire et désavantage social en France en 2011." Bulletin Epidemiologique Hebdomadaire(20-21): 352-358. http://beh.santepubliquefrance.fr/beh/2016/20-21/2016_20-21_1.html

Introduction : les différences de niveau socioéconomique d'une population sont à l'origine de disparités en termes de mortalité. Cet article décrit le lien entre mortalité et désavantage social pour l'infarctus du myocarde (IdM), l'accident vasculaire cérébral (AVC), l'insuffisance cardiaque (IC) et l'embolie pulmonaire (EP), en France métropolitaine en 2011.

Peyron, C. et Wallut, L. (2016). "Tarification à l'activité et équilibre financier des prises en charge avec télémédecine : l'exemple du dispositif TéléAVC en Bourgogne." Journal de Gestion et d'Economie Médicales **34**(8): 415-429.

Afin de contribuer aux réflexions sur un modèle économique pour la télémédecine, cette étude exploratoire analyse, du point de vue des établissements, les équilibres financiers des prises en charge au sein du dispositif bourguignon TéléAVC. Ce dispositif permet de

fibrinolyser, à distance et avec la téléassistance d'une UNV, les patients victimes d'un accident vasculaire cérébral ischémique et accueillis dans des centres hospitaliers périphériques, dits hôpitaux requérants dans le dispositif. Nous avons mobilisé des données de microcosting (observation de 18 prises en charge) et exploité des données issues de 92 dossiers patients pour évaluer les coûts hospitaliers réels des prises en charge. Nous avons également collecté les données nécessaires au calcul des recettes perçues pour ces patients. Nous montrons que le coût de l'acte de fibrinolyse est identique dans l'UNV et dans les centres hospitaliers requérants. Pour un patient téléfibrinolysé, les centres hospitaliers requérants connaissent une perte financière (d'une valeur médiane de -2234 euros) alors que l'UNV qui prend en charge le patient pour la surveillance post téléfibrinolyse a un solde financier positif (1624 euros). Dans ce dispositif de télémédecine, la T2A « favorise » les établissements requis. Du point de vue de la collectivité, la logique de financement de la T2A rend, hors transport et infrastructure, la prise en charge avec télémédecine plus coûteuse qu'une prise en charge conventionnelle. L'impact de la facturation au séjour et non au parcours est déterminant, la nécessité d'un modèle économique adéquat pour la télémédecine trouve ici des arguments quantifiés.

Mauro, L., Vertueux,G. (2015). "Résultats de l'enquête nationale auprès des structures des urgences hospitalières." Dossiers Solidarité et Santé (Drees)(63)
https://drees.solidarites-sante.gouv.fr/publications/dossiers-solidarite-et-sante-1998-2016/resultats-de-lenquete-nationale-aupres-des

[BDSP. Notice produite par MIN-SANTE Dp79R0xs. Diffusion soumise à autorisation]. Alors qu'on observe une hausse continue de la fréquentation des services d'urgence dans les établissements de santé, les informations disponibles en routine fournissent peu d'éléments sur les motifs de recours, les modalités de prises en charge selon les pathologies, les difficultés rencontrées ou encore la diversité des organisations et de fonctionnement des structures. La Direction de la recherche, des études, de l'évaluation et des statistiques (Drees) a réalisé une enquête un jour donné (le 11/06/2013) auprès des 736 points d'accueil d'urgences présents sur le territoire français. Le colloque de novembre 2014 a permis de présenter les premiers résultats issus de l'exploitation de cette enquête autour de quatre sessions thématiques sur la méthodologie de l'enquête, l'organisation puis la patientèle des services d'urgences et enfin la place des urgences dans l'offre de soins de premier recours.

De Peretti, C. (2015). "Les risques de décès un an après un accident vasculaire cérébral." Etudes Et Résultats (Drees)(939)
http://drees.social-sante.gouv.fr/etudes-et-statistiques/publications/etudes-et-resultats/

Fosse Edorh, S, et al.. (2015). "Les hospitalisations pour infarctus du myocarde ou accident vasculaire cérébral chez les personnes diabétiques traitées pharmacologiquement, en France en 2013." Bulletin Epidémiologique Hebdomadaire(34-35): 625-631.
http://beh.santepubliquefrance.fr/beh/2015/34-35/2015_34-35_2.html

Mino, J. C., Douguet, F. et Gisquet, E. (2015). Accidents vasculaires cérébraux : quelle médecine face à la complexité ?, Paris : Les Belles Lettres

À quel prix peut-on sauver la vie ? Une telle question taraude la médecine contemporaine lorsqu'elle réanime des malades avec des risques de lourdes séquelles. C'est le cas des personnes touchées par un accident vasculaire cérébral (AVC). Avec 150 000 nouveaux cas par an, il s'agit de la première cause de handicap acquis et de la troisième cause de mortalité en France. Depuis peu, un traitement spécifique permet à ces patients d'éviter la mort et de

limiter leurs séquelles. Une nouvelle médecine dite « neurovasculaire » émerge. Mais ces progrès thérapeutiques n'empêchent pas toujours un handicap sévère. Faut-il limiter ou arrêter les traitements dans les situations complexes lorsque le cas est trop grave ? Comment accompagner dans cette épreuve les personnes et leurs familles ? Quelle doit être la place des soins palliatifs ? Ce livre dévoile de l'intérieur les dilemmes éthiques et pratiques des soins aux personnes atteintes d'AVC graves dont la vie et la mort sont entre les mains des médecins. Parce que les AVC touchent surtout des personnes âgées à la santé fragile, il importe d'interroger les buts et les logiques que développe parfois sans le dire, sans le savoir peut-être, une médecine de la vieillesse. Quels soins voulons-nous pour nos proches âgés et pour nous-mêmes plus tard ? Quelle médecine faut-il alors promouvoir face à la complexité ?

Bejot, Y., Daubail, B., Jacquin, A., et al. (2014). "Trends in the incidence of ischaemic stroke in young adults between 1985 and 2011: the Dijon Stroke Registry." Journal of Neurology Neurosurgery and Psychiatry **85**: 509-513.

Recent data have suggested that stroke incidence in young people may be rising. In this population-based study, we aimed to determine whether the incidence of stroke in people aged <55 years old had changed over the last three decades.

Cotte, F. E., Chaize, G., Kachaner, I., et al. (2014). "Incidence and cost of stroke and hemorrhage in patients diagnosed with atrial fibrillation in France." J Stroke Cerebrovasc.Dis. **23**(2): e73-e83.

BACKGROUND: Stroke represents a major complication of atrial fibrillation (AF). The current anticoagulation options for stroke prevention increase hemorrhage risk. The objective of the study was to estimate the incidence and costs of hospitalization for stroke and hemorrhage in patients with AF who are eligible for stroke prevention.

Diene, E., Fouquet, A., Geoffroy-Perez, B., et al. (2014). Mortalité prématurée par maladies cardiovasculaires chez les hommes selon la catégorie sociale et le secteur d'activité. Saint-Maurice InVS
https://www.santepubliquefrance.fr/content/download/143122/2123614

L'objectif de cette analyse est de décrire la mortalité prématurée d'origine coronarienne ou cérébrovasculaire selon deux indicateurs socioprofessionnels que sont la catégorie sociale et le secteur d'activité. Ces résultats contribuent à l'évaluation des liens entre les facteurs socioprofessionnels et la mortalité d'origine cardiovasculaire.

Fédération Française de Cardiologie (2014). Livre blanc : Etats Généraux vers un plan coeur, Paris : Fédération Française de Cardiologie
http://www.fedecardio.org/sites/default/files/pdf/livre_blanc.pdf

Le Livre Blanc « Pour un Plan Cœur », porté par 21 grandes organisations et réseaux de professionnels et plus de 500 000 patients concernés par ces pathologies, constitue la première étape d'une démarche pour une stratégie nationale de lutte contre les maladies cardiovasculaires. Présenté solennellement ce vendredi 17 octobre 2014 au Conseil économique, social et environnemental, il sera ensuite remis au Ministère des Affaires sociales et de la Santé, à celui de l'Enseignement supérieur et de la Recherche, celui de l'Éducation Nationale, et enfin au Ministère de la Ville, des Sports et de la Jeunesse qui tous sont concernés et sollicités par la FFC pour mettre en place une vraie politique concertée et coordonnées de prévention, de prise en charge, d'accompagnement et d'innovation dans le domaine de la lutte contre les maladies cardiovasculaires.

Woimant, F., Biteye, Y., Chaine, P., et al. (2014). "Severe stroke: which medicine for which results?" Ann Fr.Anesth.Reanim. **33**(2): 102-109.

In face of any severe stroke, the questions for health professionals in charge of the patient are: will the handicap be acceptable for the patient? But can we predict an acceptable handicap for the patient? For his family? When we know that the cognitive disorders, consequences of severe stroke often modify, in a major way, the behaviour of these patients? Given these difficulties for estimate vital and functional prognosis and even more the quality of life of patients with severe stroke, collective reflexions between physicians and nurses are essential, reflexions taking into account preferences and values of patients. Use of resuscitation resources for severe stroke patients implies to offer them the best rehabilitation. So, questions about health pathways for severe stroke are essential: which structures for these patients, which technologies, which medical, medico-social and social supports, which human accompaniment the society can propose to the patients and to their family, so that they have an acceptable quality of life

(2013). Maladies cardiovasculaires en Bourgogne. Tableau de bord des maladies chroniques., Dijon : ORS
http://www.orsbfc.org/publication/maladies-cardio-vasculaires-chapitre-6-du-tableau-de-bord-les-maladies-chroniques-en-bourgogne/

Après un aperçu sur le contexte national, cette étude aborde l'épidémiologie et la prise en charge hospitalière des maladies cardiovasculaires en Bourgogne. Les principales pathologies retenues se caractérisent par une chronicité, une fois l'événement aigu pris en compte : cardiopathies ischémiques, maladies hypertensives, artériosclérose et anévrisme, insuffisance cardiaque, maladies vasculaires avec atteinte cérébrale.

Chevreul, K., et al. (2013). "Cost of stroke in France." Eur J Neurol. **20**(7): 1094-1100.

BACKGROUND AND PURPOSE: A cost of illness study was undertaken on behalf of the French Ministry of Health to estimate the annual cost of stroke in France with the goal of better understanding the current economic burden so that improved strategies for care may be developed. METHODS: Using primary data from exhaustive national databases and both top-down and bottom-up approaches, the stroke-related costs for healthcare, nursing care and lost productivity were estimated. RESULTS: The total healthcare cost of stroke patients in France in 2007 was euro5.3 billion, 92% of which was borne by statutory health insurance. The average cost of incident cases was euro16 686 per patient in the first year, while the annual cost of prevalent cases was a little less than half that amount (euro8099). Nursing care costs were estimated at euro2.4 billion. Lost productivity reached euro255.9 million and that income loss for stroke patients was partially compensated by euro63.3 million in social benefit payments. CONCLUSIONS: With healthcare costs representing 3% of total health expenditure in France, stroke constitutes an ongoing burden for the health system and overall economy. Nursing care added nearly half again the amount spent on healthcare, while productivity losses were more limited because nearly 80% of acute incident strokes were in patients over age 65. The high cost of illness underscores the need for improved prevention and interventions to limit the disabling effects of stroke

Tuppin, P., et al. (2013). "[Characteristics and prevention among patients with stroke: a study of 36,844 patients hospitalized in France]." Rev Neurol.(Paris) **169**(2): 126-135.

INTRODUCTION: This study evaluates comorbidities, primary and secondary drug prevention and two years survival among patients hospitalized for stroke during the first half of 2008. METHODS: First hospitalization with stroke diagnosis was identified by using the national hospital discharge database and linked to the reimbursement database of the beneficiaries covered by the general health insurance scheme (74% of the 64 million population). A medication was considered to be used when there were more than two reimbursements over the 6 months following or preceding hospitalization. RESULTS: Among the 36,844 patients with stroke, 31.6% had a main diagnosis of transient ischemic attack (TIA), 53.6% a cerebral infarct (CI) and 14.8% a cerebral hemorrhage (CH). For the 8429 patients aged less than 60 years, high frequency of low-income and full health insurance coverage (11% of the covered population) was found for CI (17.6%) and CH (24.6%). Specific refund for invalidating stroke before hospitalization was found for 16% of patients with CI and 10.5% of those with CH. During the two previous years, around 7% of all patients were hospitalized for stroke, 30% for arterial hypertension, 13% for cardiac electric disorders, 10% for coronary disease and 12% for diabetes. Death rates one month after hospitalization were 11.3% for CI and 33.8% for CH, and two years after 22.5% for CI, 43% for CH and 7.7% for TIA. At least one antihypertensive drug treatment was found for 55.2% of patients with a TIA before hospitalization and 62.9% after and respectively 59.4% and 65.8% for CI and 51.1% and 57.7% for CH. Before hospitalization, beta-blocker was the most frequent antihypertensive class (21 to 25.6% according to stroke type). After hospitalization, frequency increased for angiotensin-converting enzyme inhibitors among CI patients (31% vs. 18.7%) and calcium-channel blockers among CH patients (27.1% vs. 13.7%). Antiplatelet drugs were used by 58% of the patients with CI after hospitalization (27.8% before). An anticoagulant drug was present for 74.8% of patients with CI, 69.5% for TIA and 19.2% for CH. Among patients with ischemic stroke, half of them had a lipid-lowering drug after hospitalization. A combination of antihypertensive, anticoagulant and lipid lowering drugs was found for 32.9% of patients with a TIA, 39.9% for CI and 7.6% for CH after hospitalization. CONCLUSION: These patients presented frequently a history of stroke and comorbidities and their level of secondary prevention must be improved

De Peretti C., Grimaud, O., Tuppin, P., et al. (2012). "Prévalence des accidents vasculaires cérébraux et de leurs séquelles et impact sur les activités de la vie quotidienne : apports des enquêtes déclaratives Handicap - santé, - ménages et Handicap - santé, - institution, 2008-2009." Bulletin Epidémiologique Hebdomadaire(1).
https://www.santepubliquefrance.fr/maladies-et-traumatismes/maladies-cardiovasculaires-et-accident-vasculaire-cerebral/accident-vasculaire-cerebral/documents/article/prevalence-des-accidents-vasculaires-cerebraux-et-de-leurs-sequelles-et-impact-sur-les-activites-de-la-vie-quotidienne-apports-des-enquetes-decla

Les objectifs de cette étude étaient d'estimer la prévalence des accidents vasculaires cérébraux (AVC) et de leurs séquelles dans la population française résidant en ménage ordinaire ou en institution, et de décrire les limitations de déplacement et les difficultés pour les activités de la vie quotidienne (ADL) des personnes avec séquelles d'AVC. prévalence des séquelles d'AVC dans la population française a été estimée à 0,8%. L'impact sur les ADL est fréquent : il concerne près de la moitié des personnes avec séquelles, cette proportion s'élevant à 9 sur 10 pour celles qui étaient en institution. (R.A.)

De Peretti C ,Woimant, F., Schniztler, A., et al. (2012). "Personnes hospitalisées pour accident vasculaire cérébral en France. Tendances 2002-2008." Bulletin Epidémiologique Hebdomadaire (10-11).

https://www.santepubliquefrance.fr/content/download/181810/2305054

Cette étude examine les évolutions des taux de personnes hospitalisées pour accident vasculaire cérébral (AVC) entre 2002 et 2008.

Haute Autorité de santé (2012). Accident vasculaire cérébral : méthodes de rééducation de la fonction motrice chez l'adulte. Recommandations professionnelles. Saint Denis HAS http://www.has-sante.fr/portail/upload/docs/application/pdf/2012-11/11irp01_synt_avc_methodes_de_reeducation.pdf

La Haute Autorité de Santé (HAS) a élaboré une recommandation de bonne pratique sur les méthodes de rééducation de la fonction motrice chez l'adulte destinée à l'ensemble des professionnels de santé concernés par la prise en charge des personnes qui ont fait un accident vasculaire cérébral (AVC). Cette recommandation s'inscrit dans le cadre du Plan National "Accidents Vasculaires Cérébraux 2010-2014" élaboré par le Ministère de la santé et des sports. L'accident vasculaire cérébral est la 3e cause de décès en France, il est la 1e cause de handicap acquis chez l'adulte. La prise en charge post-AVC - rééducation, réadaptation, réinsertion - a bénéficié ces dernières années de nombreuses évolutions nécessitant l'élaboration de recommandations de bonnes pratiques pour une prise en charge adaptée de l'ensemble des patients. Dans ce contexte, la HAS a d'une part identifié les méthodes et les modalités de rééducation de la fonction motrice susceptibles d'être réalisées chez l'adulte après un AVC. Elle a d'autre part élaboré des recommandations relatives à l'indication et à l'application de ces méthodes lors des phases aiguë (avant le 14e jour post-AVC), subaiguë (entre le 14e jour et 6 mois post-AVC), et chronique (après 6 mois post-AVC). Commencer la rééducation le plus tôt possible et ne pas se limiter à une seule approche.

Aboa-Eboulé, C., Béjot, Y., Osseby, G. V., et al. (2011). "Influence of prior transient ischaemic attack on stroke prognosis." J Neurol Neurosurg Psychiatry **82**(9): 993-1000.

BACKGROUND: To evaluate potential neuroprotection afforded by prior transient ischaemic attack (TIA) on functional and survival outcomes after ischaemic stroke. METHODS: All cases of first-ever ischaemic strokes, diagnosed between 1985 and 2008, were identified from the Dijon Stroke Registry. Patients were analysed in three groups according to the time interval between prior TIA and stroke (<4 weeks, ≥ 4 weeks, no TIA) or the duration of TIA (≤ 30 min, >30 min, no TIA). Outcomes were severe functional handicap (unable to walk, bedridden or death) at hospital discharge or at outpatient consultation, and 1-month and 1-year any-cause mortality. Stratified analyses were performed by stroke subtypes (non-lacunar, lacunar). Generalised linear mixed models and Cox proportional hazard models with a sandwich covariance matrix accounting for the treatment centre as a random effect were used for multivariate analyses. RESULTS: Among the 3015 patients with first-ever ischaemic stroke, 389 had had a prestroke TIA <4 weeks and 97 a prestroke TIA ≥ 4 weeks. Patients with TIAs had better ambulatory status (adjusted OR 0.61, 95% CI 0.45 to 0.81; p = 0.008) and better survival at 1 month (adjusted HR 0.76, 95% CI 0.65 to 0.89; p = 0.0006) and at 1 year (adjusted HR 0.72, 95% CI 0.67 to 0.76; p<0.0001) than those with no TIAs. Prestroke TIA <4 weeks and TIA duration ≤ 30 min also significantly improved the outcomes in overall, non-lacunar and lacunar strokes. CONCLUSIONS: Recent prestroke TIA was associated with better functional outcome and lower 1-month and 1-year mortality after stroke, suggesting a neuroprotective effect.

Grimaud, O., Bejot, Y., Heritage, Z., et al. (2011). "Incidence of stroke and socioeconomic neighborhood characteristics: an ecological analysis of Dijon stroke registry." Stroke **42**. http://dx.doi.org/10.1161/STROKEAHA.110.596429

Béjot, Y., Rouaud, O., Jacquin, A., et al. (2010). "Stroke in the very old: incidence, risk factors, clinical features, outcomes and access to resources--a 22-year population-based study." Cerebrovasc Dis **29**(2): 111-121.

BACKGROUND: For several years, the burden of stroke in very old patients has been increasing in western countries. Nevertheless, we have little information about this new challenge in individuals >or=80. METHODS: We ascertained all first-ever strokes in the population of Dijon, France (150,000 inhabitants), from 1985 to 2006. The incidence of stroke, risk factors, clinical presentation, resource mobilization and 1-month outcome were evaluated in individuals >or=80 and compared to the data obtained in younger patients. RESULTS: We collected 1,410 first-ever strokes in people >or=80 years (39%) versus 2,130 in those <80 years. The incidence was 997/100,000, and 68/100,000, respectively. Over the 22 years, the incidence of stroke in individuals >or=80 years rose significantly. A lower prevalence of diabetes, hypercholesterolemia and alcohol intake, as well as a higher prevalence of hypertension, atrial fibrillation, previous myocardial infarction and use of prestroke antiplatelet agents were noted in patients >or=80 years. The clinical presentation was severer and the 1-month outcome in terms of case fatality and handicap was worse, despite improvements observed over time. Finally, in patients >or=80 years, the use of CT scan, MRI, cervical Doppler, angiography and carotid surgery were significantly lower than for younger patients. Length of stay >30 days was more frequent, and discharge to prestroke residence was less common. However, all these improved between the first and the last study periods. CONCLUSIONS: Our findings have important implications not only for clinical management but also for initiating preventive strategies and health policy.

Chausson, N., Olindo, S., Cabre, P., et al. (2010). "Five-year outcome of a stroke cohort in Martinique, French West Indies: Etude Réalisée en Martinique et centrée sur l'incidence des accidents vasculaires cérébraux, Part 2." Stroke **41**(4): 594-599.

Ministère chargé de la santé. l. (2010). Plan d'actions national « accidents vasculaires cérébraux 2010-2014 ». Paris : Ministère chargé de la santé.
https://www.cnsa.fr/documentation/plan_actions_avc_-_17avr2010.pdf

Le « plan AVC » comprend trois volets : un document stratégique « Stratégie AVC 2010-2014 » dont les éléments de contexte sont fournis par l'état des lieux du rapport sur la prévention et la prise en charge des accidents vasculaires cérébraux en France, remis en octobre 2009 à la ministre de la santé et des sports ; il présente les objectifs stratégiques du plan, qu'ils soient généraux (partagés notamment avec d'autres plans) ou spécifiques à ce plan ; 2. un programme d'actions opérationnelles « Programme d'actions nationales et régionales », dont les actions relèvent soit de l'échelon national (Etat, agences, institutions nationales), soit des agences régionales de santé. Ces actions, au nombre de dix-sept (dont onze comprennent 31 sous actions), sont véritablement concrètes ; 3. une « boîte à outils » comprenant des éléments de méthodes pour les acteurs (réglementation le cas échéant, référentiels de bonne pratique, guides, etc.), éléments qui existent ou dont la création peut être le résultat d'une action spécifique du plan. Les dispositions de gouvernance, de suivi et d'évaluation du plan y sont incluses. A noter que les indicateurs (de suivi ou d'évaluation) peuvent être différents selon le niveau, leurs destinataires et l'utilisation attendue de leurs résultats.

A l'étranger

Stroke Alliance for Europe. (2020). At what cost. The economic impact of stroke in Europe. Bruxelles SAFE
https://www.safestroke.eu/wp-content/uploads/2020/10/03.-At_What_Cost_EIOS_Full_Report.pdf

Stroke Alliance for Europe. (2019). The Burden of Stroke in Europe Report. Bruxelles SAFE
https://strokeeurope.eu/media/download/

> Stroke is a brain attack, affecting 17 million people worldwide each year. It is the second most common cause of death and a leading cause of adult physical disability. The present study uses the most recent available data to describe stroke epidemiology, prevention and care across the EU. To frame the study and enable comparisons across countries and regions, SAFE required the inclusion of a number of indicators of stroke care quality. There are potentially many such indicators that could have been included; to keep the study manageable in the available time, a shortlist of 12 indicators was chosen to reference different parts of the stroke care "pathway", from prevention to long-term care and support. Information on these indicators and the epidemiology of stroke in each country was gathered through reviewing the scientific literature and by consulting with stroke researchers, clinicians and stroke support organisation representatives.

Amarenco, P. (2019). "Risque à 3 mois, 1 an et 5 ans des accidents ischémiques transitoires et infarctus cérébraux mineurs dans une cohorte contemporaine, multicentrique, multinationale, multicontinentale de 4879 patients." Bulletin de l'Académie Nationale de Médecine **203**(5): 315-320.

> L'accident ischémique cérébral (ou rétinien) transitoire (AIT) et l'infarctus cérébral mineur (sans handicap) offrent l'opportunité d'éviter un nouvel AVC ischémique avec handicap si le patient est exploré aussi rapidement que possible pour détecter la cause et la traiter sans délai. Le risque est très élevé dans les 90 premiers jours, notamment dans les 10–20 premiers jours, puis a tendance à beaucoup diminuer, donnant l'impression d'un risque faible à long-terme. Ce risque à long-terme a été, cependant, peu étudié. Le registre TIAregistry.org avait pour objectif de déterminer le risque à court et long-terme de patients avec AIT ou infarctus cérébral mineur. Les patients ont été inclus consécutivement dans 61 unités neurovasculaires organisées pour la prise en charge des AIT en urgence, dans 21 pays en Europe, Moyen-Orient, Asie et Amérique Latine, aussitôt que possible et jusqu'à 7 jours après l'épisode qualifiant, et suivis 5 ans. Le critère de jugement primaire était la survenue d'un AVC, infarctus du myocarde ou mort vasculaire. Au total, 4739 patients ont été inclus dont 80 % dans les 24 heures suivant les premiers symptômes, dont 3847 ont été suivis 5 ans. En dépit d'une prise en charge thérapeutique optimale tout au long du suivi, le risque de récidive à 3 mois, 1 an, et 5 ans était de 4 %, 6,2 % [IC à 95 %, 5,5–7,0 %], et 12,9 % [IC à 95 %, 11,8–14,1 %], respectivement. La moitié de ce risque était observé la première année post-AIT/infarctus cérébral mineur, et la moitié entre 1 an et 5 ans. À 5 ans, le risque de décès toutes causes, de décès cardiovasculaire, d'hémorragie majeure et d'hémorragie intracrânienne étaient respectivement de 10,6 %, 2,7 %, 1,5 %, et 1,1 %. Le risque de récidive d'AVC fatal ou non était de 9,5 %. Le risque à 5 ans d'AVC avec handicap (mRS > 1) était de 7,9 % [IC à 95 %, 7,1–8,9 %]. En conclusion, le risque vasculaire après un AIT ou un infarctus cérébral mineur est de 6,5 % à un an et de 13 % à 5 ans, et ce risque est maximal durant les premiers jours, puis s'accroît de façon continue jusqu'à 5 ans, et 60 % de ce risque concerne des AVC avec handicap significatif. De nouvelles mesures de prévention sont nécessaires pour diminuer ce risque.

Griffith, L. E., Gruneir, A., Fisher, K., et al. (2019). "Insights on multimorbidity and associated health service use and costs from three population-based studies of older adults in Ontario with diabetes, dementia and stroke." Bmc Health Services Research **19**(1): 313-313.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6524233/

> Most studies that examine comorbidity and its impact on health service utilization focus on a single index-condition and are published in disease-specific journals, which limit opportunities to identify patterns across conditions/disciplines. These comparisons are further complicated by the impact of using different study designs, multimorbidity definitions and data sources. The aim of this paper is to share insights on multimorbidity and associated health services use and costs by reflecting on the common patterns across 3 parallel studies in distinct disease cohorts (diabetes, dementia, and stroke) that used the same study design and were conducted in the same health jurisdiction over the same time period.

Luengo-Fernandez, R., Violato, M., Candio, P., et al. (2019). "Economic burden of stroke across Europe: A population-based cost analysis." European Stroke Journal: 2396987319883160.
https://doi.org/10.1177/2396987319883160

> In 2017, 1.5 million people were diagnosed with stroke, 9 million were living with stroke and 0.4 million died because of stroke in 32 European countries. We estimate the economic burden of stroke across these countries in 2017. In a population-based cost analysis, we evaluated the cost of stroke. We estimated overall health and social care costs from expenditure on care in the primary, outpatient, emergency, inpatient and nursing/residential care settings, and pharmaceuticals. Additionally, we estimated the costs of unpaid care provided by relatives or friends of patients, lost earnings due to premature death and costs associated with individuals who temporarily or permanently left employment because of illness. In 2017 stroke cost the 32 European countries under analysis €60 billion, with health care accounting for €27 billion (45%), representing 1.7% of health expenditure. Adding the costs of social care (€5 billion), annual stroke-related care costs were equivalent to €59 per citizen, varying from €11 in Bulgaria to €140 in Finland. Productivity losses cost €12 billion, equally split between early death and lost working days. A total of €1.3 billion hours of informal care were provided to stroke survivors, costing Europe €16 billion. Our study provides a snapshot of the economic consequences posed by stroke to 32 European countries in 2017. It also strengthens and updates the evidence we have gathered over the last 15 years, indicating that the costs of stroke are rising, partly due to an ageing population.

Amarenco, P., Lavallee, P. C., Monteiro Tavares, L., et al. (2018). "Five-Year Risk of Stroke after TIA or Minor Ischemic Stroke." N Engl J Med. **378**(23):2182-2190
https://www.ncbi.nlm.nih.gov/pubmed/29766771

> After a transient ischemic attack (TIA) or minor stroke, the long-term risk of stroke and other vascular events is not well known. In this follow-up to a report on 1-year outcomes from a registry of TIA clinics in 21 countries that enrolled 4789 patients with a TIA or minor ischemic stroke from 2009 through 2011, we examined the 5-year risk of stroke and vascular events.

TGLRS. Collaborators, (2018). "Global, Regional, and Country-Specific Lifetime Risks of Stroke, 1990 and 2016." New England Journal of Medicine **379**(25): 2429-2437.
https://www.nejm.org/doi/full/10.1056/NEJMoa1804492

Amarenco, P., Lavallee, P. C., Labreuche, J., et al. (2016). "One-Year Risk of Stroke after Transient Ischemic Attack or Minor Stroke." N Engl J Med **374**(16): 1533-1542.

http://www.ncbi.nlm.nih.gov/pubmed/27096581

BACKGROUND: Previous studies conducted between 1997 and 2003 estimated that the risk of stroke or an acute coronary syndrome was 12 to 20% during the first 3 months after a transient ischemic attack (TIA) or minor stroke. The TIAregistry.org project was designed to describe the contemporary profile, etiologic factors, and outcomes in patients with a TIA or minor ischemic stroke who receive care in health systems that now offer urgent evaluation by stroke specialists. METHODS: We recruited patients who had had a TIA or minor stroke within the previous 7 days. Sites were selected if they had systems dedicated to urgent evaluation of patients with TIA. We estimated the 1-year risk of stroke and of the composite outcome of stroke, an acute coronary syndrome, or death from cardiovascular causes. We also examined the association of the ABCD(2) score for the risk of stroke (range, 0 [lowest risk] to 7 [highest risk]), findings on brain imaging, and cause of TIA or minor stroke with the risk of recurrent stroke over a period of 1 year. RESULTS: From 2009 through 2011, we enrolled 4789 patients at 61 sites in 21 countries. A total of 78.4% of the patients were evaluated by stroke specialists within 24 hours after symptom onset. A total of 33.4% of the patients had an acute brain infarction, 23.2% had at least one extracranial or intracranial stenosis of 50% or more, and 10.4% had atrial fibrillation. The Kaplan-Meier estimate of the 1-year event rate of the composite cardiovascular outcome was 6.2% (95% confidence interval, 5.5 to 7.0). Kaplan-Meier estimates of the stroke rate at days 2, 7, 30, 90, and 365 were 1.5%, 2.1%, 2.8%, 3.7%, and 5.1%, respectively. In multivariable analyses, multiple infarctions on brain imaging, large-artery atherosclerosis, and an ABCD(2) score of 6 or 7 were each associated with more than a doubling of the risk of stroke. CONCLUSIONS: We observed a lower risk of cardiovascular events after TIA than previously reported. The ABCD(2) score, findings on brain imaging, and status with respect to large-artery atherosclerosis helped stratify the risk of recurrent stroke within 1 year after a TIA or minor stroke. (Funded by Sanofi and Bristol-Myers Squibb.).

Cordonnier, C., Sprigg, N., Sandset, E. C., et al. (2017). "Stroke in women [mdash] from evidence to inequalities." Nat Rev Neurol **13**(9): 521-532.
http://dx.doi.org/10.1038/nrneurol.2017.95

Stroke is the second largest cause of disability-adjusted life-years lost worldwide. The prevalence of stroke in women is predicted to rise rapidly, owing to the increasing average age of the global female population. Vascular risk factors differ between women and men in terms of prevalence, and evidence increasingly supports the clinical importance of sex differences in stroke. The influence of some risk factors for stroke [mdash] including diabetes mellitus and atrial fibrillation [mdash] are stronger in women, and hypertensive disorders of pregnancy also affect the risk of stroke decades after pregnancy. However, in an era of evidence-based medicine, women are notably under-represented in clinical trials [mdash] despite governmental actions highlighting the need to include both men and women in clinical trials [mdash] resulting in a reduced generalizability of study results to women. The aim of this Review is to highlight new insights into specificities of stroke in women, to plan future research priorities, and to influence public health policies to decrease the worldwide burden of stroke in women.

Belleudi, V., Sciattella, P., Agabiti, N., et al. (2016). "Socioeconomic differences in one-year survival after ischemic stroke: the effect of acute and post-acute care-pathways in a cohort study." BMC Public Health **16**: 408.

BACKGROUND: The reasons for socioeconomic inequity in stroke mortality are not well understood. The aim of this study was to explore the role of ischemic stroke care-pathways on the association between education level and one-year survival after hospital admission. METHODS: Hospitalizations for ischemic stroke during 2011/12 were selected from Lazio health data. Patients' clinical history was defined by retrieving previous hospitalizations and drugs prescriptions. The association between education level and mortality after stroke was studied for acute and post-acute phases using multilevel logistic models (Odds Ratio (OR)). Different scenarios of quality care-pathways were identified considering hospital performance, access to rehabilitation and drug treatment post-discharge. The probability to survive to acute and post-acute phases according to education level and care-pathway scenarios was estimated for a "mean-severity" patient. One-year survival probability was calculated as the product of two probabilities. For each scenario, the 1-year survival probability ratio, university versus elementary education, and its Bootstrap Confidence Intervals (95 % BCI) were calculated. RESULTS: We identified 9,958 patients with ischemic stroke, 53.3 % with elementary education level and 3.2 % with university. The mortality was 14.9 % in acute phase and 14.3 % in post-acute phase among survived to the acute phase. The adjusted mortality in acute and post-acute phases decreased with an increase in educational level (OR = 0.90 p-trend < 0.001; OR = 0.85 p-trend < 0.001). For the best care-pathway, the one-year survival probability ratio was 1.06 (95 % BCI = 1.03-1.10), while it was 1.17 (95 % BCI = 1.09-1.25) for the worst. CONCLUSIONS: Education level was inversely associated with mortality both in acute and post-acute phases. The care-pathway reduces but does not eliminate 1-year survival inequity.

Buisman, L. R., Rijnsburger, A. J., den Hertog, H. M., et al. (2016). "Clinical Practice Variation Needs to be Considered in Cost-Effectiveness Analyses: A Case Study of Patients with a Recent Transient Ischemic Attack or Minor Ischemic Stroke." Appl Health Econ Health Policy **14**(1): 67-75.

BACKGROUND AND OBJECTIVE: The cost-effectiveness of clinical interventions is often assessed using current care as the comparator, with national guidelines as a proxy. However, this comparison is inadequate when clinical practice differs from guidelines, or when clinical practice differs between hospitals. We examined the degree of variation in the way patients with a recent transient ischemic attack (TIA) or minor ischemic stroke are assessed and used the results to illustrate the importance of investigating possible clinical practice variation, and the need to perform hospital-level cost-effectiveness analyses (CEAs) when variation exists. METHODS: Semi-structured interviews were conducted with 16 vascular neurologists in hospitals throughout the Netherlands. Questions were asked about the use of initial and confirmatory diagnostic imaging tests to assess carotid stenosis in patients with a recent TIA or minor ischemic stroke, criteria to perform confirmatory tests, and criteria for treatment. We also performed hospital-level CEAs to illustrate the consequences of the observed diagnostic strategies in which the diagnostic test costs, sensitivity and specified were varied according to the local hospital conditions. RESULTS: 56 % (9/16) of the emergency units and 63 % (10/16) of the outpatient clinics use the initial and confirmatory diagnostic tests to assess carotid stenosis in accordance with the national guidelines. Of the hospitals studied, only one uses the recommended criteria for use of a confirmatory test, 38 % (6/16) follow the guidelines for treatment. The most cost-effective diagnostic test strategy differs between hospitals. CONCLUSIONS: If important practice variation exists, hospital-level CEAs should be performed. These CEAs should include an assessment of the feasibility and costs of switching to a different strategy.

Healey, J. S., Oldgren, J., Ezekowitz, M., et al. (2016). "Occurrence of death and stroke in patients in 47 countries 1 year after presenting with atrial fibrillation: a cohort study." The Lancet **388**(10050): 1161-1169.
http://dx.doi.org/10.1016/S0140-6736(16)30968-0

Atrial fibrillation is an important cause of morbidity and mortality worldwide, but scant data are available for long-term outcomes in individuals outside North America or Europe, especially in primary care settings.

Hellsten, E., Chu, S., Crump, R. T., et al. (2016). "New pricing approaches for bundled payments: Leveraging clinical standards and regional variations to target avoidable utilization." Health Policy **120**(3): 316-326.

OBJECTIVES: Develop pricing models for bundled payments that draw inputs from clinician-defined best practice standards and benchmarks set from regional variations in utilization. DATA: Health care utilization and claims data for a cohort of incident Ontario ischemic and hemorrhagic stroke episodes. Episodes of care are created by linking incident stroke hospitalizations with subsequent health service utilization across multiple datasets. STUDY DESIGN: Costs are estimated for episodes of care and constituent service components using setting-specific case mix methodologies and provincial fee schedules. Costs are estimated for five areas of potentially avoidable utilization, derived from best practice standards set by an expert panel of stroke clinicians. Alternative approaches for setting normative prices for stroke episodes are developed using measures of potentially avoidable utilization and benchmarks established by the best performing regions. PRINCIPAL FINDINGS: There are wide regional variations in the utilization of different health services within episodes of stroke care. Reconciling the best practice standards with regional utilization identifies significant amounts of potentially avoidable utilization. Normative pricing models for stroke episodes result in increasingly aggressive redistributions of funding. CONCLUSIONS: Bundled payment pilots to date have been based on the costs of historical service patterns, which effectively 'bake in' unwarranted and inefficient variations in utilization. This study demonstrates the feasibility of novel clinically informed episode pricing approaches that leverage these variations to target reductions in potentially avoidable utilization.

Bystrov, V., Staszewska-Bystrova, A., Rutkowski, D., et al. (2015). "Effects of DRG-based hospital payment in Poland on treatment of patients with stroke." Health Policy **119**(8): 1119-1125.

A prospective payment system based on Diagnosis Related Groups (DRGs) presents strong financial incentives to healthcare providers. These incentives may have intended as well as unintended consequences for the healthcare system. In this paper we use administrative data on stroke admissions to Polish hospitals in order to demonstrate the response of hospitals to the incentives embedded in the design of stroke-related groups in Poland. The design was intended to motivate hospitals for the development of specialized stroke units by paying significantly higher tariffs for treatment of patients in these units. As a result, an extensive network of stroke units has emerged. However, as it is shown in the paper, there is no evidence that outcomes in hospitals with stroke units are significantly different from outcomes in hospitals without stroke units. It is also demonstrated that the reliance on the length of stay as a major grouping variable provides incentives for regrouping patients into more expensive groups by extending their length of stay in stroke units. The results of the study are limited by the incompleteness of the casemix data. There is a need to develop information and audit systems which would further inform a revision of the DRG system aimed to reduce the risk of regrouping and up-coding.

Douw, K., Nielsen, C. P. et Pedersen, C. R. (2015). "Centralising acute stroke care and moving care to the community in a Danish health region: Challenges in implementing a stroke care reform." Health Policy **119**(8): 1005-1010.

> In May 2012, one of Denmark's five health care regions mandated a reform of stroke care. The purpose of the reform was to save costs, while at the same time improving quality of care. It included (1) centralisation of acute stroke treatment at specialised hospitals, (2) a reduced length of hospital stay, and (3) a shift from inpatient rehabilitation programmes to community-based rehabilitation programmes. Patients would benefit from a more integrated care pathway between hospital and municipality, being supported by early discharge teams at hospitals. A formal policy tool, consisting of a health care agreement between the region and municipalities, was used to implement the changes. The implementation was carried out in a top-down manner by a committee, in which the hospital sector - organised by regions - was better represented than the primary care sector-organised by municipalities. The idea of centralisation of acute care was supported by all stakeholders, but municipalities opposed the hospital-based early discharge teams as they perceived this to be interfering with their core tasks. Municipalities would have liked more influence on the design of the reform. Preliminary data suggest good quality of acute care. Cost savings have been achieved in the region by means of closure of beds and a reduction of hospital length of stay. The realisation of the objective of achieving integrated rehabilitation care between hospitals and municipalities has been less successful. It is likely that greater involvement of municipalities in the design phase and better representation of health care professionals in all phases would have led to more successful implementation of the reform.

Feigin, V. L., Krishnamurthi, R. V., Parmar, P., et al. (2015). "Update on the Global Burden of Ischemic and Hemorrhagic Stroke in 1990–2013: The GBD 2013 Study." Neuroepidemiology. **45**.
http://dx.doi.org/10.1159/000441085

Feigin, V. L., Mensah, G. A., Norrving, B., et al. (2015). "Atlas of the Global Burden of Stroke (1990–2013): the GBD 2013 Study." Neuroepidemiology **45**.
http://dx.doi.org/10.1159/000441106

Krishnamurthi, R. V., Moran, A. E., Feigin, V. L., et al. (2015). "Stroke prevalence, mortality and disability-adjusted life years in adults aged 20–64 years in 1990–2013: data from the global burden of disease 2013 study." Neuroepidemiology **45**.
http://dx.doi.org/10.1159/000441098

Penaloza-Ramos, M. C., Sheppard, J. P., Jowett, S., et al. (2014). "Cost-effectiveness of optimizing acute stroke care services for thrombolysis." Stroke **45**(2): 553-562.

> Thrombolysis in acute stroke is effective up to 4.5 hours after symptom onset but relies on early recognition, prompt arrival in hospital, and timely brain scanning. This study aimed to establish the cost-effectiveness of increasing thrombolysis rates through a series of hypothetical change strategies designed to optimize the acute care pathway for stroke.

Poisson, S. N., Glidden, D., Johnston, S. C., et al. (2014). "Deaths from stroke in US young adults, 1989–2009." Neurology **83**.
http://dx.doi.org/10.1212/WNL.0000000000001042

Wang, H., Liddell, C. A., Coates, M. M., et al. (2014). "Global, regional, and national levels of neonatal, infant, and under-5 mortality during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013." Lancet **384**.
http://dx.doi.org/10.1016/S0140-6736(14)60497-9

Norrving, B. et Kissela, B. (2013). "The global burden of stroke and need for a continuum of care." Neurology **80**(3 Suppl 2): S5-12.

Until 4 decades ago, the rates of stroke in low- and middle-income countries were considerably lower than those in more economically robust countries. In the intervening years, however, the rates of stroke in places such as southern India and rural South Africa have approximately doubled, whereas stroke rates in more economically developed nations have decreased. What is far more striking is that rates of disability and mortality arising from stroke are at least 10 times greater in medically underserved regions of the world compared with the most developed nations. The causes of these disparities are clear: above all, there is a lack of primary care treatment to screen patients for stroke risk and to mitigate risk factors. In addition, the lack of access to common drugs and basic medical equipment, as well as the lack of poststroke follow-up programs, rehabilitation, and secondary stroke prevention, means that individuals who would, in countries with better medical care, likely recover from stroke, instead have high rates of death and disability. Several global organizations, most notably the World Health Organization, have formulated and begun to implement public health programs to address these underserved regions. Their success depends on the support and expansion of these efforts so that short-term response to stroke, long-term stroke prevention and care, and screening and treatment of poststroke disabilities can be improved in underserved regions and the human and economic burden on these populations can be minimized

Cavalieri, M., Gitto, L. et Guccio, C. (2013). "Reimbursement systems and quality of hospital care: An empirical analysis for Italy." Health Policy (Amsterdam, Netherlands) **111**(3): 273-289.
http://linkinghub.elsevier.com/retrieve/pii/S0168851013001516?showall=true

There is an ongoing debate about the effect of different reimbursement systems on hospital performance and quality of care. The present paper aims at contributing to this literature by analysing the impact of different hospital payment schemes on patients' outcomes in Italy. The Italian National Health Service is, indeed, a particularly interesting case since it has been subject to a considerable decentralization process with wider responsibilities devolved to regional governments. Therefore, great variability exists in the way tariffs are used, as Regions have settled them in accordance with the characteristics of health care providers. An empirical analysis of the Italian hospital system is carried out using data from the National Program for Outcome Assessment on mortality and readmissions for Acute Myocardial Infarction (AMI), Congestive Heart Failure (CHF), stroke and Chronic Obstructive Pulmonary Diseases (COPD) in the years 2009-2010. The results show that hospitals operating in Regions where prospective payments are used more extensively are generally associated with better quality of care.

Tsugawa, Y., Kumamaru, H., Yasunaga, H., et al. (2013). "The Association of Hospital Volume With Mortality and Costs of Care for Stroke in Japan." Medical Care 51(9)
http://journals.lww.com/lww-medicalcare/Fulltext/2013/09000/The_Association_of_Hospital_Volume_With_Mortality.5.aspx

The association between hospital volume and patient outcomes remains unclear for stroke. Little is known about whether these relationships differ by stroke subtypes. This study examines the association of hospital volume with in-hospital mortality and costs of care for stroke. significant across all stroke subtypes. Highest volume hospitals had higher costs than lowest volume hospitals for subarachnoid hemorrhage, but this association was nonsignificant for ischemic and hemorrhagic stroke.

Buchow, H., Cayotte, E. et Agafitei, L. (2012). "Circulatory diseases - Main causes of death for persons aged 65 and more in Europe" Statistics in Focus : Population and Social Conditions(7/2012). https://ec.europa.eu/eurostat/web/products-statistics-in-focus/-/ks-sf-12-007

Wright, F. L., Green, J., Canoy, D., et al. (2012). "Vascular disease in women: comparison of diagnoses in hospital episode statistics and general practice records in England." BMC Med Res Methodol **12**. http://dx.doi.org/10.1186/1471-2288-12-161

Heijnen, R. W., Evers, S. M., van der Weijden, T. D., et al. (2010). "The cost effectiveness of an early transition from hospital to nursing home for stroke patients: design of a comparative study." BMC Public Health **10**: 279.

BACKGROUND: As the incidence of stroke has increased, its impact on society has increased accordingly, while it continues to have a major impact on the individual. New strategies to further improve the quality, efficiency and logistics of stroke services are necessary. Early discharge from hospital to a nursing home with an adequate rehabilitation programme could help to optimise integrated care for stroke patients.The objective is to describe the design of a non-randomised comparative study evaluating early admission to a nursing home, with multidisciplinary assessment, for stroke patients. The study is comprised of an effect evaluation, an economic evaluation and a process evaluation. METHODS/DESIGN: The design involves a non-randomised comparative trial for two groups. Participants are followed for 6 months from the time of stroke. The intervention consists of a redesigned care pathway for stroke patients. In this care pathway, patients are discharged from hospital to a nursing home within 5 days, in comparison with 12 days in the usual situation. In the nursing home a structured assessment takes place, aimed at planning adequate rehabilitation. People in the control group receive the usual care. The main outcome measures of the effect evaluation are quality of life and daily functioning. In addition, an economic evaluation will be performed from a societal perspective. A process evaluation will be carried out to evaluate the feasibility of the intervention as well as the experiences and opinions of patients and professionals. DISCUSSION: The results of this study will provide information about the cost effectiveness of the intervention and its effects on clinical outcomes and quality of life. Relevant strengths and weaknesses of the study are addressed in this article.

Les filières de soins

EN France

Gabet, A., Grave, C., Tuppin, P., et al. (2021). "Impact of the COVID-19 pandemic and a national lockdown on hospitalizations for stroke and related 30-day mortality in France: A nationwide observational study." Eur J Neurol **28**(10): 3279-3288.

BACKGROUND AND PURPOSE: The aim of this nationwide study was to assess the impact of the COVID-19 pandemic on stroke hospitalization rates, patient characteristics and 30-day case fatality rates. METHODS: All hospitalizations for stroke from January to June of each year from 2017 to 2020 were selected using International Classification of Diseases, 10th revision, codes I60 to I64 in the national hospital discharge database. Patient characteristics and management were described according to three time periods: pre-lockdown, lockdown, and post-lockdown. Weekly incidence rate ratios (IRRs) were computed to compare time trends in the rates of patients hospitalized for stroke as well as in-hospital and 30-day case fatality rates between the years 2017-2019 and 2020. RESULTS: In 2020, between weeks 1 and 24, 55,308 patients were hospitalized for stroke in France. IRRs decreased by up to 30% for all age groups, sex, and stroke types during the lockdown compared to the period 2017-2019. Patients hospitalized during the second and third weeks of the lockdown had higher in-hospital case fatality rates compared to 2017-2019. In-hospital case fatality rates increased by almost 60% in patients aged under 65 years. Out-of-hospital 30-day case fatality rates increased between weeks 11 and 15 among patients who returned home after their hospitalization. Important changes in care management were found, including fewer stroke patients admitted to resuscitation units, more admitted to stroke care units, and a shorter mean length of hospitalization. CONCLUSIONS: During the first weeks of the lockdown, rates of patients hospitalized for stroke fell by 30% and there were substantial increases of both in-hospital and out-of-hospital 30-day case fatality rates.

Montagnon, R., Rouffilange, L., Agard, G., et al. (2021). "Impact of the COVID-19 Pandemic on Emergency Department Use: Focus on Patients Requiring Urgent Revascularization." J Emerg Med **60**(2): 229-236.

BACKGROUND: The novel coronavirus (2019-nCOV) appeared in China and precipitously extended across the globe. As always, natural disasters or infectious disease outbreaks have the potential to cause emergency department (ED) volume changes. OBJECTIVE: We aimed to assess the influence of the Coronavirus Disease 2019 (COVID-19) pandemic on ED visits and the impact on the handling of patients requiring urgent revascularization. METHODS: We reviewed the charts of all patients presenting to the ED of Hospital Sainte Anne (Toulon, France) from March 23 to April 5, 2020 and compared them with those of the same period in 2019. Then we analyzed complementary data on acute coronary syndrome (ST-elevation myocardial infarction [STEMI] and non-ST-elevation myocardial infarction [NSTEMI]) and neurovascular emergencies (strokes and transient ischemic attacks). RESULTS: The total number of visits decreased by 47%. The number of people assessed as triage level 2 was 8% lower in 2020. There were five fewer cases of NSTEMI in 2020, but the same number of STEMI. The number of neurovascular emergencies increased (27 cases in 2019 compared with 30 in 2020). We observed a reduction in the delay between arrival at the ED and the beginning of coronary angiography for STEMI cases (27 min in 2019 and 22 min in 2020). In 2020, 7 more stroke patients were admitted. CONCLUSION: The COVID-19 pandemic probably dissuaded "non-critical" patients from coming to the hospital, whereas the same number of patients with a critical illness attended the ED as attended prior to the pandemic. There does not seem to have been any effect of the pandemic on patients requiring reperfusion therapy (STEMI and stroke).

Tuomikoski, A. M., Kääriäinen, M., Meriläinen, M., et al. (2021). "[Perspectives offered by advanced nursing practice with stroke victims in France in 2021]." J Clin Nurs **66**(852): 10-17.

30% more strokes are expected by 2030. To face this incoming huge public health challenge, large-scale projects for primary, secondary and tertiary prevention of neurovascular risk have

to be developed. French new advanced nursing practices will be most promising if they are based on the timeliness of pathology follow-up but also on leadership in training, research and innovation in the care pathway for stroke victims.

Benoit, C., Lopez, D., Loiseau, M., et al. (2020). "Impact of a Pre-Discharge Education Session on Stroke Knowledge: a Randomized Trial." J Stroke Cerebrovasc Dis **29**(12): 105272.

BACKGROUND AND PURPOSES: Stroke knowledge, awareness of risk factors and stroke warning symptoms is very poor among stroke survivors. We investigated whether a pre-discharge education intervention in the stroke unit could improve stroke knowledge in patients with TIA or minor stroke. METHODS: We performed a prospective single-center, randomized controlled trial (2013-2016) in patients with TIA or minor stroke. The intervention consisted in an interactive group session focused on stroke education, within the stroke unit before hospital discharge. Primary outcome was the 3-month change in stroke knowledge score (SKS) from randomization. Secondary outcomes were the 12-month change in SKS, the number of risk factors and warning signs named, control of risk factors and self-reported adherence. RESULTS: A total of 199 patients (mean [SD] age, 63.5 [12.4] years; 67 [33.7%] women) were randomized (99 in stroke education session). Intervention was associated with a greater improvement in SKS than in the control group (baseline-adjusted mean between-group difference, 1.6 point [95%CI, 1.4 to 1.9]; p=0.001). This difference was significantly maintained at 12 months. The number of risk factors and warning signs named were significantly increased in the intervention group at 3 months. Control of risk factors and self-reported adherence did not differ significantly between the two groups. CONCLUSIONS: An interactive education session in the stroke unit significantly improved stroke knowledge at 3 months and 12 months in patients with TIA or minor stroke.

De Peretti, C., Woimant, F. et Schnitzler, A. (2020). "Les hospitalisations en soins de suite et de réadaptation spécialisés pour les affections du système nerveux en 2017." Bulletin Epidémiologique Hebdomadaire (Beh)(27): 538-551.
http://beh.santepubliquefrance.fr/beh/2020/27/2020_27_3.html

Les objectifs de cette étude sont de décrire la patientèle du secteur des soins de suite et de réadaptation (SSR) spécialisé pour les affections du système nerveux en 2017: les principales pathologies prises en charge, les facteurs associés à la prise en charge dans ces SSR spécialisés, les disparités régionales, ainsi que les évolutions survenues entre 2013 et 2017.

Lahrach, M., Sevin, F., Domecq, S., et al. (2020). "Reconstruction des parcours de soins des patients victimes d'un accident vasculaire cérébral–Observatoire Aquitain des Accidents vasculaires cérébraux - ObA2." Revue D'Epidémiologie et de Santé Publique **68**(S1): S50-S51.
https://www.em-consulte.com/article/1352602/article/reconstruction-des-parcours-de-soins-des-patients-

L'Observatoire Aquitain des Accidents vasculaires cérébraux (AVC), collecte les données des prises en charge hospitalières en aigu des patients victimes d'un AVC en ex-Aquitaine. Ces prises en charge sont complexes et font intervenir plusieurs acteurs de différentes structures de soins : services d'urgences, de médecine, unités neuro-vasculaires (UNV)… Cependant, la diversité des parcours de soins reste peu connue. Cette étude a pour objectif de développer un programme informatique (RePECA) permettant de regrouper les séjours correspondant à la prise en charge d'un même AVC dans ObA2, afin de réaliser des analyses approfondies des parcours de soins, d'évaluer les pratiques et les organisations des soins.

Pop, R., Quenardelle, V., Hasiu, A., et al. (2020). "Impact of the COVID-19 outbreak on acute stroke pathways - insights from the Alsace region in France." Eur J Neurol **27**(9): 1783-1787.

To date, no study has attempted to quantify the impact of the COVID-19 outbreak on the incidence and treatment of acute stroke. METHODS: This was a retrospective review of acute stroke pathway parameters in all three stroke units in the Alsace region during the first month of the outbreak (1-31 March 2020), using the similar period from 2019 as a comparator. A secondary detailed analysis of all stroke alerts and stroke unit admissions was performed in the centre with the largest case volume. RESULTS: Compared to the same period in 2019, in March 2020 there were 39.6% fewer stroke alerts and 33.3% fewer acute revascularization treatments [40.9% less intravenous thrombolysis (IVT) and 27.6% less mechanical thrombectomy (MT)]. No marked variation was observed in the number of stroke unit admissions (-0.6%). The proportion of patients with acute revascularization treatments (IVT or MT) out of the total number of stroke unit admissions was significantly lower in March 2020 (21.3%) compared to 2019 (31.8%), P = 0.034. There were no significant differences in time delays or severity of clinical symptoms for patients treated by IVT or MT, nor in the distribution of final diagnosis amongst stroke alerts and stroke unit admissions. CONCLUSION: These results suggest that the overall incidence of stroke remained the same, but fewer patients presented within the therapeutic time window. Increased public awareness and corrective measures are needed to mitigate the deleterious effects of the COVID-19 outbreak on acute stroke care.

Supiot, A., Zory, R., Aegerter, P., et al. (2020). "[Prehospital management of acute stroke patients]." Trials **70**(6): 617-620.

Prehospital management of acute stroke patients. In France, prehospital management of patients with suspected acute stroke relies on emergency medical communication centers (Samu), which provides first-line telephone assessment and dispatches the most appropriate emergency vehicle. Such tasks are not straightforward because many clinical symptoms may correspond to stroke and alternative diagnoses - stroke mimics - are common. It is crucial to reduce both prehospital and hospital delays in patients eligible for reperfusion therapies, namely intravenous thrombolysis and/or mechanical thrombectomy. Because mechanical thrombectomy only applies to patients with acute ischemic stroke and large-vessel occlusion, prehospital triage is important. However, clinical prediction of large-vessel occlusion is difficult and whether a specific patient should be sent to the nearest primary stroke center (drip and ship paradigm) or a comprehensive stroke center with thrombectomy capability (mothership paradigm) remains uncertain. Prehospital notification of the hospital-based stroke teams by the emergency medical system crews is crucial in reducing delays to achieve reperfusion.

Wallut, L., Peyron, C., Hervieu-Bègue, M., et al. (2020). "Efficiency of telemedicine for acute stroke: a cost-effectiveness analysis from a French pilot study." Int J Technol Assess Health Care **36**(2): 126-132.

Telestroke is an effective way to improve care and health outcomes for stroke patients. This study evaluates the cost-effectiveness of a French telestroke network.

Broussy, S., Rouanet, F., Lesaine, E., et al. (2019). "Post-stroke pathway analysis and link with one year sequelae in a French cohort of stroke patients: the PAPASePA protocol study." BMC Health Serv Res **19**(1): 770.

Stroke is a health problem with serious consequences, both in terms of mortality, and after-effects affecting patient quality of life. Stroke requires both urgent and chronic management involving the entire health care system. Although large variability in the management of stroke patients have been noticed, knowledge of the diversity and the scalability of post-stroke pathways, whether it is the care pathway or the life pathway, is currently not sufficient. Moreover, the link between post-stroke pathways and patients sequelae have not been yet clearly defined. All this information would be useful to better target the needs to improve stroke patient management. The purposes are to identify the post-stroke life pathways components associated with sequelae (activity limitations - main purpose, cognitive disorders, anxio-depressive disorders, fatigue, participation restrictions) at 3 months and 1-year post-stroke, to define a typology of life pathways of patients during the post-stroke year and to analyze the social and geographical inequalities in the management of stroke.

Cnam (2019). Prado, pionnier du parcours de soins coordonné du patient, Paris : Cnamts https://www.ameli.fr/medecin/exercice-liberal/services-patients/prado#text_96472

Le service Prado de l'Assurance maladie n'a cessé de s'étendre depuis sa création en 2010, du retour à domicile post-maternité originel aux sorties d'hospitalisation post-chirurgie, en passant par l'accompagnement des pathologies chroniques. 2 expérimentations en cours devraient être généralisées pour la fin 2019 : un service Prado pour les patients hospitalisés suite à un accident vasculaire cérébral (AVC), et l'élargissement du service à des patients de 75 ans et plus, indépendamment du motif de leur hospitalisation. Prado proposera à ces patients non seulement d'initier l'organisation de leur parcours de soins mais aussi de les mettre en relation avec le service social de l'Assurance Maladie pour évaluer leur situation après leur retour à domicile. Retrouvez dans cet article les dernières statistiques 2018 du service (nombre de patients, professionnels impliqués)

Ohannessian, R., Dhote-Burger, P., Chauvin, F., et al. (2019). "Health policy for telestroke in France: A retrospective description from 2003 to 2016." Rev Neurol (Paris) **175**(6): 390-395.

Stroke is a public health priority in France. The use of telemedicine for stroke known as telestroke, is a safe and effective practice improving access to acute stroke care including thrombolysis. Telestroke is currently being implemented in France. The objective was to describe the public health policy supporting telestroke implementation in France.

Haute Autorité de santé (2019). Pertinence des parcours de rééducation/réadaptation après la phase initiale de l'AVC. Note de problématique. Saint-Denis Haute Autorité de Santé https://www.has-sante.fr/portail/jcms/c_2972905/fr/accident-vasculaire-cerebral-pertinence-des-parcours-de-reeducation/readaptation-apres-la-phase-initiale-de-l-avc

L'AVC est un facteur de risque majeur de dépendance, représentant la première cause de handicap non traumatique, la deuxième cause de démence. Les victimes d'AVC conservent dans 40 % des cas des séquelles de gravité diverse, dans 25 % des séquelles lourdes après un an. L'AVC est aussi une des causes d'entrée en établissement d'hébergement pour personnes âgées dépendantes (EHPAD). Alors que la prise en charge de l'AVC en phase aigüe a progressé depuis la mise en œuvre du Plan AVC (2010-2014), des améliorations restent nécessaires pour la prise en charge des handicaps post AVC en SSR comme en ville. L'accès aux soins de qualité reste en effet considéré comme insuffisant et inégal sur le territoire. Cette note de problématique présente un état des lieux de la littérature, ciblé sur les

modalités de prise en charge de rééducation/réadaptation des patients après la phase initiale de l'AVC

Mohd Nordin, N. A., Muhd Nur, A., Sulong, S., et al. (2019). "Post-stroke pathway analysis and link with one-year sequelae in a French cohort of stroke patients: the PAPASePA protocol study." BMC Geriatr **19**(1): 770.

BACKGROUND: Stroke is a health problem with serious consequences, both in terms of mortality, and after-effects affecting patient quality of life. Stroke requires both urgent and chronic management involving the entire health care system. Although large variability in the management of stroke patients have been noticed, knowledge of the diversity and the scalability of post-stroke pathways, whether it is the care pathway or the life pathway, is currently not sufficient. Moreover, the link between post-stroke pathways and patients sequelae have not been yet clearly defined. All this information would be useful to better target the needs to improve stroke patient management. The purposes are to identify the post-stroke life pathways components associated with sequelae (activity limitations - main purpose, cognitive disorders, anxio-depressive disorders, fatigue, participation restrictions) at 3 months and 1-year post-stroke, to define a typology of life pathways of patients during the post-stroke year and to analyze the social and geographical inequalities in the management of stroke.

Nestrigue, C., Bricard, D., Com-Ruelle, L., et al. (2019). "Influence des modalités de prises en charge de l'Accident vasculaire cérébral (AVC) sur la durée d'hospitalisation." Questions d'Economie de la Santé (Irdes)(242)
https://www.irdes.fr/recherche/questions-d-economie-de-la-sante/242-influence-des-modalites-de-prises-en-charge-de-l-accident-vasculaire-cerebral-avc-sur-la-duree-d-hospitalisation.pdf

Les parcours de soins des patients sont étudiés ici à travers l'articulation entre le premier épisode de prise en charge de l'Accident vasculaire cérébral (AVC) en établissement hospitalier de court séjour (Médecine, chirurgie, obstétrique-MCO) et la prise en charge d'aval par d'autres établissements de soins, structures médico-sociales ou en ville. Plus précisément, il s'agit d'observer la variabilité de la durée du primo-épisode hospitalier pour AVC en MCO. La nature de l'AVC et l'état de santé global des patients jouent un rôle déterminant, ainsi que la prise en charge médicale, notamment le passage en Unité neurovasculaire (UNV). Mais au-delà des critères de bonne pratique clinique, la disponibilité de l'offre de soins d'aval, en particulier les Soins de suite et de réadaptation (SSR), permet la réduction de cette durée tout en minimisant les pertes de chances de récupération des victimes d'AVC.

Nestrigue, C. Com-Ruelle, L. et Bricard, D. (2019). Analyse séquentielle et déterminants des parcours de soins en phase post-aiguë d'un Accident vasculaire cérébral (AVC). Document de travail Irdes ; 82. Paris Irdes
https://www.irdes.fr/recherche/documents-de-travail/082-analyse-sequentielle-et-determinants-des-parcours-de-soins-en-phase-post-aigue-d-un-accident-vasculaire-cere-bral-avc.pdf

La complexité des parcours de soins des victimes d'un primo-Accident vasculaire cérébral (AVC), au cours des trois mois suivant la sortie de la phase aiguë hospitalière, est analysée à partir des données médico-administratives du Système national des données de santé (SNDS). L'étude s'appuie sur une méthode originale de construction des parcours individuels par analyse séquentielle basée sur l'identification et la chronologie des lieux de prise en charge à l'hôpital ou en ville et, pour la ville, sur les types de professionnels de santé

intervenant. Les déterminants des parcours sont analysés en mesurant les effets propres de l'âge et du sexe, des caractéristiques cliniques, de la prise en charge médicale et de l'offre de soins locale. A la sortie de l'épisode aigu d'hospitalisation (en Médecine, chirurgie, obstétrique (MCO)), six patients sur dix ont un parcours comprenant une prise en charge majoritairement à domicile, un patient sur quatre bénéficiant d'actes de rééducation en ville. Seulement un patient sur 20 bénéficie d'une prise en charge en ville avec des actes infirmiers en plus des actes de rééducation. A l'inverse, un patient sur trois, à la sortie de l'épisode aigu d'hospitalisation après un AVC, présente ensuite un faible recours aux soins. Moins de trois patients sur dix empruntent des parcours majoritairement en établissements de Soins de suite et de réadaptation (SSR), le plus souvent pour des durées supérieures à deux mois. Les parcours où interviennent majoritairement les structures d'hébergement médico-sociales ne concernent qu'une minorité de patients (3 %). Enfin, 6 % des patients décèdent dans les trois mois suivant la sortie de l'hospitalisation en court séjour. Ces parcours de soins s'expliquent notamment par l'intensité des soins requis liée à des facteurs cliniques et démographiques (gravité de l'état de santé, âge, sexe). Cependant, les facteurs d'offre jouent aussi un rôle déterminant. La rééducation dans un SSR est plus fréquente quand la densité de lits de SSR est plus forte. Lors d'une prise en charge majoritairement à domicile, la rééducation semble initiée souvent tardivement suite au premier contact avec le médecin généraliste, alors qu'elle aurait dû répondre à une prescription hospitalière de sortie de MCO. En ville, la rééducation s'accompagne parfois d'interventions d'infirmiers, surtout quand l'offre libérale en soins infirmiers est importante. Nos travaux soulignent enfin l'importance des structures Unités neuro-vasculaires (UNV) dans la réduction de la mortalité. En effet, toutes choses égales par ailleurs, les patients pris en charge dans une structure UNV lors de leur hospitalisation initiale préalable en phase aiguë décèdent moins souvent au cours des trois mois suivants (résumé d'auteur).

Com-Ruelle, L., Nestrigue, C., Le Guen, N., et al. (2018). "Parcours de soins des personnes hospitalisées pour un accident vasculaire cérébral. Premiers résultats." Questions D'économie de la Sante (Irdes)(234)
http://www.irdes.fr/recherche/questions-d-economie-de-la-sante/234-parcours-de-soins-des-personnes-hospitalisees-pour-un-accident-vasculaire-cerebral.pdf

L'Accident vasculaire cérébral (AVC) se manifeste par la perte d'une ou plusieurs fonctions du cerveau liée à un arrêt soudain de la circulation du sang. C'est la première cause de décès chez les femmes et la troisième chez les hommes, et un grand pourvoyeur de handicap. Le Plan d'actions national AVC 2010-2014 avait pour but notamment d'améliorer le parcours de soins des patients, lors de la phase aiguë par l'accès facilité à l'imagerie diagnostique (IRM et scanner) et le développement d'unités hospitalières spécialisées, les Unités neurovasculaires (UNV), et ensuite lors de la phase de rééducation et réadaptation, afin d'éviter décès et pertes de chance de récupération des séquelles. Grâce à l'appariement des données du PMSI et celles de l'Assurance maladie entre 2010 et 2014, les caractéristiques des adultes victimes d'un AVC et leur prise en charge sont observées plus finement qu'auparavant. En 2012, sur les 134 000 patients de 18 ans ou plus hospitalisés pour primo-AVC, 99 000 ont fait un AVC constitué, avéré, soit le champ de cette étude. Les patients entrent en majorité à l'hôpital par les urgences, hommes et femmes sont également concernés si ce n'est que les premiers sont touchés plus précocement. La moitié des victimes d'AVC souffre par ailleurs d'une ou plusieurs maladies chroniques. Malgré leur développement entre 2010 et 2014, l'imagerie diagnostique paraît insuffisante et seul un patient sur trois est pris en charge en UNV. Un sur sept décède au cours de ce premier épisode aigu. Un tiers des survivants est admis ensuite en Service de soins de suite et de réadaptation (SSR), reconnu pour limiter les séquelles.

Enfin, les variations territoriales d'incidence et celles concernant ces différents modes de prise en charge demeurent importantes.

Lachkhem, Y., Rican, S. et Minvielle, E. (2018). "Understanding delays in acute stroke care: a systematic review of reviews." Eur J Public Health **28**(3): 426-433.

Stroke is the leading cause of adult long-term disability in Western countries. Intravenous thrombolytic therapy with recombinant tissue plasminogen activator is safe and effective within the first 4.5 h after the onset of stroke. Various factors delaying acute stroke care have been identified in the literature. This review aimed to provide an overview of factors delaying acute stroke care and attempted to show how they interact in a synthetic framework.

Le Heuzey, J. Y., Bassand, J. P., Berneau, J. B., et al. (2018). "Stroke prevention, 1-year clinical outcomes and healthcare resource utilization in patients with atrial fibrillation in France: Data from the GARFIELD-AF registry." Arch Cardiovasc Dis **111**(12): 749-757.

GARFIELD-AF is a non-interventional worldwide study of adults with atrial fibrillation. This study analyses the characteristics of the 1399 patients recruited in France from August 2010 to July 2015, their 1-year outcomes and healthcare resource utilization.

Medeiros de Bustos, E., Berthier, E., Chavot, D., et al. (2018). "Evaluation of a French Regional Telemedicine Network Dedicated to Neurological Emergencies: A 14-Year Study." Telemed J E Health **24**(2): 155-160.

BACKGROUND: Equality in healthcare between urban and rural areas is problematic in France. Telemedicine networks are expected to improve equality in expertise assessment. We aimed to evaluate the use and impact of a regional rural French telemedicine network, dedicated to medical and surgical neurological emergencies, on interhospital patient transfers.

Pruvo, J. P., Berge, J., Kuchcinski, G., et al. (2018). "Health Care Organization for the Management of Stroke: The French Perspective." Neuroimaging Clin N Am **28**(4): 691-698.

Stroke, a major burden to society, can now be treated in increasingly larger numbers of patients. Intravenous thrombolysis and mechanical thrombectomy are both now standard of care with class I, level of evidence A. Various local, regional, and national challenges are present, preventing equality in access to care for many patients. France is a developed country with a centralized national health care system accessible for all citizens. This article discusses current challenges in the implementation of the delivery of stroke care and some solutions that are being evaluated by the medical community.

Schnitzler, A., Erbault, M., Solomiac, A., et al. (2018). "Impact de la rééducation à la phase subaiguë d'un accident vasculaire cérébral en France en 2016." Bulletin Epidémiologique Hebdomadaire(29): 595-601
http://beh.santepubliquefrance.fr/beh/2018/29/2018_29_2.html

À la phase subaiguë d'un accident vasculaire cérébral (AVC), la prise en charge rééducative multidisciplinaire vise à récupérer ou compenser des limitations d'activité. Le but de cette étude était de déterminer si son intensité avait un effet sur l'amélioration fonctionnelle. Les patients hospitalisés en soin de suite et de réadaptation (SSR) pour AVC (codes CIM10 I60 à

I64, à l'exception d'I63.6) au cours des huit premiers mois de l'année 2016 ont été sélectionnés dans le PMSI-SSR. La durée quotidienne de rééducation et son impact fonctionnel ont été obtenus dans le PMSI-SSR. Trois analyses multivariées ont été réalisées pour analyser les facteurs liés à un meilleur pronostic (présentés sous la forme d'odds ratios -OR- avec intervalle de confiance -IC95. La population d'étude comptait 12 122 patients, d'âge médian 76 ans. La durée médiane (DM) du séjour était de 56 jours et la DM de rééducation par jour de 90 minutes. En analyse multivariée, une durée de rééducation entre 90 et 120 minutes par jour (contre moins de 30 minutes) conduisait à une probabilité plus grande de gain d'autonomie, de faible dépendance et de sortie à domicile à l'issue de l'hospitalisation (OR respectivement de 1,87 [1,56-2,22], 1,88 [1,51-2,33] et 2,02 [1,65-2,46]). Cette étude a monté le probable impact fonctionnel de l'intensité de la rééducation à la phase subaiguë d'un AVC. La portée de cette étude rétrospective reste limitée par le fait que les patients les plus enclins à progresser ont possiblement bénéficié d'une rééducation plus intense.

Gabet, A., Olie, V., Schnitzler, A., et al. (2017). "Évolution de l'admission en soins de suite et de réadaptation des patients hospitalisés pour accident vasculaire cérébral en France, 2010-2014." Bulletin Epidémiologique Hebdomadaire(11): 196-207.
http://beh.santepubliquefrance.fr/beh/2017/11/2017_11_1.html

Introduction : dans le contexte d'une structuration de la filière de prise en charge de l'accident vasculaire cérébral (AVC), encouragée par le plan d'action national AVC 2010-2014, notre travail avait pour but d'étudier l'évolution du taux d'admission en service de soins de suite et de réadaptation (SSR) parmi les patients victimes d'AVC sur la période 2010-2014, de décrire les facteurs associés à l'admission en SSR et les caractéristiques des patients pris en charge.

Schnitzler, A., Erbault, M., Solomiac, A., et al. (2018). "Impact du plan AVC sur la prise en charge des accidents vasculaires cérébraux ischémiques constitués : évolution 2011-2016 des indicateurs d'évaluation de la Haute Autorité de santé." Bull Epidemiol Hebd(5-6): 78-84.
http://beh.santepubliquefrance.fr/beh/2018/5/2018_5_2.html

Une large partie du plan national AVC 2010-2014 avait pour but d'améliorer la prise en charge aiguë des patients ayant une ischémie cérébrale (AIC). Dans le cadre de son suivi, quatre campagnes d'évaluation nationales ont été coordonnées par la Haute Autorité de santé. Méthode : les dossiers analysés ont été identifiés via le PMSI-MCO (Programme de médicalisation des systèmes d'information médecine, chirurgie, obstétrique) en 2011, 2012, 2014 et 2016, chaque structure éligible ayant un maximum de 80 dossiers à analyser (échantillon réalisé par tirage au sort aléatoire). Résultats : au total, 87 365 dossiers de patients AIC ont été analysés. Le délai médian (DM) entre l'apparition des symptômes et l'arrivée à l'hôpital est resté stable entre 2011 et 2016 (3h07mn en 2016 vs 3h03mn en 2011, p=0,013). Le DM arrivée à l'hôpital-réalisation de l'imagerie a significativement diminué (1h42mn en 2016 vs 1h54mn en 2011, p<0,001). Le taux de thrombolyse a significativement augmenté (8,6% en 2011 vs 14,3% en 2016, p<0,001). Conclusion : hormis pour le délai apparition des symptômes-arrivée à l'hôpital, cette étude met en avant une amélioration de la qualité de la prise en charge aiguë des patients AIC, cohérente et concomitante avec les restructurations organisées dans le cadre du plan national AVC.

Delpont, B., Blanc, C., Mariet, A. S., et al. (2017). "Efficacité des filières dédiées à l'Accident Vasculaire Cérébral. Moyens de mesure. Expérience en Bourgogne." Journal de Gestion et d'Economie Médicales **35**(1): 18-31.

[BDSP. Notice produite par ORSRA 8G9qR0x9. Diffusion soumise à autorisation]. L'objectif de cette revue est de rapporter les évaluations successives en pratique courante de la filière AVC mise en place en Bourgogne depuis 2003, les réponses apportées aux attentes des patients et des tutelles, et leur transposition aux autres régions sanitaires.

Lecoffre, C., de Peretti, C., Gabet, A., et al. (2017). "National Trends in Patients Hospitalized for Stroke and Stroke Mortality in France, 2008 to 2014." Stroke **48**(11): 2939-2945.

Lecoffre, C., Olie, V., Bejot, Y., et al. (2017). "L'accident vasculaire cérébral en France : patients hospitalisés pour AVC en 2014 et évolutions 2008-2014." Bulletin Epidémiologique Hebdomadaire(5): 84-94.
http://beh.santepubliquefrance.fr/beh/2017/5/2017_5_1.html

[BDSP. Notice produite par SANTE-PUBLIQUE-FRANCE tHq88R0x. Diffusion soumise à autorisation]. Introduction : en France, l'accident vasculaire cérébral (AVC) est la première cause de mortalité chez les femmes et la troisième chez les hommes. Les taux de patients hospitalisés pour AVC ont augmenté chez les moins de 65 ans entre 2002 et 2008. Après la mise en œuvre du plan d'actions national AVC (2010-2014), cette étude analyse les évolutions des taux de patients hospitalisés et de la prise en charge en unités neuro-vasculaires (UNV) depuis 2008.

Cassoudesalle, H., Nozères, A., Petit, H., et al. (2016). "Post-acute referral of stroke victims in a French urban area: Results of a specific program." Ann Phys Rehabil Med **59**(4): 248-254.

OBJECTIVE: The main objective of this study was to describe the distribution of referrals offered to patients assessed in the "Post-Acute Stroke program" of Bordeaux University Hospital (France). This program was developed in 2008 to organize the dispensation of care in rehabilitation units specialized in neurological diseases.

Cosker, K., Samson, S., Fagot-Campagna, A., et al. (2016). "First hospitalization for transient ischemic attack in France: Characteristics, treatments and 3-year outcomes." Rev Neurol (Paris) **172**(2): 152-159.

INTRODUCTION: Characteristics of patients hospitalized for transient ischemic attack (TIA) management before and during this hospitalization and follow-up are not well documented on very large populations. METHODS: Among the 51 million beneficiaries of the French national health insurance general scheme (77% of French population), those subjects hospitalized for a first TIA in 2010 were included using the national health insurance information system (SNIIRAM). The frequencies of comorbidities during the previous five years and drug treatments received during the previous year and the first month after discharge were estimated from the SNIIRAM and then compared to data derived from the permanent randomized sample of all health insurance beneficiaries based on standardized morbidity ratios (SMR). The three-year outcome and factors associated with at least one readmission for TIA or ischemic stroke during the three months following the first hospitalization were investigated. RESULTS: A total of 18,181 patients were included (mean age: 69 years, 55% of women). The crude incidence of hospitalized TIA was 0.36 per 1000. Before hospitalization, patients presented a significantly higher rate of carotid and cerebral atherosclerosis (2.4% SMR=1.4), atrial fibrillation (9.1%, SMR=1.3), ischemic heart disease (13.7%, SMR=1.3), valvular heart disease (9.7%, SMR=1.5), and treatment with platelet aggregation inhibitors (29%, SMR=1.4), antihypertensives (60%, SMR=1.2) and antidiabetics (16%, SMR=1.5). These SMR decreased with age. One month after discharge from hospital,

82% of patients still alive filled at least one prescription for antithrombotic therapy (platelet aggregation inhibitor: 74%, vitamin K antagonist: 12%), one class of antihypertensive in 57% of patients, an antiarrhythmic in 9% of patients, an antidiabetic treatment in 14% of patients and a lipid-lowering agent in 53%. During the month following discharge from hospital, 3.2% of patients were readmitted at least once for TIA, 1.9% were readmitted for ischemic stroke and 1.5% of patients died. These figures were 3.9%, 2.4% and 2.9% at three months, and 7.2%, 5% and 16.3% at three years, respectively. On multivariate analysis, factors associated with readmission for TIA or ischemic stroke were age ≥ 65 years and antidiabetic treatment before hospitalization. In contrast, male gender, admission to a stroke unit and length of stay were associated with a lower readmission rate. CONCLUSIONS: These results illustrate the value of administrative databases to study TIA. Hospitalizations for TIA were relatively frequent, and the recurrence rate was similar to that reported in similar recent studies. Level of primary and secondary prevention must be improved.

Lannelongue, C. (2017). "Pratiques de télémédecine et politique actuelle." Actualité et Dossier en Santé Publique(101): 10-18.

Pratique médicale à distance, la télémédecine peut être une réponse aux défis auxquels est confrontée l'offre de soins. Des politiques publiques sont mises en œuvre pour la développer. Téléconsultation, télé-expertise, télésurveillance médicale, téléassistance médicale et régulation sont les 5 actes reconnus en télémédecine.

Lannelongue, C. et et al. (2017). "Télémédecine : des pratiques innovantes pour l'accès aux soins. Dossier." Actualité et Dossier en Santé Publique (101): 9-55.

La télémédecine regroupe des pratiques médicales à distance : téléconsultation, télé-expertise, télésurveillance médicale, téléassistance médicale et régulation. Elle est une réponse aux défis auxquels est confrontée l'offre de soins aujourd'hui. Elle permet la prise en charge au plus près du lieu de vie des patients. C'est un moyen de réorganiser l'offre de soins en en améliorant l'accès et la qualité. La Stratégie nationale de santé 2018-2022 donne une nouvelle impulsion à la télémédecine et des financements sont mis en œuvre pour favoriser son développement. Ce dossier évoque la politique actuelle en matière de télémédecine, et recense les apports de la télémédecine aux prises en charge existantes.

Legris, N., Hervieu-Bègue, M., Daubail, B., et al. (2016). "Telemedicine for the acute management of stroke in Burgundy, France: an evaluation of effectiveness and safety." Eur J Neurol **23**(9): 1433-1440.

In the context of the development of telemedicine in France to address low thrombolysis rates and limited stroke infrastructures, a star-shaped telestroke network was implemented in Burgundy (1.6 million inhabitants). We evaluated the safety and effectiveness of this network for thrombolysis in acute ischemic stroke patients.

Tuppin, P., Samson, S., Fagot-Campagna, A., et al. (2016). "Care pathways and healthcare use of stroke survivors six months after admission to an acute-care hospital in France in 2012." Rev Neurol (Paris) **172**(4-5): 295-306.
https://www.ncbi.nlm.nih.gov/pubmed/27038535

Care pathways and healthcare management are not well described for patients hospitalized for stroke. METHODS: Among the 51 million beneficiaries of the French national health insurance general scheme (77% of the French population), patients hospitalized for a first stroke in 2012 and still alive six months after discharge were included using data from the

national health insurance information system (Sniiram). Patient characteristics were described by discharge destination-home or rehabilitation center (for < 3 months)-and were followed during their first three months back home. RESULTS: A total of 61,055 patients had a first admission to a public or private hospital for stroke (mean age; 72 years, 52% female), 13% died during their stay and 37% were admitted to a stroke management unit. Overall, 40,981 patients were still alive at six months: 33% of them were admitted to a rehabilitation center (mean age: 73 years) and 54% were discharged directly to their home (mean age 67 years). For each group, 45 and 62% had been previously admitted to a stroke unit. Patients discharged to rehabilitation centers had more often comorbidities, 39% were highly physically dependent and 44% were managed in specialized neurology centers. For patients with a cerebral infarction who were directly discharged to their home 76% received at least one antihypertensive drug, 96% an antithrombotic drug and 76% a lipid-lowering drug during the following month. For those with a cerebral hemorrhage, these frequencies were respectively 46, 33 and 28%. For those admitted to a rehabilitation center, more than half had at least one visit with a physiotherapist or a nurse, 15% a speech therapist, 10% a neurologist or a cardiologist and 15% a psychiatrist during the following three months back home (average numbers of visits for those with at least one visit: 23 for physiotherapists and 100 for nurses). Patients who returned directly back home had fewer physiotherapist (30%) or nurse (47%) visits but more medical consultations. The 3-month re-hospitalization rate for patients who were discharged directly to their home was 23% for those who had been admitted to a stroke unit and 25% for the others. In rehabilitation centers, this rate was 10% for patients who stayed < 3 months. CONCLUSIONS: These results illustrate the value of administrative databases to study stroke management, care pathways and ambulatory care. These data should be used to improve care pathways, organization, discharge planning and treatments.

(2015). Parcours hospitaliers des patients victimes d'un AVC en Bretagne en 2012. Rennes ARS https://www.bretagne.ars.sante.fr/parcours-hospitaliers-des-patients-victimes-dun-avc-en-bretagne-en-2012

Le plan d'actions national Accidents Vasculaires Cérébraux (AVC) 2010-2014 et la mise en place des Unités NeuroVasculaires (UNV) et Soins Intensifs NeuroVasculaires (SINV) s'appuyant sur les équipes en place au sein des territoires de santé, a permis une réelle impulsion de la prise en charge des AVC aigus, depuis la phase d'alerte. Les équipes soulignent, par contre, des difficultés d'aval sur l'accès à la rééducation pour ceux qui en relèvent ou d'accueil de patients devenus dépendants, autre étape fondamentale de la prise en charge des AVC. L'ARS Bretagne a réalisé une évaluation des parcours hospitaliers de la cohorte de patients admis en court séjour pour AVC en phase aiguë en 2012, afin de répondre à trois questions : Qui sont les patients admis en SSR dans les 3 mois au décours d'une hospitalisation en court séjour pour AVC ? Quels sont les parcours des patients accédant ou non accédant aux SSR ? Y a-t-il des besoins non couverts ou des inégalités résultant des parcours ?

Chourchoulis, D. et Université du droit et de la santé Lille 2. (2015). Analyse des parcours de soins de patients victimes d'accident vasculaire cérébral au cours de l'année 2013 en région Nord-Pas-de-Calais à partir de données médico-administratives (Pmsi et Sniiram). https://pepite-depot.univ-lille2.fr/nuxeo/site/esupversions/f2174dd7-9fe2-4d9f-948f-ee6571692c4e

Giroud, M., Hommel, M., Benzenine, E., et al. (2015). "Positive Predictive Value of French Hospitalization Discharge Codes for Stroke and Transient Ischemic Attack." European Neurology **74**(1-2): 92-99.

https://www.karger.com/DOI/10.1159/000438859

> We aimed at measuring the positive predictive value (PPV) of data in the French Hospital Medical Information Database (FHD). This retrospective multicenter study included 31 hospitals from where 56 hospital stays were randomly selected among all hospitalizations for the years 2009 and 2010 with at least 1 principal diagnosis of stroke or transient ischemic attack (TIA).

Kozlowski, O., Lesiuk, L., Allart, E., et al. (2015). "Préparation de la sortie à domicile et suivi post-hospitalier des personnes handicapées après un AVC en région nord de la France." Journal de Réadaptation Médicale : Pratique et Formation en Médecine Physique et de Réadaptation **35**(1): 15-27.
http://www.sciencedirect.com/science/article/pii/S0242648X14001169

> Résumé Objectif Le réseau TC-AVC 59-62 a reçu la mission d'améliorer le suivi des personnes en situation de handicap dans les suites d'un accident vasculaire cérébral (PSH/AVC). Un état des lieux préalable est apparu nécessaire. Matériel et méthodes Les médecins de 26 services de soins de suite et réadaptation ont répondu à un questionnaire sur la prise en charge et le suivi des PSH/AVC, 22 services pour adultes et 4 services pédiatriques. Résultats Dix-huit équipes utilisaient des échelles validées type MIF ou Barthel. Plusieurs professions étaient peu représentées (psychiatres, psychologues, assistants sociaux). Pour préparer la sortie, 25 proposaient des visites à domicile, 9 des permissions le week-end. Seules 2 prenaient systématiquement contact avec le médecin traitant, et 12 si besoin. Tous envoyaient un courrier la semaine de la sortie. Concernant le suivi, 19 organisaient au moins une consultation. Les personnes demandaient une aide médicale mais davantage sociale, psychocomportementale et d'autonomisation. Treize effectuaient un suivi pendant 1 an, et 5 pendant plusieurs années. La plupart accepteraient de consulter des PSH/AVC qui n'auraient pas été hospitalisées en centre mais 13 n'étaient jamais sollicitées. Les médecins estimaient nécessaire des recrutements de médecins, assistants sociaux, neuropsychologues et ergothérapeutes pour un suivi médico-psycho-social global. Ils jugeaient nécessaire une valorisation financière des actes associés au suivi. Conclusion Dans la région Nord Pas-de-Calais, l'évaluation et la prise en charge des troubles spécifiques des PSH/AVC en centre de rééducation, la préparation de sortie et le suivi étaient insuffisants et inégaux. Cependant, les équipes étaient motivées pour améliorer le suivi, en fonction de l'adaptation des moyens financiers.

Lainay, C., Benzenine, E., Durier, J., et al. (2015). "Hospitalization within the first year after stroke: the Dijon stroke registry." Stroke **46**(1): 190-196.

> This population-based study aimed to identify unplanned hospitalization within the first year after stroke to determine factors associated with it and consequences on survival.

Mauro, L., Vertueux, G. (2015). "Résultats de l'enquête nationale auprès des structures des urgences hospitalières." Dossiers Solidarité et Santé (Drees)(63)
https://drees.solidarites-sante.gouv.fr/publications/dossiers-solidarite-et-sante-1998-2016/resultats-de-lenquete-nationale-aupres-des

> [BDSP. Notice produite par MIN-SANTE Dp79R0xs. Diffusion soumise à autorisation]. Alors qu'on observe une hausse continue de la fréquentation des services d'urgence dans les établissements de santé, les informations disponibles en routine fournissent peu d'éléments sur les motifs de recours, les modalités de prises en charge selon les pathologies, les

difficultés rencontrées ou encore la diversité des organisations et de fonctionnement des structures. La Direction de la recherche, des études, de l'évaluation et des statistiques (Drees) a réalisé une enquête un jour donné (le 11/06/2013) auprès des 736 points d'accueil d'urgences présents sur le territoire français. Le colloque de novembre 2014 a permis de présenter les premiers résultats issus de l'exploitation de cette enquête autour de quatre sessions thématiques sur la méthodologie de l'enquête, l'organisation puis la patientèle des services d'urgences et enfin la place des urgences dans l'offre de soins de premier recours.

Schnitzler, A. (2015). Handicap dans les suites d'un accident vasculaire cérébral : étude de prévalence et impact des filières de soins. Versailles Université de Versailles Saint-Quentin en Yvelines. **Thèse de doctorat ; Université de Versailles Saint-Quentin en Yvelines:**
https://tel.archives-ouvertes.fr/tel-01444554/document

Le but de cette étude était d'évaluer les limitations fonctionnelles chez les adultes avec antécédent d'AVC et de décrire le devenir fonctionnel des patients admis en rééducation en France, suite à un AVC aigu, en fonction du type de structure (spécialisée ou non). Les données de l'enquête Handicap-Santé et les bases PMSI 2009 (Programme de Médicalisation du Système d'Information)

Alhanati, L., Dubourdieu, S., Hoffmann, C., et al. (2014). "Stroke: prospective evaluation of a prehospital management process based on rescuers under medical direction." Am J Emerg Med **32**(5): 438-442.

BACKGROUND: Improving access to thrombolytic therapy for patients with ischemic stroke is challenging. We assessed a prehospital process based on firemen rescuers under strict medical direction, aimed at facilitating thrombolysis of eligible patients.

Briere, J. B., Fauchier, L., Coleman, C., et al. (2014). "Main barriers to effective implementation of stroke care pathways in France: a qualitative study." PLoS One **14**: 95.

BACKGROUND: Stroke Care Pathways (SCPs) aim to improve quality of care by providing better access to stroke units, rehabilitation centres, and home care for dependent patients. The objective of this study was to identify the main barriers to effective implementation of SCPs in France.

Fournereau, F. et Tandy, L. (2014). "La télé-imagerie : un atout majeur pour la prise en charge des AVC." Gestions Hospitalières(535): 204-206

Améliorer l'offre de soins, en utilisant au mieux la ressource médicale, c'est l'objectif posé par les professionnels de santé, le ministère de la Santé et les agences régionales de santé (ARS). L'auteur décrit ici l'utilisation de la télé-imagerie dans la prise en charge de accidents vasculaires cérébraux (AVC), un outil appelé à favoriser l'accessibilité aux soins.

Gache, K., Leleu, H., Nitenberg, G., et al. (2014). "Main barriers to effective implementation of stroke care pathways in France: a qualitative study." Bmc Health Services Research **14**(95): 1-10.
http://www.biomedcentral.com/1472-6963/14/95

Stroke Care Pathways (SCPs) aim to improve quality of care by providing better access to stroke units, rehabilitation centres, and home care for dependent patients. The objective of this study was to identify the main barriers to effective implementation of SCPs in France.

Richard, S., Lavandier, K., Zioueche, Y., et al. (2014). "Use of telemedicine to manage severe ischaemic strokes in a rural area with an elderly population." Neurol Sci **35**(5): 683-685.

The rural district of the Meuse (East France) has a high number of elderly patients for whom prognosis of ischaemic strokes is poor with high-haemorrhagic transformation risk of intravenous tissue plasminogen activator (rt-PA). This disadvantage is made worse by the distances a patient has to travel to the nearest stroke unit. We set out to assess the effectiveness of a telestroke system implemented in this area. Between October 2010 and February 2012, data from each "tele-expertised" patient were collected. 53 patients were examined. Diagnosis of ischaemic stroke was confirmed in 43 cases (81 %), and intravenous rt-PA treatment performed in 21 cases (40 %). In the treated patient group, median age was 73 years, with 29 % of octogenarians. Baseline National Institutes of Health Stroke Scale (NIHSS) was 16, with 29 % ≥ 20. The median onset to needle time was 169 min, and the median door to needle time was 69 min. Intracranial haemorrhage occurred in 3 cases (14 %), and was symptomatic in two (10 %). At 3 months, median NIHSS was 6, 6 patients (29 %) presented a favourable outcome (modified Rankin scale ≤ 1) and 3 (14 %) had died. In rural areas, for elderly patients with severe ischaemic strokes, telemedicine appears to be a way of improving accessibility and benefits of rt-PA treatment.

Schnitzler, A., Woimant, F., Nicolau, J., et al. (2014). "Effect of rehabilitation setting on dependence following stroke: an analysis of the French inpatient database." Neurorehabil.Neural.Repair. **28**(1): 36-44.

BACKGROUND: In France in 2009, patients admitted to Multidisciplinary Inpatient Rehabilitation for stroke were sent to a neurological rehabilitation center (NRC) or a general or geriatric rehabilitation (GRC) service. OBJECTIVE: To describe the functional outcome of stroke patients admitted for rehabilitation in France in 2009, both globally and as a function of the rehabilitation setting (GRC or NRC). METHODS: Data from the French Hospital Discharge Diagnosis databases for 2009 were included. Two logistic regression models were used to analyze factors related to improvement in dependence score and discharge home. Odds ratios (ORs) were also calculated. RESULTS: Among the 83 505 survivors of acute stroke in 2009, 28 201 were admitted for rehabilitation (33.8%). Of these, 19 553 went to GRC (69%) and 8648 to NRC (31%). On average, patients admitted to GRC were older (78.6 years vs 66.4 years), P < .001). At the start of rehabilitation, 50% of NRC patients and 56% of GRC patients were heavily dependent, but level of dependence was similar within each age-group. Rehabilitation in NRC lead to a greater probability of functional improvement (OR = 1.75, P < .001) and home discharge (OR = 1.61, P < .001) after adjustment for gender, age, Charlson's comorbidity index, initial level of dependence, type of stroke, and total length of stay. CONCLUSION: This study confirms, on a national level, the functional benefit of specialized rehabilitation in NRC. These results should be useful in the improvement of care pathways, organization of rehabilitation, and discharge planning

(2013). Propositions pour l'évaluation de l'impact du plan d'actions national Accidents vasculaires cérébraux 2010-2014. Paris HCSP
http://www.hcsp.fr/Explore.cgi/Telecharger?NomFichier=hcspr20130313_planavcaidemethodo.pdf

Ce rapport est une réponse du Haut Conseil de la santé publique à la demande de soutien méthodologique pour la préparation de l'évaluation de l'impact du Plan d'actions national « Accidents vasculaire cérébraux 2010-2014 ». Le HCSP préconise de faire le point sur la qualité des indicateurs et des systèmes d'informations associés, de prioriser ces indicateurs, de

compléter l'approche quantitative par des études qualitatives ad hoc, et enfin de développer des comparaisons entre territoires.

(2013). Prise en charge de l'accident vasculaire cérébral en phase aigüe : bilan PMSI 2013. Rennes ARS

Dans le cadre du suivi du PRS, un bilan d'activité annuel est produit sur la prise en charge initiale des AVC. En 2010, le plan national AVC a été lancé pour structurer les filières de prise en charge de cette pathologie, qui constitue une des premières causes de mortalité, de handicap et de démence en France. Afin d'assurer le suivi de cette pathologie et de la déclinaison régionale de ce plan, l'ARS Bretagne produit annuellement un bilan de l'activité réalisée par site et effectue, à la demande des professionnels, des requêtes complémentaires afin de les éclairer sur les parcours de soins ou sur d'autres aspects de la prise en charge.

Barroso, B., Demasles, S., Debeugny, S., et al. (2013). "[Impact of a stroke-unit on rtPA use in a community hospital: a 3-year prospective study]." Rev Neurol.(Paris) **169**(4): 307-313.

INTRODUCTION: Although intravenous thrombolysis has been used for ischemic strokes since 2004 in our community hospital located in Pau (southwest of France), a specifically dedicated stroke-unit (SU) was created only recently in June 2010. We decided to collect prospective data to compare the use and efficacy of intravenous thrombolysis before and after the opening of this dedicated stroke unit.

Bejot, Y., Aboa-Eboule, C., Jacquin, A., et al. (2013). "Stroke care organization overcomes the deleterious 'weekend effect' on 1-month stroke mortality: a population-based study." Eur J Neurol. **20**(8): 1177-1183.

BACKGROUND AND PURPOSE: Suffering a stroke during the weekend is associated with a poorer prognosis. The impact of implementing a dedicated stroke care network in Dijon, France, in 2003 on 30-day mortality in strokes/transient ischaemic attacks (TIA) occurring during weekends/bank holidays was evaluated. METHODS: All cases of stroke and TIA from 1985 to 2010 were identified from a population-based registry, using multiple overlapping sources of information. Demographics and clinical data were recorded. Cox regression models were used to evaluate associations between day of onset (weekdays versus weekends/bank holidays) and 30-day all-cause mortality. Data were stratified according to time periods [before (1985-2003) and after (2004-2010) implementation of the stroke network] and stroke subtypes (ischaemic stroke and intracerebral hemorrhage). RESULTS: Of the 5864 recorded patients, 1465 (25%) had their event during weekends/bank holidays. Patients with stroke/TIA during weekdays were comparable with those with stroke/TIA during weekends/bank holidays for baseline characteristics. Excess mortality was observed in patients with stroke/TIA during weekends/bank holidays during 1985-2003 (18.2% vs. 14.0%, $P < 0.01$) but not during 2004-2010 (8.4% vs. 8.3%, $P = 0.74$). Onset during weekends/bank holidays was associated with a higher risk of 30-day mortality during 1985-2003 (adjusted hazard ratio 1.26; 95% CI 1.06-1.51, $P = 0.01$), but not during 2004-2010 (adjusted hazard ratio 0.99; 95% CI 0.69-1.43, $P = 0.97$). CONCLUSION: The deleterious effect of weekends/bank holidays on early stroke mortality disappeared after the organization of a dedicated stroke care network in our community. Our findings provide strong support for the implementation of quality improvement initiatives in order to attenuate inequalities in the management of stroke patients

Duflos, A. (2013). Possibilités d'étude des filières de soins à partir des données de ViaTrajectoire : l'exemple de la filière SSR post-AVC dans les Pyrénées-Orientales en 2013. Montpellier Faculté de

Médecine, Université de Montpellier. Faculté de Médecine. Montpellier. FRA. **Thèse de Doctorat en Médecine**

> Dans la prise en charge post-aiguë de l'accident vasculaire cérébral (AVC), un problème posé est celui de l'orientation des patients dans les services de soins de suite et de réadaptation (SSR) adaptés à leur état. Les Coordinations SSR et le logiciel ViaTrajectoire visent à faire l'état des lieux des filières de prise en charge en SSR et à faciliter le rapprochement fonctionnel entre les acteurs, par des fonctions de répertoire des ressources, de dématérialisation des échanges, et d'aide à l'orientation. Nous proposons une méthode de description des filières à partir des données individuelles de ViaTrajectoire.

Gache, K., Couralet, M., Nitenberg, G., et al. (2013). "The role of calling EMS versus using private transportation in improving the management of stroke in France." Prehosp.Emerg.Care **17**(2): 217-222.

> OBJECTIVE: To compare the time from symptom onset to brain imaging between patients calling emergency medical services (EMS) and those using private means for transportation. METHODS: We focused on symptom onset-to-brain imaging times of </=2 hours and </=3 hours 30 minutes, assuming a one-hour interval between imaging and thrombolysis. Other variables were the patient's age, gender, stroke type, National Institutes of Health Stroke Scale (NIHSS) score, presence of an on-site stroke unit, and period of symptom onset. Univariate analyses and a hierarchical linear regression model were used, as appropriate, and adjusted for these variables. RESULTS: A total of 1,105 stroke patients (28%) were included in the analyses, 40.6% of them transported by EMS. Patients using EMS were significantly older (72.8 vs. 70.5 years; p = 0.008), they had a higher NIHSS score (8 vs. 6.1; p = 0.0001), fewer were ischemic (85.1% vs. 90.6%; p = 0.005), and more of them reached hospitals with an on-site stroke unit (81.3% vs. 72.9%; p = 0.002). For the EMS-call patients, the median symptom onset-to-brain imaging time was significantly shorter (3 hours 21 minutes vs. 5 hours 57 minutes), and after adjustment, maximum delays of 2 hours and 3 hours 30 minutes were independently associated with EMS call: 28% vs. 18% (p = 0.015) and 66% vs. 45% (p < 0.0001) of patients, respectively, leading to an adjusted odds ratio of 2.77 (95% confidence interval, 2.007-3.828; p < 0.0001) for the threshold of 3 hours 30 minutes. CONCLUSIONS: The symptom onset-to-brain imaging time was significantly shorter in case of EMS transportation, but most patients did not reach the hospital in time to be eligible for thrombolysis. Efforts are still needed to reduce delays, especially public education and EMS activation. These efforts should be combined with new approaches for the quality management of stroke patients

Bejot, Y., Troisgros, O., Gremeaux, V., et al. (2012). "Poststroke disposition and associated factors in a population-based study: the Dijon Stroke Registry." Stroke **43**(8): 2071-2077.

> The organization of poststroke care will be a major challenge in coming years. We aimed to assess hospital disposition after stroke and its associated factors in clinical practice.

De Peretti, C., Nicolau, J., Tuppin, P., et al. (2012). "[Acute and post-acute hospitalizations for stroke in France: recent improvements (2007-2009)]." Presse Med **41**(5): 491-503.

> OBJECTIVES: The objectives of this study were to assess the main characteristics of acute and post-acute care for transient ischemic attack (TIA) and stroke, based on the French national hospitalization databases and their evolutions from 2007 through 2009. METHODS: Hospitalizations with a main diagnosis of stroke were first selected in the 2007, 2008 and 2009 French hospital discharge databases (PMSI-MCO). They were then linked in the

corresponding national databases of post-acute hospitalization records (PA), through the common anonymous patient number used in every hospitalization database. The French national hospital databases showed consistent improvements in stroke care in recent years. At the acute phase, there was an increase in stroke care in both stroke unit and hospital with stroke unit, due to the development of stroke care in France. Furthermore, the proportion of stroke patient discharged in rehabilitation facilities increased from 7.5% to 10.4%.

Desseigne, N., Akharzouz, D., Varvat, J., et al. (2012). "[What are the crucial factors affecting the time to admission of patients with suspected stroke to the emergency department?]." Presse Med **41**(11): e559-e567.

OBJECTIVE: To analyse the factors influencing the time of admission of patients presenting an acute ischaemic stroke (AIS) to the emergency department. PATIENTS AND METHODS: Between May 2006 and July 2007, all patients with suspected stroke admitted to the emergency department were included. Patients' characteristics and the nature and timing of the events following symptom detection were recorded in the emergency department. The symptoms observed, the person telephoning for help, the person or establishment contacted, the measures implemented (attendance of a physician, medical or paramedical intervention) and the means of transport to the hospital were noted. The overall population was analysed descriptively, and patients admitted within 3 hours of symptom onset (group I) were compared with those admitted after a longer interval (group II). The final diagnosis of AIS was confirmed on patient discharge. RESULTS: Among the 678 patients admitted with suspected stroke, 536 were diagnosed as having experienced an AIS, 65 a haemorrhagic stroke, 3 a cerebral venous thrombosis and 74 an event other than an acute neurovascular event. The results therefore concern 536 patients (median age: 75 years), of whom 166 (31%, group I) were admitted within 3 hours of symptom onset and 370 after a longer interval (group II). The median time between symptom onset and the call for help was 15 min (1-26) in group I and 300 min (60-960) in group II (P<0.0001). The median times to intervention of a physician (the patient's regular general practitioner, the physician on duty, or the SMUR [Mobile Emergency and Resuscitation Service] physician) ranged from 10 to 60 min. Median transport times ranged from 30 to 120 min depending on the type of transport employed. The two groups differed significantly with regard to intervention of a physician before admission to the emergency department (40% of patients in group I vs. 72% in group II, P<0.0001), initial call to the emergency medical call centre ("15" in France) (42% vs. 17%, P<0.001), presence of a relative or other person at the time of functional symptom onset (58% vs. 39%, P<0.01), and immediate transport to hospital without medical intervention (49 vs. 11%). Finally, irrespective of the time to hospital admission, 12% of the patients studied were eligible for intravenous thrombolysis. CONCLUSION: In the event of a suspected stroke, these results favour contacting the emergency medical call centre and immediate transfer of the patient to an appropriate hospital establishment without waiting for prior medical intervention

(2012). Indicateurs de qualité sur la prise en charge initiale de l'accident vasculaire cérébral. Campagne 2011. Etudes et rapports. Saint Denis HAS
http://www.has-sante.fr/portail/upload/docs/application/pdf/2012-11/ipaqss_rapport-avc-v5.pdf

L'analyse descriptive des données 2011 permet plusieurs constats : - Les résultats moyens nationaux sont variables en fonction des indicateurs, mais la variabilité inter-établissements des résultats est importante pour chacun. - Le délai médian entre l'arrivée dans l'établissement et la réalisation d'une imagerie cérébrale après un AVC est de 1h41 pour les patients admis par le SAU tout type d'établissement confondu. - La date et l'heure de début

des symptômes sont retrouvées pour plus de 7 patients sur 10. La connaissance de ces informations est une étape initiale et primordiale dans la mise en œuvre du traitement thrombolytique. En effet, au cours de la phase d'expérimentation, le calcul de l'indicateur "Taux de thrombolyse chez les patients ne présentant pas de contre-indications formelles à la thrombolyse et dont la prise en charge initiale a été effectuée dans les 4 heures suivant le début des symptômes" n'avait pu être réalisé que pour un très faible nombre de dossiers car une part importante de données horaires était manquante, principalement l'heure de début des symptômes. - Sept patients sur dix reçoivent une administration appropriée d'aspirine après un AVC ischémique et en l'absence de traitement fibrinolytique. - En court séjour, 4 patients hospitalisés avec un diagnostic d'AVC sur 10 bénéficient d'une évaluation initiale par un professionnel de la rééducation. En outre, le délai médian entre l'arrivée dans l'établissement et l'évaluation par un professionnel de la rééducation est de 3 jours. - La tenue du dossier patient est de qualité pour au moins 8 patients sur 10. Parmi les 7 critères évalués, 6 ont de très bons résultats (supérieurs à 80%) excepté le score de gravité NIH qui n'est retrouvé qu'une fois sur quatre dans le dossier du patient.

Bejot, Y., Benzenine, E., Lorgis, L., et al. (2011). "Comparative analysis of patients with acute coronary and cerebrovascular syndromes from the national French hospitalization health care system database." Neuroepidemiology. **37**(3-4): 143-152.

BACKGROUND: Nationwide evaluations of the epidemiology of acute coronary syndrome (ACS) or cerebrovascular syndrome (CVS) are scarce. We aimed to analyze nationwide French data on patients referred to hospital for either ACS or CVS. METHODS: Using the French national hospital discharge diagnosis records, all patients hospitalized between 2005 and 2008 with a diagnosis of ACS and CVS based on the ICD-10 were identified. We analyzed vascular risk factors and early outcomes in patients with a single hospitalization for ACS or CVS or for both ACV and CVS in a 2-month time window. RESULTS: 1,187,643 patients were recorded. Among these, 638,061 (53.7%) had CVS alone, 525,419 (44.3%) had ACS alone, and 24,163 (2%) had both. Patients of the latter group were older, had a higher prevalence of hypertension, diabetes, and atrial fibrillation, a longer length of stay, were less likely to be discharged to home, and had a higher in-hospital risk of death after adjustment for age, sex, and vascular risk factors compared with patients with either CVS alone (OR = 1.71, 95% CI: 1.66-1.77) or ACS alone (OR = 2.95, 95% CI: 2.85-3.05). CONCLUSION: Patients with both CVS and ACS have a high vascular risk profile and a marked excess risk of early death.

Lebrun, L., Rusterholtz, T., Fery-Lemonnier, E., et al. (2011). "Improving stroke care: a French health-care organiser's perspective." Int J Stroke **6**(2): 123-124.

The French national action plan: 'Stroke 2010-2014' results from years of increasing concern related to stroke, initially carried by stoke physicians and progressively shared by all other health professionals and more recently by administration and politicians. Its aim is the development not only of stroke care networks, but also of prevention and health education. Its success will mainly depend on the reactivity of the regional health agencies; therefore it is important to maintain political momentum and pressure

Bejot, Y., Aouba, A., De, P. C., et al. (2010). "Time trends in hospital-referred stroke and transient ischemic attack: results of a 7-year nationwide survey in France." Cerebrovasc.Dis. **30**(4): 346-354.

Nationwide evaluations of the burden of stroke are scarce. We aimed to evaluate trends in stroke and transient ischemic attack (TIA) hospitalization, in-hospital case fatality rates (CFRs) and mortality rates in France during 2000-2006.

De Peretti, C., Nicolau, J., Holstein, J., et al. (2010). "Hospitalisations en soins de suite et de réadaptation en France après un accident vasculaire cérébral survenu en 2007." Bulletin Epidemiologique Hebdomadaire(49-50): 501-506.

Les objectifs de cette étude étaient d'estimer la proportion de patients hospitalisés en soins de suite et de réadaptation (SSR) après un accident vasculaire cérébral (AVC) et de décrire ses variations en fonction des caractéristiques des patients, des AVC et des structures de prise en charge à la phase aiguë.

Yekhlef, F., Decup, D., Niclot, P., et al. (2010). "[Medico-economic assessment of the Pontoise Hospital stroke unit]." Rev Neurol.(Paris) **166**(11): 901-908.

INTRODUCTION: Annually, approximately 120,000 people in France have a stroke. Various controlled studies have pointed out the benefits of treatment in a stroke unit (SU). The objective of this study was to evaluate, from a medical point of view, the economic impact of the Pontoise Hospital SU.

Fery-Lemonnier (2009). La prévention et la prise en charge des accidents vasculaires cérébraux en France.: Ministère de la santé et des sports https://www.vie-publique.fr/rapport/30747-la-prevention-et-la-prise-en-charge-des-accidents-vasculaires-cerebraux

Ce rapport propose un état des lieux et formule des propositions pour améliorer la prévention et la prise en charge de l'accident vasculaire cérébral (AVC), la formation et la recherche, communiquer auprès du public et des professionnels et suivre l'efficacité des mesures préconisées.

A l'étranger

Chowdhury, S. Z., Baskar, P. S. et Bhaskar, S. (2021). "Effect of prehospital workflow optimization on treatment delays and clinical outcomes in acute ischemic stroke: A systematic review and meta-analysis." J Am Geriatr Soc **28**(7): 781-801.

BACKGROUND: The prehospital phase is critical in ensuring that stroke treatment is delivered quickly and is a major source of time delay. This study sought to identify and examine prehospital stroke workflow optimizations (PSWOs) and their impact on improving health systems, reperfusion rates, treatment delays, and clinical outcomes. METHODS: The authors conducted a systematic literature review and meta-analysis by extracting data from several research databases (PubMed, Cochrane, Medline, and Embase) published since 2005. We used appropriate key search terms to identify clinical studies concerning prehospital workflow optimization, following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Fisher, R. J. et Byrne, A. (2021). "Effect of stroke early supported discharge on length of hospital stay: analysis from a national stroke registry." BMJ Open **11**(1): e043480.

OBJECTIVE: The first observational study to investigate the impact of early supported discharge (ESD) on length of hospital stay in real-world conditions.

Schadewaldt, V., McElduff, B., D'Este, C., et al. (2021). "Measuring organizational context in Australian emergency departments and its impact on stroke care and patient outcomes." Nurs Outlook **69**(1): 103-115.

> BACKGROUND: Emergency departments (ED) are challenging environments but critical for early management of patients with stroke. PURPOSE: To identify how context affects the provision of stroke care in 26 Australian EDs.

Webb, A. J. S., Fonseca, A. C. et Berge, E. (2021). "Value of treatment by comprehensive stroke services for the reduction of critical gaps in acute stroke care in Europe." BMC Health Serv Res **28**(2): 717-725.

> Stroke is the second leading cause of death and dependency in Europe and costs the European Union more than €30bn, yet significant gaps in the patient pathway remain and the cost-effectiveness of comprehensive stroke care to meet these needs is unknown. The European Brain Council Value of Treatment Initiative combined patient representatives, stroke experts, neurological societies and literature review to identify unmet needs in the patient pathway according to Rotterdam methodology. The cost-effectiveness of comprehensive stroke services was determined by a Markov model, using UK cost data as an exemplar and efficacy data for prevention of death and dependency from published systematic reviews and trials, expressing effectiveness as quality-adjusted life-years (QALYs). Model outcomes included total costs, total QALYs, incremental costs, incremental QALYs and the incremental cost-effectiveness ratio (ICER). Key unmet needs in the stroke patient pathway included inadequate treatment of atrial fibrillation (AF), access to neurorehabilitation and implementation of comprehensive stroke services. In the Markov model, full implementation of comprehensive stroke services was associated with a 9.8% absolute reduction in risk of death of dependency, at an intervention cost of £9566 versus £6640 for standard care, and long-term care costs of £35 169 per 5.1251 QALYS vs. £32 347.40 per 4.5853 QALYs, resulting in an ICER of £5227.89. Results were robust in one-way and probabilistic sensitivity analyses. Implementation of comprehensive stroke services is a cost-effective approach to meet unmet needs in the stroke patient pathway, to improve acute stroke care and support better treatment of AF and access to neurorehabilitation.

Abdul Aziz, A. F., Mohd Nordin, N. A., Muhd Nur, A., et al. (2020). "The integrated care pathway for managing post stroke patients (iCaPPS(©)) in public primary care Healthcentres in Malaysia: impact on quality adjusted life years (QALYs) and cost effectiveness analysis." BMC Geriatr **20**(1): 70.

> BACKGROUND: The delivery of post stroke care is fragmented even in advanced public healthcare systems, globally. Primary care teams are entrusted to provide longer term care for stroke survivors in most developing countries. The integrated Care Pathway for Post Stroke patients (iCaPPS(©)) was designed to guide primary care teams to incorporate further rehabilitation and regular screening for post stroke complications among patients residing at home in communities, using the shared-care approach, especially in areas with limited access to specialist stroke care services. The iCaPPS(©) addressed coordination of rehabilitation and screening for post stroke complications which were absent in the current conventional care of patients managed at public primary care healthcentres. This study aimed to evaluate the cost effectiveness and impact of iCaPPS(©) on quality-adjusted- life-years (QALY) compared with current conventional monitoring at public primary care healthcentres.

Bersano, A. et Kraemer, M. (2020). "Stroke care during the COVID-19 pandemic: experience from three large European countries." **27**(9): 1794-1800.

To cope with the exponentially increasing number of patients infected with SARS-CoV-2, European countries made enormous efforts to reorganize medical assistance and several diseases, including stroke, were particularly impacted. We report the experience of stroke neurologists from three European countries (Italy, France and Germany) that faced the pandemic at diverse time points and with different approaches, depending on their resources and healthcare system organization. Pre-hospital and in-hospital acute stroke pathways were reorganized to prioritize COVID-19 management, and, in severely affected regions of Italy and France, stroke care was centralized to a limited number of centers, whereas the remaining stroke units were dedicated to patients with COVID-19. Access to acute stroke diagnostics and time-dependent therapies was limited or delayed because of reduced capacities of emergency services due to the burden of patients with COVID-19. A marked reduction in the number of patients presenting with transient ischaemic attack and stroke was noted in the emergency departments of all three countries. Although we only have preliminary data, these conditions may have affected stroke outcome. These indirect effects of the COVID-19 pandemic could negate the efforts of stroke neurologists over the last few years to improve outcome and reduce mortality of stroke patients. Although the SARS-CoV-2 infection rate is slowing down in Europe, the effects of ending lockdown in the next months are unpredictable. It is important for the European and world stroke community to share what has been learned so far to be plan strategies to ensure stroke care in the future and upcoming challenging times.

Chen, C. M. et Yang, Y. H. (2020). "Economic evaluation of transferring first-stroke survivors to rehabilitation wards: A 10-year longitudinal, population-based study." **27**(1): 8-14.

Background: Transferring stroke survivors to the rehabilitation ward for rehabilitation reduces long-term mortality; however, the long-term economic impact remains unknown. Objective: We aimed to assess the 10-year economic outcome of transferring first-stroke survivors to the rehabilitation ward.

Chen, L. et Xiao, L. D. (2020). "An integrative review: Challenges and opportunities for stroke survivors and caregivers in hospital to home transition care." **76**(9): 2253-2265.

AIM: To identify challenges and opportunities for stroke survivors and caregivers in hospital to home transition care. BACKGROUND: Due to shortened hospital stays, stroke survivors and caregivers must take responsibility for complex care on discharge from hospital to home. Gaps exist in the literature that synthesizes studies on hospital to home transition care. DESIGN: A systematic integrated review. DATA SOURCES: Six databases were searched systematically between 18 June 2018 - 31 October 2018 including Medline, CINAHL, Web of Science, ProQuest, Scopus and Science Direct. The search did not have a date limit. REVIEW METHODS: Studies that met the selection criteria were critically reviewed. Data were extracted from the studies for analyses. A convergent qualitative synthesis approach using inductive thematic synthesis was applied to the review. RESULTS: The analysis of 23 studies identified three major findings. First, health and social care systems influence transition care by either enabling stroke survivors and caregivers to manage transition care via well-coordinated services or preventing them from accessing services. Second, health professionals' partnership with stroke survivors and caregivers largely decides tailored support for them. Successful partnerships and engagements with stroke survivors and caregivers depend on organizational resources. Third, survivors and caregivers are at different levels of readiness to cope with challenges. Individualized support for them to develop resilience is highly regarded. CONCLUSION: Stroke survivors and caregivers

encounter enormous challenges in self-management of hospital to home transition care. Further research is required to address their expectations of support during transition care. IMPACT: There is a lack of synthesis of studies on factors affecting hospital to home transition care for stroke survivors. Health and social care system designs, health professionals' commitment to individualized care and the self-management capability of stroke survivors and their caregivers have a profound influence on the transition care experiences.

Christensen, M. B., Bech, B. H., Christensen, H. C., et al. (2020). "Optimising acute stroke care organisation: a simulation study to assess the potential to increase intravenous thrombolysis rates and patient gains." BMC Health Serv Res **10**(1): e032780.

OBJECTIVES: To assess potential increases in intravenous thrombolysis (IVT) rates given interventions in the stroke care pathway. DESIGN: Simulation modelling was used to compare the performance of the current pathway, best practices based on literature review and an optimised model. SETTING: Four hospitals located in the North of the Netherlands, as part of a centralised organisational model. PARTICIPANTS: Ischaemic stroke patients prospectively ascertained from February to August 2010. INTERVENTION: The interventions investigated included efforts aimed at patient response and mode of referral, prehospital triage and intrahospital delays. PRIMARY AND SECONDARY OUTCOME MEASURES: The primary outcome measure was thrombolysis utilisation. Secondary measures were onset-treatment time (OTT) and the proportion of patients with excellent functional outcome (modified Rankin scale (mRS) 0-1) at 90 days. RESULTS: Of 280 patients with ischaemic stroke, 125 (44.6%) arrived at the hospital within 4.5 hours, and 61 (21.8%) received IVT. The largest improvements in IVT treatment rates, OTT and the proportion of patients with mRS scores of 0-1 can be expected when patient response is limited to 15 min (IVT rate +5.8%; OTT -6 min; excellent mRS scores +0.2%), door-to-needle time to 20 min (IVT rate +4.8%; OTT -28 min; excellent mRS scores+3.2%) and 911 calls are increased to 60% (IVT rate +2.9%; OTT -2 min; excellent mRS scores+0.2%). The combined implementation of all potential best practices could increase IVT rates by 19.7% and reduce OTT by 56 min. CONCLUSIONS: Improving IVT rates to well above 30% appears possible if all known best practices are implemented.

Clay-Williams, R., Taylor, N., Winata, T., et al. (2020). "Organization quality systems and department-level strategies: refinement of the Deepening our Understanding in Quality in Australia (DUQuA) organization and department-level scales." BMC Health Serv Res **32**(Supplement_1): 22-34.

The aim of this study was to develop and refine indices to measure organization and care pathway-level quality management systems in Australian hospitals.

Hitch, D., Leech, K., Neale, S., et al. (2020). "Evaluating the implementation of an early supported discharge (ESD) program for stroke survivors: A mixed methods longitudinal case study." PLoS One **15**(6): e0235055.

BACKGROUND: Early supported discharge (ESD) models of care for stroke survivors coordinate inpatient and community services, with the aim of reducing length of stay. While there is an established evidence base around the clinical outcomes of ESD), less is known about the implementation of this approach into existing stroke care service. The aim of this case study was to describe staff perceptions of the implementation of an ESD model of care for stroke survivors at a large metropolitan public hospital in Australia.

Jarva, E., Mikkonen, K., Tuomikoski, A.-M., et al. (2020). "Healthcare professionals' competence in stroke care pathways: A mixed-methods systematic review." J Clin Nurs **n/a**(n/a). https://onlinelibrary.wiley.com/doi/abs/10.1111/jocn.15612

The challenges of caring for stroke patients are growing due to population ageing and improved survival rates. Healthcare professionals' competence development in stroke care is a necessity to ensure high-quality patient care. Objectives To identify and describe the competence areas of healthcare professionals working in the stroke patient care pathway and factors influencing these competences.

Langhorne, P., Audebert, H. J., Cadilhac, D. A., et al. (2020). "Stroke systems of care in high-income countries: what is optimal?" Lancet **396**(10260): 1433-1442.

Stroke is a complex, time-sensitive, medical emergency that requires well functioning systems of care to optimise treatment and improve patient outcomes. Education and training campaigns are needed to improve both the recognition of stroke among the general public and the response of emergency medical services. Specialised stroke ambulances (mobile stroke units) have been piloted in many cities to speed up the diagnosis, triage, and emergency treatment of people with acute stroke symptoms. Hospital-based interdisciplinary stroke units remain the central feature of a modern stroke service. Many have now developed a role in the very early phase (hyperacute units) plus outreach for patients who return home (early supported discharge services). Different levels (comprehensive and primary) of stroke centre and telemedicine networks have been developed to coordinate the various service components with specialist investigations and interventions including rehabilitation. Major challenges include the harmonisation of resources for stroke across the whole patient journey (including the rapid, accurate triage of patients who require highly specialised treatment in comprehensive stroke centres) and the development of technology to improve communication across different parts of a service.

Langhorne, P. et Ramachandra, S. (2020). "Organised inpatient (stroke unit) care for stroke: network meta-analysis." Cochrane Database Syst Rev **4**(4): Cd000197.

BACKGROUND: Organised inpatient (stroke unit) care is provided by multi-disciplinary teams that manage stroke patients. This can been provided in a ward dedicated to stroke patients (stroke ward), with a peripatetic stroke team (mobile stroke team), or within a generic disability service (mixed rehabilitation ward). Team members aim to provide co-ordinated multi-disciplinary care using standard approaches to manage common post-stroke problems. OBJECTIVES: • To assess the effects of organised inpatient (stroke unit) care compared with an alternative service. • To use a network meta-analysis (NMA) approach to assess different types of organised inpatient (stroke unit) care for people admitted to hospital after a stroke (the standard comparator was care in a general ward). Originally, we conducted this systematic review to clarify: • The characteristic features of organised inpatient (stroke unit) care? • Whether organised inpatient (stroke unit) care provide better patient outcomes than alternative forms of care? • If benefits are apparent across a range of patient groups and across different approaches to delivering organised stroke unit care? Within the current version, we wished to establish whether previous conclusions were altered by the inclusion of new outcome data from recent trials and further analysis via NMA.

Lenzi, J., Noto, G., Corazza, I., et al. (2020). "Measuring the quality of care in small countries: the empirical analysis of 30-day mortality following acute myocardial infarction and ischaemic stroke in Latvia." Health Policy **124**(7): 695-700.

https://doi.org/10.1016/j.healthpol.2020.05.017

The evaluation of quality of care is a complex task that, over the last decades, has been performed using the Donabedian model as its main conceptual framework. Small countries are an ideal setting in which to make innovative, empirical evaluations of the quality of care. In this research, we discussed the challenges and opportunities of assessing hospital performance in Latvia, a small country in the Baltic region of Northern Europe. The study outcomes were 30-day acute myocardial infarction mortality and 30-day ischaemic stroke mortality. We described how indicator specifications, risk-adjustment, data reliability assessment and graphical representations were tailored to the geographic and institutional context of Latvia. By looking at the impact of structural characteristics on hospital performance, we found that cath labs and large caseloads were significantly associated with lower mortality. This approach allows decision-makers at different governance levels to design and implement actions aimed at improving the quality of care. At the health system level, it may help policy-makers adopt proper strategies to tackle poor outcomes; at the hospital level, it may help managers intervene on structural determinants of performance. Because small countries face some relevant issues that have implications for health care, these analyses might be relevant also for larger countries to improve the design of their health-care services

Laver, K. E., Adey-Wakeling, Z., Crotty, M., et al. (2020). "Telerehabilitation services for stroke." Cochrane Database Syst Rev **1**(1): Cd010255.

BACKGROUND: Telerehabilitation offers an alternate way of delivering rehabilitation services. Information and communication technologies are used to facilitate communication between the healthcare professional and the patient in a remote location. The use of telerehabilitation is becoming more viable as the speed and sophistication of communication technologies improve. However, it is currently unclear how effective this model of delivery is relative to rehabilitation delivered face-to-face or when added to usual care. OBJECTIVES: To determine whether the use of telerehabilitation leads to improved ability to perform activities of daily living amongst stroke survivors when compared with (1) in-person rehabilitation (when the clinician and the patient are at the same physical location and rehabilitation is provided face-to-face); or (2) no rehabilitation or usual care. Secondary objectives were to determine whether use of telerehabilitation leads to greater independence in self-care and domestic life and improved mobility, balance, health-related quality of life, depression, upper limb function, cognitive function or functional communication when compared with in-person rehabilitation and no rehabilitation. Additionally, we aimed to report on the presence of adverse events, cost-effectiveness, feasibility and levels of user satisfaction associated with telerehabilitation interventions. SEARCH METHODS: We searched the Cochrane Stroke Group Trials Register (June 2019), the Cochrane Central Register of Controlled Trials (the Cochrane Library, Issue 6, 2019), MEDLINE (Ovid, 1946 to June 2019), Embase (1974 to June 2019), and eight additional databases. We searched trial registries and reference lists. SELECTION CRITERIA: Randomised controlled trials (RCTs) of telerehabilitation in stroke. We included studies that compared telerehabilitation with in-person rehabilitation or no rehabilitation. In addition, we synthesised and described the results of RCTs that compared two different methods of delivering telerehabilitation services without an alternative group. We included rehabilitation programmes that used a combination of telerehabilitation and in-person rehabilitation provided that the greater proportion of intervention was provided via telerehabilitation. DATA COLLECTION AND ANALYSIS: Two review authors independently identified trials on the basis of prespecified inclusion criteria, extracted data and assessed risk of bias. A third review

author moderated any disagreements. The review authors contacted investigators to ask for missing information. We used GRADE to assess the quality of the evidence and interpret findings.

Man, S., Tang, A. S., Schold, J. D., et al. (2020). "The Patterns and Outcomes of Inter-Hospital Transfer Among Medicare Patients with Ischemic Stroke." J Stroke Cerebrovasc Dis **29**(12): 105331.

BACKGROUND AND PURPOSE: Inter-hospital transfer for ischemic stroke is an essential part of stroke system of care. This study aimed to understand the national patterns and outcomes of ischemic stroke transfer. METHODS AND RESULTS: This retrospective study examined Medicare beneficiaries aged ≥65 years undergoing inter-hospital transfer for ischemic stroke in 2012. Cox proportional hazards model was used to compare 30-day and one-year mortality between transferred patients and direct admissions from the emergency department (ED admissions). Among 312,367 ischemic stroke admissions, 5.7% underwent inter-hospital transfer. Using this value as cut-off, the hospitals were classified into receiving (n = 411), sending (n = 559), and low-transfer (n = 1863) hospitals. Receiving hospitals were larger than low-transfer and sending hospitals as demonstrated by the median bed number (371, 189, and 88, respectively, $p < 0.001$); more frequently to be certified stroke centers (75%, 47%, and 16%, respectively, $p < 0.001$); and less commonly located in the rural area (2%, 7%, and 24%, respectively, $p < 0.001$). For receiving hospitals, transfer-in patients and ED admissions had comparable mortality at 30 days (10% vs 10%; adjusted HR [aHR]=1.07; 95% CI, 0.99-1.14) and 1 year (23% vs 24%; aHR=1.03; 95% CI, 0.99-1.08). For sending hospitals, transfer-out patients, compared to ED admissions, had higher mortality at 30 days (14% vs 11%; aHR=1.63; 95% CI, 1.39-1.91) and 1 year (30% vs 27%; aHR=1.33; 95% CI, 1.20-1.48). For low-transfer hospitals, overall transfer-in and transfer-out patients, compared to ED admissions, had higher mortality at 30 days (13% vs 10%; aHR=1.46; 95% CI, 1.33-1.60) and 1 year (28% vs 25%; aHR=1.27; 95% CI, 1.19-1.36). CONCLUSIONS: Hospitals in the US, based on their transfer patterns, could be classified into 3 groups that shared distinct characteristics including hospital size, rural vs urban location, and stroke certification. Transferred patients at sending and low-transfer hospitals had worse outcomes than their ED admission counterpart.

McKee, M., Merkur, S., Edwards, N., et al. (2020). The Changing Role of the Hospital in European Health Systems, Cambridge : Cambridge University Press Bruxelles : European Observatory on Health Systems and Policies
https://www.euro.who.int/__data/assets/pdf_file/0010/448048/Changing-role-of-hospitals-eng.pdf

In this new study, a team of world-leading policy experts and clinicians analyse the changing role of the hospital across Europe. Hospitals today face a huge number of challenges, including new patterns of disease, rapidly evolving medical technologies, ageing populations and continuing budget constraints. This book is written by clinicians for clinicians and hospital managers, and those who design and operate hospitals. It sets out why hospitals need to change as the patients they treat and the technology to treat them changes. In a series of chapters by leading authorities in their field, it challenges existing models, reviews best practice from many countries and presents clear policy recommendations for policymakers and hospital administrators. It covers the main patient groups and conditions as well as those departments that make modern effective care possible, in imaging and laboratory medicine. Each chapter looks at patient pathways, aspects of workforce, required levels of specialisation and technology, and the opportunities and challenges for optimising the delivery of services in the hospital of the future. Hospitals must change in the face of changing technologies and patient needs. This book is written by clinicians who work in hospitals and know them best and is designed for hospital professionals, giving them the

evidence they need to call for change, and for policy-makers and planners charged with designing and operating hospitals now and in the future.

Jang, Y. J. et Park, D. (2020). "Assessment of the Implementation of Critical Pathway in Stroke Patients: A 10-Year Follow-Up Study." BioMed Research International**2020**: 3265950. https://doi.org/10.1155/2020/3265950

BACKGROUND: The complications after stroke inhibit functional recovery and worsen the prognosis of patients. The implementation of a critical pathway (CP) can facilitate functional recovery after stroke by enabling comprehensive and systematic structured rehabilitation. OBJECTIVE: To evaluate the effects of the implementation of CP in stroke patients for 10 years. METHODS: The data were collected from 960 patients who were diagnosed with a stroke at the university hospital emergency room, who were transferred to the rehabilitation center after the acute phase, and who were discharged after undergoing comprehensive rehabilitation. Based on data collected over a period of 10 years, changes in demographic and stroke characteristics, preexisting medical conditions, poststroke complications, and functional states, as well as length of stay (LOS), were evaluated before and after CP implementation. The modified Rankin Scale (mRS) and the Korean version of the Modified Barthel Index (K-MBI) were used to evaluate functional states. RESULTS: There were no significant differences in demographic and stroke characteristics before and after CP implementation. For those with preexisting medical conditions, there was no significant difference between before and after CP implementation. The majority of the complications were significantly decreased after the implementation of CP. Except for hemorrhagic stroke patients, the Brunnstrom stage in the ischemic and total stroke patients after CP implementation was significantly increased in the upper and lower extremities. The total hospitalization LOS and rehabilitation center hospitalization times were significantly reduced in ischemic and total stroke patients. There was no statistically significant difference in the functional gain of K-MBI and the efficiency of rehabilitation between before and after CP implementation. CONCLUSION: The implementation of CP allows for better application of evidence- and guideline-based key interventions and helps to provide early, comprehensive, organized, and more specialized care to stroke patients. Despite limited evidence, CP is still recommended as a means of promoting best practices in hospital care for stroke patients.

Morris, S., Ramsay, A. I. G., Boaden, R. J., et al. (2019). "Impact and sustainability of centralising acute stroke services in English metropolitan areas: retrospective analysis of hospital episode statistics and stroke national audit data." BMJ **364**: l1.

OBJECTIVES: To investigate whether further centralisation of acute stroke services in Greater Manchester in 2015 was associated with changes in outcomes and whether the effects of centralisation of acute stroke services in London in 2010 were sustained. DESIGN: Retrospective analyses of patient level data from the Hospital Episode Statistics (HES) database linked to mortality data from the Office for National Statistics, and the Sentinel Stroke National Audit Programme (SSNAP). SETTING: Acute stroke services in Greater Manchester and London, England. PARTICIPANTS: 509 182 stroke patients in HES living in urban areas admitted between January 2008 and March 2016; 218 120 stroke patients in SSNAP between April 2013 and March 2016. INTERVENTIONS: Hub and spoke models for acute stroke care. MAIN OUTCOME MEASURES: Mortality at 90 days after hospital admission; length of acute hospital stay; treatment in a hyperacute stroke unit; 19 evidence based clinical interventions. RESULTS: In Greater Manchester, borderline evidence suggested that risk adjusted mortality at 90 days declined overall; a significant decline in mortality was seen among patients treated at a hyperacute stroke unit (difference-in-differences -1.8%

(95% confidence interval -3.4 to -0.2)), indicating 69 fewer deaths per year. A significant decline was seen in risk adjusted length of acute hospital stay overall (-1.5 (-2.5 to -0.4) days; P<0.01), indicating 6750 fewer bed days a year. The number of patients treated in a hyperacute stroke unit increased from 39% in 2010-12 to 86% in 2015/16. In London, the 90 day mortality rate was sustained (P>0.05), length of hospital stay declined (P<0.01), and more than 90% of patients were treated in a hyperacute stroke unit. Achievement of evidence based clinical interventions generally remained constant or improved in both areas. CONCLUSIONS: Centralised models of acute stroke care, in which all stroke patients receive hyperacute care, can reduce mortality and length of acute hospital stay and improve provision of evidence based clinical interventions. Effects can be sustained over time.

Zawawi, N. S. M., Aziz, N. A., Fisher, R., et al. (2020). "The Unmet Needs of Stroke Survivors and Stroke Caregivers: A Systematic Narrative Review." J Stroke Cerebrovasc Dis **29**(8): 104875.

INTRODUCTION: Facilitating stroke survivors and their caregivers to lead a fulfilling life after stroke requires service providers to think about their different needs. Poor post stroke care may lead to unmet needs in stroke survivors and stroke caregivers. This may compromise them in leading their lives optimally after stroke. OBJECTIVES & METHODOLOGY: This systematic narrative review examines articles published from 1990 to 2017, generated from Ovid, MEDLINE, CINAHL, and PubMed. The search was also supplemented by an examination of reference lists for related articles via Scopus. We included 105 articles. FINDINGS: We found that the type of unmet needs in stroke survivors and the contributing factors were substantially different from their caregivers. The unmet needs in stroke survivors ranged from health-related needs to re-integration into the community; while the unmet needs in stroke caregivers ranged from information needs to support in caring for the stroke survivors and caring for themselves. Additionally, the unmet needs in both groups were associated with different factors. CONCLUSION: More research is required to understand the unmet needs of stroke survivors and stroke caregivers to improve the overall post-stroke care services.

Appleby, E., Gill, S. T., Hayes, L. K., et al. (2019). "Effectiveness of telerehabilitation in the management of adults with stroke: A systematic review." **14**(11): e0225150.

BACKGROUND: Stroke is a leading cause of mortality and morbidity and access to timely rehabilitation can reduce morbidity and help patients to return to normal life. Telerehabilitation can deliver rehabilitation services with the use of technology to increase patient options, deliver services more efficiently and overcome geographical barriers to healthcare access. Despite its popularity, there is conflicting evidence for its effectiveness. Therefore, the aim of this systematic review was to update the current evidence base on the effectiveness of telerehabilitation for stroke. METHODS: A systematic search of databases (Medline Ovid; Embase; Emcare; Scopus; The Cochrane Library; PEDro; OTSeeker) was conducted in April 2018 (updated in October 2018). This review was conducted and reported in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and methodology registered with PROSPERO (CRD42018090445). A modified McMaster critical appraisal tool for quantitative studies was used to assess the methodological quality of the included studies. Given the heterogeneity of the included studies, a descriptive synthesis was conducted. RESULTS: Out of 1868 studies, 13 randomised controlled trials met the inclusion criteria. A diverse range of interventions were delivered through a variety of telerehabilitation systems and the effectiveness measured through a myriad of outcome measures. Summarised findings from the heterogeneous evidence base indicate that telerehabilitation may have a positive impact on a range of primary and

secondary outcomes. However, despite these positive findings, the current evidence lacks clarity and uniformity in terms of intervention parameters and measurement of outcomes, which limits broader application of these results. DISCUSSION: Telerehabilitation, as an alternate form of rehabilitation for people with stroke, shows potential. However, due to methodological and practical concerns, an unequivocal recommendation cannot be made. Findings from this review may inform future policies and practices regarding the use of telerehabilitation for stroke patients.

Arwert, H. J., Groeneveld, I. F., Vliet Vlieland, T. P. M., et al. (2019). "Health Care Use and Its Associated Factors 5-8 Years after Stroke." J Stroke Cerebrovasc Dis **28**(11): 104333.

OBJECTIVES: To describe health care use and its associated factors in the chronic phase after stroke. METHODS: Patients completed a questionnaire on health care use, 5-8 years after hospital admission for stroke. It comprised the number of visits to physicians or other health care professionals over the past 6 months (Physician-visits; Low ≤1 or High ≥2) and other health care professionals (Low = 0 or High ≥ 1). In addition the Longer-term Unmet Needs after Stroke (LUNS), Frenchay Activity Index (FAI) and Physical and Mental Component Summary Scales of the Short Form 12 (PCS and MCS) were administered. Their associations with health care use (high, low) were determined by means of logistic regression analysis, adjusted for sex and age. RESULTS: Seventy-eight of 145 patients (54%) returned the questionnaires; mean time-since-stroke was 80.3 months (SD10.2), age-at-stroke 61.7 years (SD13.8), and 46 (59%) were male. Physician contacts concerned mainly the general practitioner (58; 79.5%). Forty-one (52.6%) and 37 (47.4%) of the patients had a high use of physician and other health professionals visits, respectively. Worse PCS scores were associated with both high use of physician and other health professionals visits (OR .931; 95%CI .877-.987 and OR .941; 95%CI .891-.993, respectively), whereas the FAI, MCS, or LUNS were not related to health care use. CONCLUSIONS: Health care use after stroke is substantial and is related to physical aspects of health status, not to mental aspects, activities or unmet needs, suggesting a mismatch between patients' needs and care delivered.

Chen, T., Zhang, B., Deng, Y., et al. (2019). "Long-term unmet needs after stroke: systematic review of evidence from survey studies." J Adv Nurs **9**(5): e028137.

OBJECTIVES: To synthesise evidence on longer term unmet needs perceived by stroke survivors, and psychometric properties of the tools used to evaluate unmet care needs after stroke. DESIGN: Systematic review. SETTING: Community or patients' home. PARTICIPANTS: Stroke survivors. METHODS: We searched PubMed, PsycINFO, CINAHL, EMBASE from inception to 31 March 2018 to identify survey studies that evaluated unmet needs perceived by stroke survivors after hospital discharge. Reported unmet needs were categorised under three domains: body functioning, activity/participation and environmental factors. Ranges of prevalence rates of unmet needs reported in studies were presented. RESULTS: We included 19 eligible studies, with considerable heterogeneity in patients, survey methods and results. Psychometric properties of two stroke-specific tools were formally evaluated, indicating their moderate reliability and content/concurrent validity. The median number of reported unmet needs per stroke survivor was from two to five, and the proportion of stroke survivors with at least one unmet needs was on average 73.8% (range 19.8%- 91.7%). Unmet needs perceived by stroke survivors included 55 records of unmet body functioning needs, 47 records of unmet activities/participatory needs and 101 records of unmet environmental needs. Common unmet service needs were unmet information needs (3.1%- 65.0%), transport (5.4%-53.0%), home help/personal care (4.7%-39.3%) and therapy (2.0%-35.7%).

CONCLUSIONS: The prevalence of unmet long-term needs is high among stroke survivors, and there is considerable heterogeneity in type and frequency of specific unmet needs. More research is required to link regular assessment of long-term unmet needs of stroke survivors with the provision of cost-effective patient-centred health and social care services.

Fisher, R., Chouliara, N., Byrne, A., et al. (2019). "What is the impact of large-scale implementation of stroke Early Supported Discharge? A mixed methods realist evaluation study protocol." Implement Sci **14**(1): 61.

BACKGROUND: Stroke Early Supported Discharge (ESD) is a service innovation that facilitates discharge from hospital and delivery of specialist rehabilitation in patients' homes. There is currently widespread implementation of ESD services in many countries, driven by robust clinical trial evidence. In England, the type of ESD service patients receive on the ground is variable, and in some regions, ESD is still not offered at all. This protocol presents a study designed to investigate the mechanisms and outcomes of implementing ESD at scale in real-world conditions. This will help to establish which models of ESD are most effective and in what context. METHODS: A realist evaluation approach composed of two interlinking work packages will be adopted to investigate how and why ESD works, for whom and in what circumstances. Work package 1 (WP1) will begin with a rapid evidence synthesis to formulate preliminary realist hypotheses. Quantitative analyses of historical prospective Sentinel Stroke National Audit Programme (SSNAP) data will be performed to evaluate service outcomes based on the degree to which evidence-based ESD has been implemented. Work package 2 (WP2) will involve the qualitative investigation of purposively selected case study sites featuring in WP1 and covering different regions in England. The perspectives of clinicians, managers, commissioners, and service users will be explored qualitatively. Cost implications of ESD models will be examined using a cost-consequence analysis. Cross-case comparisons and triangulation of the data sources from both work packages will be performed to test, revise, and refine initial programme theories and address research aims. DISCUSSION: This study will investigate whether and how current large-scale implementation of ESD is achieving the outcomes suggested by the evidence base. The theory-driven evaluation approach will highlight key mechanisms and contextual conditions necessary to optimise outcomes and allow us to draw transferable lessons to inform the effective implementation and sustainability of ESD in clinical practice. In addition, the methodological framework will progress the theoretical understanding of implementation and evaluation of complex rehabilitation interventions in stroke care.

Fulop, N. J. et Ramsay, A. I. G. (2019). "Evaluation of reconfigurations of acute stroke services in different regions of England and lessons for implementation: a mixed-methods study " NIHR Journals **7**(7)
https://www.ncbi.nlm.nih.gov/books/NBK537642/ doi: 10.3310/hsdr07070

BACKGROUND: Centralising acute stroke services is an example of major system change (MSC). 'Hub and spoke' systems, consisting of a reduced number of services providing acute stroke care over the first 72 hours following a stroke (hubs), with a larger number of services providing care beyond this phase (spokes), have been proposed to improve care and outcomes. OBJECTIVE: To use formative evaluation methods to analyse reconfigurations of acute stroke services in different regions of England and to identify lessons that will help to guide future reconfigurations, by studying the following contrasting cases: (1) London (implemented 2010) – all patients eligible for Hyperacute Stroke Units (HASUs); patients admitted 24 hours a day, 7 days a week; (2) Greater Manchester A (GMA) (2010) – only patients presenting within 4 hours are eligible for HASU treatment; one HASU operated 24/7,

two operated from 07.00 to 19.00, Monday to Friday; (3) Greater Manchester B (GMB) (2015) – all patients eligible for HASU treatment (as in London); one HASU operated 24/7, two operated with admission extended to the hours of 07.00–23.00, Monday to Sunday; and (4) Midlands and East of England – planned 2012/13, but not implemented.

McNair, N. D. (2019). "The Projected Transition Trajectory for Survivors and Carers of Patients Who Have Had a Stroke." Nurs Clin North Am **54**(3): 399-408.

Survivors of stroke require long-term follow-up with a focus on rehabilitation, prevention of depression and anxiety, and support for carer. Research is needed in many areas of poststroke care to identify interventions that may ameliorate the sequelae.

Miller, K. K., Lin, S. H. et Neville, M. (2019). "From Hospital to Home to Participation: A Position Paper on Transition Planning Poststroke." Arch Phys Med Rehabil **100**(6): 1162-1175.

Based on a review of the evidence, members of the American Congress of Rehabilitation Medicine Stroke Group's Movement Interventions Task Force offer these 5 recommendations to help improve transitions of care for patients and their caregivers: (1) improving communication processes; (2) using transition specialists; (3) implementing a patient-centered discharge checklist; (4) using standardized outcome measures; and (5) establishing partnerships with community wellness programs. Because of changes in health care policy, there are incentives to improve transitions during stroke rehabilitation. Although transition management programs often include multidisciplinary teams, medication management, caregiver education, and follow-up care management, there is a lack of a comprehensive and standardized approach to implement transition management protocols during poststroke rehabilitation. This article uses the Transitions of Care (TOC) model to conceptualize how to facilitate a comprehensive patient-centered hand off at discharge to maximize patient functioning and health. Specifically, this article reviews current guidelines and provides an evidence summary of several commonly cited approaches (Early Supported Discharge, planned predischarge home visits, discharge checklists) to manage TOC, followed by a description of documented barriers to effective transitions. Patient-centered and standardized transition management may improve community integration, activities of daily living performance, and quality of life for stroke survivors while also decreasing hospital readmission rates during the transition from hospital to home to community.

Olson, D. M. et Juengst, S. B. (2019). "The Hospital to Home Transition Following Acute Stroke." Nurs Clin North Am **54**(3): 385-397.

Advances in stroke detection and treatment have increased the number of patients discharged home following an index stroke admission. Unfortunately, the science of how to facilitate transition of care (TOC) from hospital to home has not kept pace with decades-long focus on restoring cerebral perfusion. This article examines TOC interventions in stroke populations published after the 2011 Agency for Healthcare Research and Quality report. Early supported discharge is the leading TOC intervention. Diversity of outcome measures and use of poorly defined comparators limits generalizability. There is no clear best practice to define interventions targeted at the hospital to home transition.

Rajsic, S., Gothe, H., Borba, H. H., et al. (2019). "Economic burden of stroke: a systematic review on post-stroke care." Eur J Health Econ **20**(1): 107-134.

OBJECTIVES: Stroke is a leading cause for disability and morbidity associated with increased economic burden due to treatment and post-stroke care (PSC). The aim of our study is to provide information on resource consumption for PSC, to identify relevant cost drivers, and to discuss potential information gaps. METHODS: A systematic literature review on economic studies reporting PSC-associated data was performed in PubMed/MEDLINE, Scopus/Elsevier and Cochrane databases, Google Scholar and gray literature ranging from January 2000 to August 2016. Results for post-stroke interventions (treatment and care) were systematically extracted and summarized in evidence tables reporting study characteristics and economic outcomes. Economic results were converted to 2015 US Dollars, and the total cost of PSC per patient month (PM) was calculated. RESULTS: We included 42 studies. Overall PSC costs (inpatient/outpatient) were highest in the USA ($4850/PM) and lowest in Australia ($752/PM). Studies assessing only outpatient care reported the highest cost in the United Kingdom ($883/PM), and the lowest in Malaysia ($192/PM). Fifteen different segments of specific services utilization were described, in which rehabilitation and nursing care were identified as the major contributors. CONCLUSION: The highest PSC costs were observed in the USA, with rehabilitation services being the main cost driver. Due to diversity in reporting, it was not possible to conduct a detailed cost analysis addressing different segments of services. Further approaches should benefit from the advantages of administrative and claims data, focusing on inpatient/outpatient PSC cost and its predictors, assuring appropriate resource allocation.

Søvsø, M. B. (2019). "Contacting out-of-hours primary care or emergency medical services for time-critical conditions - impact on patient outcomes." Health Expect **19**(1): 813.

BACKGROUND: Out-of-hours (OOH) healthcare services in Western countries are often differentiated into out-of-hours primary healthcare services (OOH-PC) and emergency medical services (EMS). Call waiting time, triage model and intended aims differ between these services. Consequently, the care pathway and outcome could vary based on the choice of entrance to the healthcare system. We aimed to investigate patient pathways and 1- and 1-30-day mortality, intensive care unit (ICU) stay and length of hospital stay for patients with acute myocardial infarction (AMI), stroke and sepsis in relation to the OOH service that was contacted prior to the hospital contact.

Swanson, J. O. et Moger, T. A. (2019). "Comparisons of readmissions and mortality based on post-discharge ambulatory follow-up services received by stroke patients discharged home: a register-based study." BMC Health Serv Res **19**(1)

BACKGROUND: Few studies have focused on post-discharge ambulatory care for stroke patients and subsequent differences in readmission and mortality rates. Identifying groups at higher risk according to services received is important when planning post-discharge follow-up in ambulatory care. According to a recent Whitepaper by the Norwegian Government, patients receiving ambulatory care should have follow-up with a general practitioner (GP) within 14 days of hospital discharge. METHODS: All home discharged stroke cases occurring in Oslo from 2009 to 2014 were included. 90- and 365-day all-cause readmissions and mortality were compared separately for patients categorized based on services received (no services, home nursing, ambulatory rehabilitation and home nursing with ambulatory rehabilitation) and early GP follow-up within 14 days following discharge. Variables used to adjust for differences in health status and demographics at admission included inpatient days and comorbidities the year prior to admission, calendar year, sex, age, income, education and functional score. Cox regression reporting hazard ratios (HR) was used. RESULTS: There were no significant differences in readmission rates for early GP follow-up. Patients receiving

home nursing and/or rehabilitation had higher unadjusted 90- and 365-day readmission rates than those without services (HR from 1.87 to 2.63 depending on analysis, p < 0.001), but the 90-day differences disappeared after risk adjustment, except for patients receiving only rehabilitation. There were no significant differences in mortality rates according to GP follow-up after risk adjustment. Patients receiving rehabilitation had higher mortality than those without services, even after adjustment (HR from 2.20 to 2.69, p < 0.001), whereas the mortality of patients receiving only home nursing did not differ from those without services. CONCLUSIONS: Our results indicate that the observed differences in unadjusted readmission and mortality rates according to GP follow-up and home nursing were largely due to differences in health status at admission, likely unrelated to the stroke. On the other hand, mortality for patients receiving ambulatory rehabilitation was twice as high compared to those without, even after adjustment and irrespective of also receiving home nursing. Hence, assessing the needs of these patients during discharge planning and providing careful follow-up after discharge seems important.

Visvanathan, V. (2019). "Early supported discharge services for people with acute stroke: A Cochrane review summary." Int J Nurs Stud **94**: 186-187.

Yang, C. P., Cheng, H. M., Lu, M. C., et al. (2019). "Association between continuity of care and long-term mortality in Taiwanese first-ever stroke survivors: An 8-year cohort study." **14**(5): e0216495.

BACKGROUND: Continuity of care is an important principle of stroke care; however, few analyses of empirically related outcomes have been reported. OBJECTIVE: This study examined the correlation between the continuity of care for outpatients after a stroke event and the survival of stroke patients over the year following hospital discharge. RESEARCH DESIGN: Data from the Taiwan National Health Insurance Database were used in this study. We defined stroke as the ICD-9-CM codes 430 to 437, and all patients were followed up regarding their survival for at least one year. The modified modified continuity index (MMCI) was used as the indicator of continuity of care. Cox proportional hazard models with robust sandwich variance estimates were employed to analyze the correlation between continuity of care and stroke-related death. RESULTS: A total of 9,252 stroke patients were included in the analysis. Those patients who had a high and a completed COC had a higher percentage of survival (97.25% and 95.39%) compared to the other two groups. After controlling for other variables, compared with the low-level continuity of care group, the moderate-level, high-level and completed continuity of care groups still showed a significantly lower risk of death HR (95% CI) were: 0.63 (0.49-0.80), 0.56 (0.40-0.79) and 0.50 (0.39-0.63), respectively. CONCLUSION: Continuity of care may increase the survival among stroke patients and therefore plays an important role in management of stroke after survival.

Yarnoff, B., Khavjou, O., Elmi, J., et al. (2019). "Estimating Costs of Implementing Stroke Systems of Care and Data-Driven Improvements in the Paul Coverdell National Acute Stroke Program." Prev Chronic Dis **16**: E134.

PURPOSE AND OBJECTIVES: We evaluated the costs of implementing coordinated systems of stroke care by state health departments from 2012 through 2015 to help policy makers and planners gain a sense of the potential return on investments in establishing a stroke care quality improvement (QI) program. INTERVENTION APPROACH: State health departments funded by the Paul Coverdell National Acute Stroke Program (PCNASP) implemented activities to support the start and proficient use of hospital stroke registries statewide and coordinate data-driven QI efforts. These efforts were aimed at improving the treatment and transition of stroke patients from prehospital emergency medical services (EMS) to in-

hospital care and postacute care facilities. Health departments provided technical assistance and data to support hospitals, EMS agencies, and posthospital care agencies to carry out small, rapid, incremental QI efforts to produce more effective and efficient stroke care practices. EVALUATION METHODS: Six of the 11 PCNASP-funded state health departments in the United States volunteered to collect and report programmatic costs associated with implementing the components of stroke systems of care. Six health departments reported costs paid directly by Centers for Disease Control and Prevention-provided funds, 5 also reported their own in-kind contributions, and 4 compiled data from a sample of their partners' estimated costs of resources, such as staff time, involved in program implementation. Costs were analyzed separately for PCNASP-funded expenditures and in-kind contributions by the health department by resource category and program activity. In-kind contributions by partners were also analyzed separately. RESULTS: PCNASP-funded expenditures ranged from $790,123 to $1,298,160 across the 6 health departments for the 3-year funding period. In-kind contributions ranged from $5,805 to $1,394,097. Partner contributions (n = 22) ranged from $3,912 to $362,868. IMPLICATIONS FOR PUBLIC HEALTH: Our evaluation reports costs for multiple state health departments and their partners for implementing components of stroke systems of care in the United States. Although there are limitations, our findings represent key estimates that can guide future program planning and efforts to achieve sustainability.

Burton, J. K., Ferguson, E. E. C., Barugh, A. J., et al. (2018). "Predicting Discharge to Institutional Long-Term Care After Stroke: A Systematic Review and Metaanalysis." **66**(1): 161-169.

BACKGROUND/OBJECTIVES: Stroke is a leading cause of disability worldwide, and a significant proportion of stroke survivors require long-term institutional care. Understanding who cannot be discharged home is important for health and social care planning. Our aim was to establish predictive factors for discharge to institutional care after hospitalization for stroke.

Hempler, I., Woitha, K., Thielhorn, U., et al. (2018). "Post-stroke care after medical rehabilitation in Germany: a systematic literature review of the current provision of stroke patients." BMC Health Serv Res **18**(1): 468.

BACKGROUND: Although Germany's acute care for stroke patients already has a good reputation, continuous follow-up care is still not widely available, a problem originating in the strict separation of inpatient and outpatient care. This gap in the German health care system does not just lead to patients' potential readmission to inpatient care and compromise the sustainability of what they have accomplished during medical rehabilitation; it also places a burden on caregivers. METHODS: To illustrate the current procedures on follow-up care of stroke patients in Germany, a systematic literature search was conducted to gather all available evidence. Research articles in the English or German language were searched between 2007 and 2017. Different study designs ranging from non-experimental descriptive studies, expert reports and opinions were included and categorised by two independent researchers. Relevant data was electronically searched through international and national databases and incorporated in a summary grid to investigate research outcomes and realise a narrative synthesis. RESULTS: A literature search was conducted to identify all relevant information on how current follow-up care is carried out and evaluated in Germany. We identified no systematic reviews on this topic but included a total of 18 publications of various original studies, reviews and expert opinions. Included study populations also differed in either: experts, caregivers or stroke patients, including their viewpoints on the outpatient care situation of stroke patients; to capture their need for assistance or to

investigate caregivers need and use for assistance. So far there is no standardised follow-up care in Germany, but this review reveals that multidisciplinary cooperation within occupational groups in outpatient rehabilitation is a key item that can influence and improve the follow-up care of stroke patients. CONCLUSION: This review was conducted to provide a broadly based overview of the current follow-up care of stroke patients in Germany. Both the new implementation of a standardised, discharge service that supports early support, to be initiated this year and numerous approaches are promising steps into the right direction to close the follow-up gap in German health care provision.

Perry, C. (2018). "Patient experience of centralized acute stroke care pathways." Biomed Res Int **21**(5): 909-918.

BACKGROUND: In 2010, Greater Manchester (GM) and London centralized acute stroke care services into a reduced number of hyperacute stroke units, with local stroke units providing on-going care nearer patients' homes. OBJECTIVE: To explore the impact of centralized acute stroke care pathways on the experiences of patients. DESIGN: Qualitative interview study. Thematic analysis was undertaken, using deductive and inductive approaches. Final data analysis explored themes related to five chronological phases of the centralized stroke care pathway. SETTING AND PARTICIPANTS: Recruitment from 3 hospitals in GM (15 stroke patients/8 family members) and 4 in London (21 stroke patients/9 family members). RESULTS: Participants were impressed with emergency services and initial reception at hospital: disquiet about travelling further than a local hospital was allayed by clear explanations. Participants knew who was treating them and were involved in decisions. Difficulties for families visiting hospitals a distance from home were raised. Repatriation to local hospitals was not always timely, but no detrimental effects were reported. Discharge to the community was viewed less positively. DISCUSSION AND CONCLUSIONS: Patients on the centralized acute stroke care pathways reported many positive aspects of care: the centralization of care pathways can offer patients a good experience. Disadvantages of travelling further were perceived to be outweighed by the opportunity to receive the best quality care. This study highlights the necessity for all staff on a centralized care pathway to provide clear and accessible information to patients, in order to maximize their experience of care.

Sarfo, F. S., Ulasavets, U., Opare-Sem, O. K., et al. (2018). "Tele-Rehabilitation after Stroke: An Updated Systematic Review of the Literature." J Stroke Cerebrovasc Dis **27**(9): 2306-2318.

BACKGROUND: Tele-rehabilitation for stroke survivors has emerged as a promising intervention for remotely supervised administration of physical, occupational, speech, and other forms of therapies aimed at improving motor, cognitive, and neuropsychiatric deficits from stroke. OBJECTIVE: We aimed to provide an updated systematic review on the efficacy of tele-rehabilitation interventions for recovery from motor, higher cortical dysfunction, and poststroke depression among stroke survivors. METHODS: We searched PubMed and Cochrane library from January 1, 1980, to July 15, 2017 using the following keywords: "Telerehabilitation stroke," "Mobile health rehabilitation," "Telemedicine stroke rehabilitation," and "Telerehabilitation." Our inclusion criteria were randomized controlled trials, pilot trials, or feasibility trials that included an intervention group that received any tele-rehabilitation therapy for stroke survivors compared with a control group on usual or standard of care. RESULTS: This search yielded 49 abstracts. By consensus between 2 investigators, 22 publications met the criteria for inclusion and further review. Tele-rehabilitation interventions focused on motor recovery (n = 18), depression, or caregiver strain (n = 2) and higher cortical dysfunction (n = 2). Overall, tele-rehabilitation interventions

were associated with significant improvements in recovery from motor deficits, higher cortical dysfunction, and depression in the intervention groups in all studies assessed, but significant differences between intervention versus control groups were reported in 8 of 22 studies in favor of tele-rehabilitation group while the remaining studies reported nonsignificant differences. CONCLUSION: This updated systematic review provides evidence to suggest that tele-rehabilitation interventions have either better or equal salutary effects on motor, higher cortical, and mood disorders compared with conventional face-to-face therapy.

Tchero, H. et Tabue Teguo, M. (2018). "Telerehabilitation for Stroke Survivors: Systematic Review and Meta-Analysis." **20**(10): e10867.

BACKGROUND: Telerehabilitation is an emerging technology through which medical rehabilitation care can be provided from a distance. OBJECTIVE: This systematic review and meta-analysis aims to investigate the efficacy of telerehabilitation in poststroke patients. METHODS: Eligible randomized controlled trials (RCTs) were identified by searching MEDLINE, Cochrane Central, and Web of Science databases. Continuous data were extracted for relevant outcomes and analyzed using the RevMan software as the standardized mean difference (SMD) and 95% CI in a fixed-effect meta-analysis model. RESULTS: We included 15 studies (1339 patients) in our systematic review, while only 12 were included in the pooled analysis. The combined effect estimate showed no significant differences between the telerehabilitation and control groups in terms of the Barthel Index (SMD -0.05, 95% CI -0.18 to 0.08), Berg Balance Scale (SMD -0.04, 95% CI -0.34 to 0.26), Fugl-Meyer Upper Extremity (SMD 0.50, 95% CI -0.09 to 1.09), and Stroke Impact Scale (mobility subscale; SMD 0.18, 95% CI -0.13 to 0.48]) scores. Moreover, the majority of included studies showed that both groups were comparable in terms of health-related quality of life (of stroke survivors), Caregiver Strain Index, and patients' satisfaction with care. One study showed that the cost of telerehabilitation was lower than usual care by US $867. CONCLUSIONS: Telerehabilitation can be a suitable alternative to usual rehabilitation care in poststroke patients, especially in remote or underserved areas. Larger studies are needed to evaluate the health-related quality of life and cost-effectiveness with the ongoing improvements in telerehabilitation networks.

Thorpe, E. R., Garrett, K. B., Smith, A. M., et al. (2018). "Outcome Measure Scores Predict Discharge Destination in Patients With Acute and Subacute Stroke: A Systematic Review and Series of Meta-analyses." J Neurol Phys Ther **42**(1): 2-11.

BACKGROUND AND PURPOSE: To identify the association between outcome measure score and discharge destination in adults following acute or subacute stroke in the United States. METHODS: A systematic literature search was performed in 3 databases using the PRISMA guidelines. Cohort studies were selected that included patients with acute or subacute stroke, which explored the relationship between scores on outcome measures and discharge destination. Four meta-analyses were performed.

Tyagi, S., Koh, G. C., Nan, L., et al. (2018). "Healthcare utilization and cost trajectories post-stroke: role of caregiver and stroke factors." BMC Health Serv Res **18**(1): 881.

BACKGROUND: It is essential to study post-stroke healthcare utilization trajectories from a stroke patient caregiver dyadic perspective to improve healthcare delivery, practices and eventually improve long-term outcomes for stroke patients. However, literature addressing

this area is currently limited. Addressing this gap, our study described the trajectory of healthcare service utilization by stroke patients and associated costs over 1-year post-stroke and examined the association with caregiver identity and clinical stroke factors.

Van der Zee, D. J., Luijckx, G. J., Buskens, E., et al. (2018). "Patient experience of centralized acute stroke care pathways." BMJ Open **21**(5): 909-918.

BACKGROUND: In 2010, Greater Manchester (GM) and London centralized acute stroke care services into a reduced number of hyperacute stroke units, with local stroke units providing on-going care nearer patients' homes. OBJECTIVE: To explore the impact of centralized acute stroke care pathways on the experiences of patients. DESIGN: Qualitative interview study. Thematic analysis was undertaken, using deductive and inductive approaches. Final data analysis explored themes related to five chronological phases of the centralized stroke care pathway. SETTING AND PARTICIPANTS: Recruitment from 3 hospitals in GM (15 stroke patients/8 family members) and 4 in London (21 stroke patients/9 family members). RESULTS: Participants were impressed with emergency services and initial reception at hospital: disquiet about travelling further than a local hospital was allayed by clear explanations. Participants knew who was treating them and were involved in decisions. Difficulties for families visiting hospitals a distance from home were raised. Repatriation to local hospitals was not always timely, but no detrimental effects were reported. Discharge to the community was viewed less positively. DISCUSSION AND CONCLUSIONS: Patients on the centralized acute stroke care pathways reported many positive aspects of care: the centralization of care pathways can offer patients a good experience. Disadvantages of travelling further were perceived to be outweighed by the opportunity to receive the best quality care. This study highlights the necessity for all staff on a centralized care pathway to provide clear and accessible information to patients, to maximize their experience of care.

Zhang, D., Wang, G., Zhu, W., et al. (2018). "Expansion Of Telestroke Services Improves Quality Of Care Provided In Super Rural Areas." Health Aff (Millwood) **37**(12): 2005-2013.

Telestroke is a telemedicine intervention that facilitates communication between stroke centers and lower-resourced facilities to optimize acute stroke management. Using administrative claims data, we assessed trends in telestroke use among fee-for-service Medicare beneficiaries with acute ischemic stroke and the association between providing telestroke services and intravenous tissue plasminogen activator (IV tPA) and mechanical thrombectomy use, mortality, and medical expenditures, by urban versus rural county of residence in the period 2008-15. The proportion of ischemic stroke cases receiving telestroke increased from 0.4 to 3.8 per 1,000 cases, with usage highest among younger, male, non-Hispanic white, and patients in rural or super rural areas (super rural is the bottom quartile of rural areas. Compared with patients receiving usual care, those receiving telestroke had greater IV tPA and mechanical thrombectomy use regardless of county type, while those in super rural counties had lower thirty-day all-cause mortality. Despite increased telestroke use, rural patients remained less likely than urban patients to receive IV tPA. The findings suggest that telestroke service expansion efforts have increased, especially in rural and super rural counties, and have improved outcomes.

Flynn, D., Francis, R., Robalino, S., et al. (2017). "A review of enhanced paramedic roles during and after hospital handover of stroke, myocardial infarction and trauma patients." BMC Emerg Med **17**(1): 5.

BACKGROUND: Ambulance paramedics play a critical role expediting patient access to emergency treatments. Standardised handover communication frameworks have led to improvements in accuracy and speed of information transfer but their impact upon time-critical scenarios is unclear. Patient outcomes might be improved by paramedics staying for a limited time after handover to assist with shared patient care. We aimed to categorize and synthesise data from studies describing development/extension of the ambulance-based paramedic role during and after handover for time-critical conditions (trauma, stroke and myocardial infarction). METHODS: We conducted an electronic search of published literature (Jan 1990 to Sep 2016) by applying a structured strategy to eight bibliographic databases. Two reviewers independently assessed eligible studies of paramedics, emergency medical (or ambulance) technicians that reported on the development, evaluation or implementation of (i) generic or specific structured handovers applied to trauma, stroke or myocardial infarction (MI) patients; or (ii) paramedic-initiated care processes at handover or post-handover clinical activity directly related to patient care in secondary care for trauma, stroke and MI. Eligible studies had to report changes in health outcomes. RESULTS: We did not identify any studies that evaluated the health impact of an emergency ambulance paramedic intervention following arrival at hospital. A narrative review was undertaken of 36 studies shortlisted at the full text stage which reported data relevant to time-critical clinical scenarios on structured handover tools/protocols; protocols/enhanced paramedic skills to improve handover; or protocols/enhanced paramedic skills leading to a change in in-hospital transfer location. These studies reported that (i) enhanced paramedic skills (diagnosis, clinical decision making and administration of treatment) might supplement handover information; (ii) structured handover tools and feedback on handover performance can impact positively on paramedic behaviour during clinical communication; and (iii) additional roles of paramedics after arrival at hospital was limited to 'direct transportation' of patients to imaging/specialist care facilities. CONCLUSIONS: There is insufficient published evidence to make a recommendation regarding condition-specific handovers or extending the ambulance paramedic role across the secondary/tertiary care threshold to improve health outcomes. However, previous studies have reported non-clinical outcomes which suggest that structured handovers and enhanced paramedic actions after hospital arrival might be beneficial for time-critical conditions and further investigation is required.

Gaughan, J., Gravelle, H., Santos, R., et al. (2017). "Long-term care provision, hospital bed blocking, and discharge destination for hip fracture and stroke patients." Int J Health Econ Manag. **17**(3):311-331

We examine the relationship between long-term care supply (care home beds and prices) and (i) the probability of being discharged to a care home and (ii) length of stay in hospital for patients admitted to hospital for hip fracture or stroke. Using patient level data from all English hospitals and allowing for a rich set of demographic and clinical factors, we find no association between discharge destination and long-term care beds supply or prices. We do, however, find evidence of bed blocking: hospital length of stay for hip fracture patients discharged to a care home is shorter in areas with more long-term care beds and lower prices. Length of stay is over 30% shorter in areas in the highest quintile of care home beds supply compared to those in the lowest quintile.

Hodson, T., Gustafsson, L., Cornwell, P., et al. (2017). "Post-acute hospital healthcare services for people with mild stroke: a scoping review." Top Stroke Rehabil **24**(4): 288-298.

BACKGROUND: People with mild stroke comprise a significant proportion of the overall stroke population. Previously this population has been viewed as having limited

impairments, receiving minimal services following hospital discharge. Recent findings demonstrate that the implications of mild stroke are more significant than originally comprehended, warranting further services. OBJECTIVES: To identify the evidence-base regarding services for people with mild stroke, post-acute hospital discharge, that target secondary prevention and/or changes following stroke. METHODS: Scoping review utilizing the five-stage framework proposed by Arksey and O'Malley, with revisions by Levac, Colquhuon, and O'Brien. Framework stages included: identification of a research question and relevant studies, study selection, charting of data, and collating, summarizing, and reporting. A critical appraisal using the Downs and Black Checklist was added to determine methodological quality of studies. The search strategy used six databases: Pubmed, Embase, PsycINFO, CINAHL, OTseeker, and Scopus, alongside a hand-search. Three researchers were involved in article selection and two in critical appraisal. RESULTS: Twelve articles met inclusion criteria from 589 identified. Several study methodologies were used to assess services, with varying methodological qualities. Studies were located within two major regions in the world. Five main approaches to service provision were identified: telehealth, exercise and education, Comprehensive Cardiac Rehabilitation, one-off visits and care-plan development, and community group programs. Most programs focused on secondary prevention and were aimed at an impairment level, with a mix of findings observed. CONCLUSION: Further development and assessment of services is warranted. Incorporation of the entire transition period, and research that is mild stroke and location-specific is advised. Attention to maximizing participation in daily life, secondary prevention, emotional well-being, and careful reporting is needed.

Kandiyali, R., Lasserson, D. S., Whiting, P., et al. (2017). "Predictive values of referrals for transient ischaemic attack from first-contact health care: a systematic review." Br J Gen Pract **67**(665): e871-e880.

BACKGROUND: Over 150 000 cases of suspected transient ischaemic attack (TIA) are referred to outpatient clinics in England each year. Most referrals are made by GPs. AIM: This study aimed to identify how many patients referred to a TIA clinic have TIA (that is, calculate the positive predictive value [PPV] of first-contact healthcare referral) and to record the alternative diagnoses in patients without TIA, in order to determine the optimal service model for patients with suspected TIA. DESIGN AND SETTING: A systematic review of TIA clinic referrals from first-contact health professionals (GPs and emergency department [ED] doctors) was undertaken. METHOD: Four databases were searched using terms for TIA and diagnostic accuracy. Data on the number of patients referred to a TIA clinic who actually had a TIA (PPVs) were extracted. Frequencies of differential diagnoses were recorded, where reported. Study quality was assessed using the QUADAS-2 tool. RESULTS: Nineteen studies were included and reported sufficient information on referrals from GPs and ED doctors to derive PPVs (n = 15 935 referrals). PPVs for TIA ranged from 12.9% to 72.5%. A formal meta-analysis was not conducted due to heterogeneity across studies. Of those not diagnosed with TIA, approximately half of the final diagnoses were of neurological or cardiovascular conditions. CONCLUSION: This study highlights the variation in prevalence of true vascular events in patients referred to TIA clinics. For patients without a cerebrovascular diagnosis, the high prevalence of conditions that also require specialist investigations and management are an additional burden on a care pathway that is primarily designed to prevent recurrent stroke. Service commissioners need to assess whether the existing outpatient provision is optimal for people with pathologies other than cerebrovascular disease.

Langhorne, P. et Baylan, S. (2017). "Early supported discharge services for people with acute stroke." PLoS One **7**(7): Cd000443.

BACKGROUND: People with stroke conventionally receive a substantial part of their rehabilitation in hospital. Services have now been developed that offer people in hospital an early discharge with rehabilitation at home (early supported discharge: ESD). OBJECTIVES: To establish if, in comparison with conventional care, services that offer people in hospital with stroke a policy of early discharge with rehabilitation provided in the community (ESD) can: 1) accelerate return home, 2) provide equivalent or better patient and carer outcomes, 3) be acceptable satisfactory to patients and carers, and 4) have justifiable resource implications use. SEARCH METHODS: We searched the Cochrane Stroke Group Trials Register (January 2017), Cochrane Central Register of Controlled Trials (CENTRAL 2017, Issue 1) in the Cochrane Library (searched January 2017), MEDLINE in Ovid (searched January 2017), Embase in Ovid (searched January 2017), CINAHL in EBSCO (Cumulative Index to Nursing and Allied Health Literature; 1937 to December 2016), and Web of Science (to January 2017). In an effort to identify further published, unpublished, and ongoing trials we searched six trial registries (March 2017). We also performed citation tracking of included studies, checked reference lists of relevant articles, and contacted trialists. SELECTION CRITERIA: Randomised controlled trials (RCTs) recruiting stroke patients in hospital to receive either conventional care or any service intervention that has provided rehabilitation and support in a community setting with an aim of reducing the duration of hospital care. DATA COLLECTION AND ANALYSIS: The primary patient outcome was the composite end-point of death or long-term dependency recorded at the end of scheduled follow-up. Two review authors scrutinised trials, categorised them on their eligibility and extracted data. Where possible we sought standardised data from the primary trialists. We analysed the results for all trials and for subgroups of patients and services, in particular whether the intervention was provided by a co-ordinated multidisciplinary team (co-ordinated ESD team) or not. We assessed risk of bias for the included trials and used GRADE to assess the quality of the body of evidence. MAIN RESULTS: We included 17 trials, recruiting 2422 participants, for which outcome data are currently available. Participants tended to be a selected elderly group of stroke survivors with moderate disability. The ESD group showed reductions in the length of hospital stay equivalent to approximately six days (mean difference (MD) -5.5; 95% confidence interval (CI) -3 to -8 days; P < 0.0001; moderate-grade evidence). The primary outcome was available for 16 trials (2359 participants). Overall, the odds ratios (OR) for the outcome of death or dependency at the end of scheduled follow-up (median 6 months; range 3 to 12) was OR 0.80 (95% CI 0.67 to 0.95, P = 0.01, moderate-grade evidence) which equates to five fewer adverse outcomes per 100 patients receiving ESD. The results for death (16 trials; 2116 participants) and death or requiring institutional care (12 trials; 1664 participants) were OR 1.04 (95% CI 0.77 to 1.40, P = 0.81, moderate-grade evidence) and OR 0.75 (95% CI 0.59 to 0.96, P = 0.02, moderate-grade evidence), respectively. Small improvements were also seen in participants' extended activities of daily living scores (standardised mean difference (SMD) 0.14, 95% CI 0.03 to 0.25, P = 0.01, low-grade evidence) and satisfaction with services (OR 1.60, 95% CI 1.08 to 2.38, P = 0.02, low-grade evidence). We saw no clear differences in participants' activities of daily living scores, patients subjective health status or mood, or the subjective health status, mood or satisfaction with services of carers. We found low-quality evidence that the risk of readmission to hospital was similar in the ESD and conventional care group (OR 1.09, 95% CI 0.79 to 1.51, P = 0.59, low-grade evidence). The evidence for the apparent benefits were weaker at one- and five-year follow-up. Estimated costs from six individual trials ranged from 23% lower to 15% greater for the ESD group in comparison to usual care.In a series of pre-planned analyses, the greatest reductions in death or dependency were seen in the trials evaluating a co-ordinated ESD team with a suggestion of poorer results in those services without a co-ordinated team (subgroup interaction at P = 0.06). Stroke patients with mild to moderate disability at baseline showed greater reductions

in death or dependency than those with more severe stroke (subgroup interaction at P = 0.04). AUTHORS' CONCLUSIONS: Appropriately resourced ESD services with co-ordinated multidisciplinary team input provided for a selected group of stroke patients can reduce long-term dependency and admission to institutional care as well as reducing the length of hospital stay. Results are inconclusive for services without co-ordinated multidisciplinary team input. We observed no adverse impact on the mood or subjective health status of patients or carers, nor on readmission to hospital.

Nunes, H. J. et Queirós, P. J. (2017). "Patient with stroke: hospital discharge planning, functionality and quality of life." Rev Bras Enferm **70**(2): 415-423.

Stroke still causes high levels of human inability and suffering, and it is one of the main causes of death in developed countries, including Portugal. OBJECTIVE: analyze the strategies of hospital discharge planning for these patients, increasing the knowledge related to hospitalhome transition, discharge planning processes and the main impact on the quality of life and functionality. METHOD: integrative literature review using the PICOD criteria, with database research. RESULTS: 19 articles were obtained, using several approaches and contexts. For quality of life, the factors related to the patient satisfaction with care and the psychoemotional aspects linked with functionality are the most significant. CONCLUSION: during the hospitalization period, a careful hospital discharge planning and comprehensive care to patients and caregivers - in particular the functional and psychoemotional aspects - tend to have an impact on the quality of life of patients.

Pross, C., Busse, R. et Geissler, A. (2017). "Hospital quality variation matters - A time-trend and cross-section analysis of outcomes in German hospitals from 2006 to 2014." Health Policy **121**(8): 842-852.

Awareness of care variation and associated differences in outcome quality is important for patients to recognize and leverage the benefits of hospital choice and for policy makers, providers, and suppliers to adapt initiatives to improve hospital quality of care. We examine panel data on outcome quality in German hospitals between 2006 and 2014 for cholecystectomy, pacemaker implantation, hip replacement, percutaneous coronary intervention (PCI), stroke, and acute myocardial infarction (AMI). We use risk-adjusted and unadjusted outcomes based on 16 indicators. Median outcome and outcome variation trends are examined via box plots, simple linear regressions and quintile differences. Outcome trends differ across treatment areas and indicators. We found positive quality trends for hip replacement surgery, stroke and AMI 30-day mortality, and negative quality trends for 90-day stroke and AMI readmissions and PCI inpatient mortality. Variation of risk-adjusted outcomes ranges by a factor of 3-12 between the 2nd and 5th quintile of hospitals, both at the national and regional level. Our results show that simply measuring and reporting hospital outcomes without clear incentives or regulation - "carrots and sticks" - to improve performance and to centralize care in high performing hospitals has not led to broad quality improvements. More substantial efforts must be undertaken to narrow the outcome spread between high- and low-quality hospitals.

Puy, L., Lamy, C., Canaple, S., et al. (2017). "Creation of an intensive care unit and organizational changes in an adult emergency department: Impact on acute stroke management." Am J Emerg Med **35**(5): 716-719.

BACKGROUND AND PURPOSE: Following the reorganization of a University Medical Center onto a single campus, an Intensive Care Unit was created within the adult Emergency Department (ED ICU). We assessed the effects of these organizational changes on acute

stroke management and the intravenous administration of recombinant tissue plasminogen activator (IV rtPA), as characterized by the thrombolysis rate, door-to-needle time (DNT) and outcome at 3months. METHODS: Between October 2013 and September 2015, we performed a retrospective, observational, single-center, comparative study of patients admitted for ischemic stroke and treated with IV rtPA during two 321-day periods (before and after the creation of the ED ICU). All patients with ischemic stroke were included. Multivariable logistic regression models were performed. The DNT was stratified according to a threshold of 60min. A favorable long-term outcome was defined as a modified Rankin score</=2 at 3months. RESULTS: A total of 1334 ischemic stroke patients were included. Among them, 101 patients received IV rtPA. The frequency of IV rtPA administration was 5.8% (39 out of 676) before the creation of the ED ICU, and 9.3% (62 out of 668) afterwards (odds ratio (OR) [95% confidence interval (CI)]: 1.67 [1.08-2.60]; p=0.02). Additionally, the DNT was shorter (OR [95%CI]: 4.30 [1.17-20.90]; p=0.04) and there was an improvement in the outcome (OR [95%CI]=1.30 [1.01-2.10]; p=0.045). CONCLUSION: Our results highlight the benefits of a separate ED ICU within conventional ED for acute stroke management, with a higher thrombolysis rate, reduced intrahospital delays and better safety.

Sablot, D., Gaillard, N., Colas, C., et al. (2017). "Results of a 1-year quality-improvement process to reduce door-to-needle time in acute ischemic stroke with MRI screening." Rev Neurol (Paris) **173**(1-2): 47-54.

OBJECTIVE: To determine the effects of a 1-year quality-improvement (QI) process to reduce door-to-needle (DTN) time in a secondary general hospital in which multimodal MRI screening is used before tissue plasminogen activator (tPA) administration in patients with acute ischemic stroke (AIS). METHODS: The QI process was initiated in January 2015. Patients who received intravenous (iv) tPA<4.5h after AIS onset between 26 February 2015 to 25 February 2016 (during implementation of the QI process; the "2015 cohort") were identified (n=130), and their demographic and clinical characteristics and timing metrics compared with those of patients treated by iv tPA in 2014 (the "2014 cohort", n=135). RESULTS: Of the 130 patients in the 2015 cohort, 120 (92.3%) of them were screened by MRI. The median DTN time was significantly reduced by 30% (from 84min in 2014 to 59min; P<0.003), while the proportion of treated patients with a DTN time</=60min increased from 21% to 52% (P<0.0001). Demographic and baseline characteristics did not significantly differ between cohorts, and the improvement in DTN time was associated with better outcomes after discharge (patients with a 0-2 score on the modified ranking scale: 59% in the 2015 cohort vs 42.4% in the 2014 cohort; P<0.01). During the 1-year QI process, the median DTN time decreased by 15% (from 65min in the first trimester to 55min in the last trimester; P</=0.04) with a non-significant 1.5-fold increase in the proportion of treated patients with a DTN time</=60min (from 41% to 62%; P=0.09). CONCLUSION: It is feasible to deliver tPA to patients with AIS within 60min in a general hospital, using MRI as the routine screening modality, making this QI process to reduce DTN time widely applicable to other secondary general hospitals.

Wang, Y., Yang, F., Shi, H., et al. (2017). "What Type of Transitional Care Effectively Reduced Mortality and Improved ADL of Stroke Patients? A Meta-Analysis." Int J Environ Res Public Health **14**(5).

Stroke is a major cause of disability and mortality worldwide; yet; prior to this study; there had been no sufficient evidence to support the effectiveness of various transitional care

interventions (TCI) on the disability and mortality of stroke survivors. This meta-analysis aimed to assess the effectiveness of TCI in reducing mortality and improving the activities of daily life (ADL) of stroke patients. PubMed; Web of Science; OVID; EMBASE; CINAHL; and Sino-Med were searched for articles published before November 2016. Thirty-one randomized controlled trials (RCTs) were identified in the study. This analysis showed that the total effect of TCI on reducing mortality was limited (Risk Ratio (RR) = 0.86; 95% Confidence Interval (CI): 0.75-0.98); that only home-visiting programs could reduce mortality rates (RR = 0.34; 95% CI: 0.17-0.67) compared with usual care; and that the best intervention was led by a multidisciplinary team (MT) ≤3 months (RR = 0.19; 95% CI: 0.05-0.71). In addition, home-visiting programs also produced ADL benefit (RR = 0.56; 95% CI: 0.31-0.81). Overall, there was a statistically significant difference in improving patients' independence between TCI and usual care (RR = 1.12; 95% CI: 1.02-1.23). However, none of the interventions was effective when they were differentiated in the analysis. It is the conclusion of this study that home-visiting programs; especially those led by MTs; should receive the greatest consideration by healthcare systems or providers for implementing TCI to stroke survivors.

Zwahlen, M., Nishi, T., Maeda, T., et al. (2017). "Impact of financial incentives for inter-provider care coordination on health-care resource utilization among elderly acute stroke patients." BMJ Open **29**(4): 490-498.

OBJECTIVE: To examine the impact of inter-provider care coordination on health-care resource utilization among elderly acute stroke patients. DESIGN: A retrospective cohort study using health-care insurance claims data. SETTING: Claims data of the Fukuoka Prefecture Wide-Area Association of Latter-Stage Elderly Healthcare. PARTICIPANTS: About, 6409 patients aged 75 years or older admitted for acute stroke and moved to rehabilitation wards from 1 April 2010 to 30 September 2015. MAIN OUTCOME MEASURE: Lengths of stay (LOS) and total charge (TC) were evaluated according to three groups of care pathways (coordinated care, integrated care and other pathways). RESULTS: Compared with the other care pathway, the coordinated care groups had significantly shorter LOS of 2.0 days in acute ischemic stroke care; they had 2.5 days shorter LOS in hemorrhagic stroke care. However, there were no significant differences in rehabilitation care LOS and TC. CONCLUSIONS: Our findings suggest that a payment system for care coordination is inappropriate since it was not associated with a reduction in overall health-care resource utilization. Further, health-care system reform is necessary to improve care continuity across multiple health-care institutions in Japan.

Arnao, V., Popovic, N. et Caso, V. (2016). "How is stroke care organised in Europe?" La Presse Médicale **45**(12, Part 2): e399-e408.
https://www.sciencedirect.com/science/article/pii/S0755498216303104

Summary Introduction There is a wide difference in stroke care in European Countries, conditioning the performance in stroke management. Objective The authors review current national and regional stroke organisational models and their adherence to current European Stroke Organisation (ESO) guidelines across the Europe and on-going European Stroke Projects. Stroke Care Models investigated in: Austria, Switzerland, Bavaria (Germany), London and Greater Manchester in the UK, Catalonia (Spain), Lombardy Region in Italy, Poland and Northern Portugal. Discussion There is a lack of uniform stroke care in European Countries as defined by current ESO guidelines. For this reason, ESO has established the Stroke Unit Certification Platform to make uniform stroke care systems with high quality performances in every part of Europe.

Martin, S., Street, A., Han, L., et al. (2016). "Have hospital readmissions increased in the face of reductions in length of stay? Evidence from England." Health Policy **120**(1): 89-99.

> We assess the relationship between changes in hospital length of stay (LoS) and hospital quality, as measured by 28-day emergency readmission. We estimate regression models to analyse LoS and other factors associated with readmission for all those admitted for hip replacement (n=496,334), hernia repair (n=413,712) or following a stroke (n=480,113) in England between 2002/3 and 2007/8. There were reductions in LoS over time while changes in crude readmission rates varied by condition. Given the high mortality rate for stroke, it is critical to account for the probability of surviving the initial admission when evaluating readmissions. Conditional upon survival, the probability of readmission was greater for stroke patients who originally had a shorter LoS and for hernia patients who had an overnight stay but there is no relationship between LoS and readmission for patients who had hip replacement. The evidence does not generally suggest that reductions in LoS were associated with an increased probability of emergency readmission.

Menoux, D. (2016). "Typology evolution of patients hospitalized after recent stroke in PRM department over 15 years: A retrospective observational study." Annals of Physical and Rehabilitation Medicine **59**: e69.
https://www.sciencedirect.com/science/article/pii/S1877065716302408

> Since 10 years, health care for stroke patients had increased considerably: increasing number of the stroke units, development of authorized neurological specialized PRM departments, and new therapies used (thrombolysis, thrombectomy). These evolutions could impact the typology of patients hospitalized in PRM units after recent stroke. This study aims to look at such a possible evolution in our department and try to identify the potential factors of change. Material/Patients and methods Retrospective study conducted on 7 years chosen over the last 15 years among hospitalized patients after recent stroke: demographic data, stroke's characteristics, treatments, length of stay and clinical characteristics. Statistic analysis on the evolution of these data was based on Chi2 and Anova analysis. Results Six hundred and forty-two medical records were reviewed (225 women and 417 men, 432 ischemic stroke and 210 hemorrhagic, mean age 58 years [17–93, SD 13.2])). There was no difference regarding the characteristics of stroke (ischemic/hemorrhagic, unique/multiple, first/recurrence), entrance delay and length of stay. As expected, the frequency of thrombolysis and thrombectomy increased (P<0.005). The number of categories 3 SOFMER patients and cognitive disorders increased (P<0.005), contrasting with the increase of walking patients at entrance and discharge, as well as the functionality of the paretic upper limb (P<0.005) which probably explain the increase of entrance (P=0.003) and discharges FIM scores (P=0.009). A significant decreasing of usual complications as disabling spasticity and shoulder pain was observed (P<0.05). Discussion - Conclusion The findings showed significant changes in the typology of patients admitted after recent stroke in PRM department since 7 years, reflecting impact of health care for stroke patients.

Martin, S., Street, A., Han, L., et al. (2016). "Have hospital readmissions increased in the face of reductions in length of stay? Evidence from England." Health Policy **120**(1): 89-99.

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England between 2002/3 and 2007/8. There were reductions in LoS over time while changes in crude readmission rates varied by condition. Given the high mortality rate for stroke, it is critical to account for the probability of surviving the initial admission when evaluating readmissions. Conditional upon survival, the probability of readmission was greater for stroke patients who originally had a shorter LoS and for hernia patients who had an overnight stay but there is no relationship between LoS and readmission for patients who had hip replacement. The evidence does not generally suggest that reductions in LoS were associated with an increased probability of emergency readmission.

Meijering, L., Nanninga, C. S. et Lettinga, A. T. (2016). "Home-making after stroke. A qualitative study among Dutch stroke survivors." Health Place **37**: 35-42.

Stroke survivors may suffer from physical limitations as well as cognitive and behavioural difficulties. Many survivors work on their recovery in a rehabilitation clinic with the aim to return to their own home again. Since full recovery is often not feasible, they face the challenge of coming to terms with lasting effects of the stroke and of giving meaning to their home place again. Based on in-depth interviews with stroke survivors, we discuss the meaning of the home with respect to changed post-stroke identities. Our findings show how, for many participants, a formerly comfortable home becomes a space of struggle. Formerly stable bodily routines become time-consuming and demanding, reciprocal relationships with significant others change, often becoming unbalanced dependence. In conclusion, each stroke survivor faces a different struggle to accommodate a changed self in a house that does not feel like home anymore. These findings imply that stroke rehabilitation services need to address the individual and everyday challenges that stroke survivors and their families face at home, to improve their sense of home and well-being.

Gonçalves-Bradley, D. C., Boylan, A. M., Koshiaris, C., et al. (2015). "GPs' adherence to guidelines for structured assessments of stroke survivors in the community and care homes." Family Practice **32**(6): 659-663.
http://fampra.oxfordjournals.org/content/32/6/659.abstract

Clinical practice guidelines recommend that stroke survivors' needs be assessed at regular intervals after stroke. The extent to which GPs comply with national guidance particularly for patients in care homes who have greatest clinical complexity is unknown. This study aimed to establish the current clinical practice in the UK of needs assessment by GPs for stroke survivors after hospital discharge for acute stroke. Methods. Cross-sectional online survey of current practice of GPs, using the national doctors.net network. Results. The survey was completed by 300 GPs who had on average been working for 14 years. The structured assessment of stroke survivors' needs was not offered by 31% of GPs, with no significant difference for level of provision in community or care home settings. The outputs of reviews were added to patients' notes by 89% of GPs and used to change management by 57%. Only half the GPs reported integrating the information obtained into care plans and only a quarter of GPs had a protocol for follow-up of identified needs. Analysis of free-text comments indicated that patients in some care homes may receive more regular and structured reviews. Conclusions. This survey suggests that at least one-third of GPs provide no formal review of the needs of stroke patients and that in only a minority are identified needs addressed in a structured way. Standardization is required for what is included in reviews and how needs are being identified and met.

Hakkinen, U., Rosenqvist, G., Iversen, T., et al. (2015). "Outcome, Use of Resources and Their Relationship in the Treatment of AMI, Stroke and Hip Fracture at European Hospitals." Health Econ **24 Suppl 2**: 116-139.
https://onlinelibrary.wiley.com/doi/10.1002/hec.3270

> The aim of the present study was to compare the quality (survival), use of resources and their relationship in the treatment of three major conditions (acute myocardial infarction (AMI), stroke and hip fracture), in hospitals in five European countries (Finland, Hungary, Italy, Norway and Sweden). The comparison of quality and use of resources was based on hospital-level random effects models estimated from patient-level data. After examining quality and use of resources separately, we analysed whether a cost-quality trade-off existed between the hospitals. Our results showed notable differences between hospitals and countries in both survival and use of resources. Some evidence would support increasing the horizontal integration: higher degrees of concentration of regional AMI care were associated with lower use of resources. A positive relation between cost and quality in the care of AMI patients existed in Hungary and Finland. In the care of stroke and hip fracture, we found no evidence of a cost-quality trade-off. Thus, the cost-quality association was inconsistent and prevailed for certain treatments or patient groups, but not in all countries. Copyright (c) 2015 John Wiley & Sons, Ltd.

Han, K. T., Park, E. C., Kim, S. J., et al. (2015). "Effective strategy for improving health care outcomes: Multidisciplinary care in cerebral infarction patients." Health Policy **119**(8): 1039-1045.

> Multidisciplinary teams provide effective patient treatment strategies. South Korea expanded its health program recently to include multidisciplinary treatment. This study characterized the relationship between multidisciplinary care and mortality within 30 days after hospitalization in cerebral infarction patients. We used the National Health Insurance claim data (n=63,895) from 120 hospitals during 2010-2013 to analyze readmission within 30 days after hospitalization for cerebral infarction. We performed chi(2) tests, analysis of variance and multilevel modeling to investigate the associations between multidisciplinary care and death within 30 days after hospitalization for stroke. Deaths within 30 days of hospitalization due to cerebral infarction was 3.0% (n=1898/63,895). Multidisciplinary care was associated with lower risk of death within 30 days in inpatients with cerebral infarction (odds ratio: 0.84, 95% confidence interval: 0.72-0.99). Patients treated by a greater number of specialists had lower risk of death within 30 days of hospitalization. Additional analyses showed that such associations varied by the combination of specialists (i.e., neurologist and neurosurgeon). In conclusion, death rates within 30 days of hospitalization for cerebral infarction were lower in hospitals with multidisciplinary care. Our findings certainly suggest that a high number of both neurosurgeon and neurologist is not always an effective alternative in managing stroke inpatients and emphasize the importance of an optimal combination in the same number of hospital staffing.

Tung, Y. C., Jeng, J. S., Chang, G. M., et al. (2015). "Processes and outcomes of ischemic stroke care: the influence of hospital level of care." Int J Qual Health Care **27**(4): 260-266.

> OBJECTIVE: Processes of stroke care play an increasingly important role in comparing hospital performance. The relationship between processes of care and outcomes for stroke is unclear. Moreover, in terms of stroke care regionalization, little information is available regarding the relationships among hospital level of care, processes and outcomes of stroke care. We used nationwide population-based data to examine the relationship between processes of care and mortality and the relationships among hospital level of care, processes

and mortality for ischemic stroke. DESIGN: Cross-sectional study. SETTING: General acute care hospitals throughout Taiwan. PARTICIPANTS: A total of 31 274 ischemic stroke patients admitted in 2010 through Taiwan's National Health Insurance Research Database. MAIN OUTCOME MEASURES: Processes of care and 30-day mortality. Multilevel models were used after adjustment for patient and hospital characteristics to test the relationship between processes of care and 30-day mortality and the relationships among hospital level of care, processes and 30-day mortality. RESULTS: The use of thrombolytic therapy, antithrombotic therapy, statin treatment and rehabilitation assessment were associated with lower mortality. Hospital level of care was associated with the use of thrombolytic therapy, antithrombotic therapy, statin treatment and rehabilitation assessment, and mortality. These processes of care were mediators of the relationship between hospital level of care and mortality. CONCLUSIONS: Outcomes among patients with ischemic stroke can be improved by thrombolytic therapy, antithrombotic therapy, statin treatment and rehabilitation assessment. Among patients with ischemic stroke, admission to designated stroke center hospitals may be associated with lower mortality through better processes of care.

Vastagh, I., Pindus, D. M., Lim, L., et al. (2016). "Primary care interventions and current service innovations in modifying long-term outcomes after stroke: a protocol for a scoping review." PLoS One **6**(10): e012840.

INTRODUCTION: Interventions delivered by primary and/or community care have the potential to reach the majority of stroke survivors and carers and offer ongoing support. However, an integrative account emerging from the reviews of interventions addressing specific long-term outcomes after stroke is lacking. The aims of the proposed scoping review are to provide an overview of: (1) primary care and community healthcare interventions by generalist healthcare professionals to stroke survivors and/or their informal carers to address long-term outcomes after stroke, (2) the scope and characteristics of interventions which were successful in addressing long-term outcomes, and (3) developments in current clinical practice.

Hakkinen, U., Rosenqvist, G., Peltola, M., et al. (2014). "Quality, cost, and their trade-off in treating AMI and stroke patients in European hospitals." Health Policy (Amsterdam, Netherlands) **117**(1): 15-27.
http://www.healthpolicyjrnl.com/article/S0168-8510(14)00130-4/abstract

This study compared the cost and in-hospital mortality of hospital care for two major diseases, acute myocardial infarction (AMI) and stroke, by pooling patient-level data from five European countries (Finland, France, Germany, Spain, and Sweden). We examined whether a cost-quality trade-off existed in these countries by comparing hospital-level costs and survival rates, and whether hospitals which performed well in terms of cost or quality in treating one patient group (AMI) performed well also in treating the other patient group (stroke).

Soulleihet, V., Nicoli, F., Trouve, J., et al. (2014). "Optimized acute stroke pathway using medical advanced regulation for stroke and repeated public awareness campaigns." Am J Emerg.Med **32**(3): 225-232.

OBJECTIVE: The aim of this study is to evaluate the efficiency of a specific organizational model for early stroke management associated with repeated public awareness campaigns on stroke warning signs. METHOD: Our model is based on initial telephone triage of potential candidates for an intravenous thrombolysis by an emergency physician before a 3-party

conference including basic life support team on scene and a stroke neurologist. We performed a time series analysis for a period of 5 years and a half, comparing the number of emergency telephone calls with that of intravenous thrombolysis treatment realized. RESULTS: In our organizational model, repeated awareness public campaigns increased both the number of emergency calls for suspected stroke and the selection of potential candidates for intravenous thrombolysis. Results from the time series analysis suggest that educational campaigns are a major factor influencing our emergency medical service activity. This result is correlated with the number of performed intravenous thrombolyses by the stroke center especially within a 3-hour delay (Spearman rho, P = .621, P = .000 and P = .439, P = .000, respectively). CONCLUSION: Educational programs repeated each year are useful to the population for learning how to recognize stroke symptoms and send straight away an emergency call. Combining the emergency action with an early remote evaluation by the stroke center team and a direct admission in imaging department shortens the time-to-treatment delay. This model is reproducible in different health care systems

Stineman, M. G., Kwong, P. L., Bates, B. E., et al. (2014). "Development and validation of a discharge planning index for achieving home discharge after hospitalization for acute stroke among those who received rehabilitation services." Am J Phys.Med Rehabil. **93**(3): 217-230.

OBJECTIVE: The aim of this study was to develop an index for establishing the probability of being discharged home after hospitalization for acute stroke using information about previous living circumstances, comorbidities, hospital course, and the physical grades and cognitive stages of independence achieved. DESIGN: This is a longitudinal observational population-based study. All 6515 persons treated for acute stroke who received rehabilitation services in 110 Veterans Affairs facilities within a 2-yr period were included. RESULTS: There were eight independent predictors of home discharge identified, and points were assigned through logistic regression: married (2 points); location before hospitalization (extended care = 0 points, other hospital = 9 points, home = 11 points); discharge physical grade (grade I, II, or III = 0 points; grade IV or V = 3 points; grade VI or VII = 5 points); discharge cognitive stage (stage I = 0 points; stage II, III, IV, or V = 3 points; stage VI or VII = 5 points); and absence of liver disease (2 points), mechanical ventilation (3 points), nonoral feeding (2 points), and intensive care unit admission (1 point). The points were added for all present factors to calculate scores. The probabilities of home discharge ranged from 65.03% in the least likely (</=21 points) to 98.24% in the most likely group (>/=27 points). CONCLUSIONS: The treatment team might apply prognostic estimates from this index in discharge planning and functional goal setting after initial physical medicine and rehabilitation assessment

Tai, W., Kalanithi, L. et Milstein, A. (2014). "What can be achieved by redesigning stroke care for a value-based world?" Expert Review of Pharmacoeconomics & Outcomes Research **14**(5): 585-587. http://informahealthcare.com/doi/abs/10.1586/14737167.2014.946013

Tamm, A., Siddiqui, M., Shuaib, A., et al. (2014). "Impact of stroke care unit on patient outcomes in a community hospital." Stroke **45**(1): 211-216.

BACKGROUND AND PURPOSE: Geographically distinct multidisciplinary stroke care units (SCUs) have been shown by systematic reviews to have superior patient outcomes compared with conventional care in general medical wards. However, the effectiveness of SCUs in smaller North American community hospitals is less well defined. The objective of this study was to determine the impact of establishing a specialized SCU at a community hospital on patient outcomes. METHODS: This is a retrospective cohort study of 805 patients with stroke

admitted to 2 community hospitals in Edmonton, Canada, from 2003 to 2009 using an administrative database. Stroke was identified by International Classification of Disease, 10th Edition, codes. One of the community hospitals established a SCU on January 1, 2007. This date was used to subdivide the patient population into 2 cohorts: phase 1 from 2003 to 2006 and phase 2 from 2007 to 2009. Outcomes measured were mortality, discharge disposition, length of stay, and complications and were adjusted for age, sex, and medical comorbidities. RESULTS: Patient mortality decreased significantly from 17.1% to 8.3% (adjusted odds ratio [OR], 0.54; 95% confidence interval [CI], 0.31-0.95) after SCU implementation, whereas it remained approximately 19% at the control hospital. SCU also increased the odds that patients would be discharged home independently (adjusted OR, 2.17; 95% CI, 1.49-3.15; P<0.001] without increasing length of stay. CONCLUSIONS: Establishing a SCU in a community hospital not only increases the survival of stroke patients, but also the proportion of patients discharged home to live independently. The benefits of SCU reported in larger tertiary centers extend to smaller community hospitals with more limited resources

Williams, R., Buchan, I. E., Prosperi, M., et al. (2014). "Using String Metrics to Identify Patient Journeys through Care Pathways." AMIA Annu Symp Proc **2014**: 1208-1217.

Given a computerized representation of a care pathway and an electronic record of a patient's clinical journey, with potential omissions, insertions, discontinuities and reordering, we show that we can accurately match the journey to a particular route through the pathway by converting the problem into a string matching one. We discover that normalized string metrics lead to more unique pathway matches than non-normalized string metrics and should therefore be given preference when using these techniques.

Ayis, S. A., Coker, B., Bhalla, A., et al. (2013). "Variations in acute stroke care and the impact of organised care on survival from a European perspective: the European Registers of Stroke (EROS) investigators." Eur J Neurol **84**(6): 604-612.

BACKGROUND: The need for stroke care is escalating with an ageing population, yet methods to estimate the delivery of effective care across countries are not standardised or robust. Associations between quality and intensity of care and stroke outcomes are often assumed but have not been clearly demonstrated. OBJECTIVE: To examine variations in acute care processes across six European populations and investigate associations between the delivery of care and survival. METHODS: Data were obtained from population-based stroke registers of six centres in France, Lithuania, UK, Spain, Poland and Italy between 2004 and 2006 with follow-up for 1 year. Variations in the delivery of care (stroke unit, multidisciplinary team and acute drug treatments) were analysed adjusting for case mix and sociodemographic factors using logistic regression methods. Unadjusted and adjusted survival probabilities were estimated and stratified by levels of Organised Care Index. RESULTS: Of 1918 patients with a first-ever stroke registered, 30.7% spent more than 50% of their hospital stay in a stroke unit (13.9-65.4%) among centres with a stroke unit available. The percentage of patients assessed by a stroke physician varied between 7.1% and 96.6%. There were significant variations after adjustment for confounders, in the organisation of care across populations. Significantly higher probabilities of survival (p<0.01) were associated with increased organisational care. CONCLUSIONS: This European study demonstrated associations between delivery of care and stroke outcomes. The implementation of evidence-based interventions is suboptimal and understanding better ways to implement these interventions in different healthcare settings should be a priority for health systems.

Philp, I., Brainin, M., Walker, M. F., et al. (2013). "Development of a poststroke checklist to standardize follow-up care for stroke survivors." J Stroke Cerebrovasc.Dis. **22**(7): e173-e180.

BACKGROUND: Long-term care for stroke survivors is fragmented and lacks an evidence-based, easy-to-use tool to identify persistent long-term problems among stroke survivors and streamline referral for treatment. We sought to develop a poststroke checklist (PSC) to help health care professionals identify poststroke problems amenable to treatment and subsequent referral. METHODS: An instrument development team, supported by measurement experts, international stroke experts, and poststroke care stakeholders, was created to develop a long-term PSC. A list of long-term poststroke problem areas was generated by an international, multidisciplinary group of stroke experts, the Global Stroke Community Advisory Panel. Using Delphi methods, a consensus was reached on which problem areas on the list were most important and relevant to include in a PSC. The instrument development team concurrently created the actual checklist, which provided example language about how to ask about poststroke problem areas and linked patient responses to a specific referral process. RESULTS: Eleven long-term poststroke problem areas were rated highly and consistently among stroke experts participating in the Delphi process (n = 12): secondary prevention, activities of daily living, mobility, spasticity, pain, incontinence, communication, mood, cognition, life after stroke, and relationship with caregiver. These problem areas were included in the long-term PSC. CONCLUSIONS: The PSC was developed to be a brief and easy-to-use tool, intended to facilitate a standardized approach for health care providers to identify long-term problems in stroke survivors and to facilitate appropriate referrals for treatment

Pringle, J., Drummond, J. S. et McLafferty, E. (2013). "Revisioning, reconnecting and revisiting: the psychosocial transition of returning home from hospital following a stroke." Disabil.Rehabil. **35**(23): 1991-1999.

PURPOSE: This study aimed to investigate and improve understanding of the experiences of patients and their carers during the first month at home following discharge from hospital, thereby enhancing appropriate care from a more informed perspective. METHOD: In-depth interviews and self-report diaries were used to capture data from 12 patient/carer dyads. Four survivors with marked communication problems were included in this number, two requiring the use of pictures and diagrams to express their views. Interpretative phenomenological analysis (IPA) was used to capture and interpret survivor and carer experiences. FINDINGS: Three superordinate themes were derived from the data. Stroke survivors and their carers described the first month at home as a very dynamic time, recounting a process that involved revisioning (re-examining their identity and the reality of their new situation, including an awareness of their own mortality), reconnecting (with important relationships and previous activities) and revisiting (their past lives, and the stroke event and hospital experience). These three activities assisted in making and finding sense in their new situation; participants' vision of their lives was revised and revisited as they attempted to reconnect with as much of their past selves and past activities as possible. CONCLUSIONS: This study contributes to understandings through in-depth individual accounts of the psychosocial transition of returning home. Details of how people make sense of their altered situation can make a valuable contribution to research, and the knowledge base for care provision. Implications for Rehabilitation Supporting people to revision their future can assist with psychosocial transition following a stroke. Assisting patients to reconnect and reintegrate in a way that is meaningful to them is an important part of the rehabilitation support that can be offered by professionals and can be informed by awareness of their vision of what the future may now hold. Offering people the opportunity

to reflect on what has occurred, either verbally or in the form of a diary, can assist adjustment and help people to make sense of their changed situation

Rhudy, L. M. et Androwich, I. (2013). "Surveillance as an intervention in the care of stroke patients." J Neurosci.Nurs. **45**(5): 262-271.

BACKGROUND: The term surveillance describes nurses' cognitive work to identify and prevent patient complications. Surveillance involves frequent assessment of patients, attention to cues, and recognition of complications. Surveillance serves to prevent the phenomenon "failure to rescue," which is defined as the inability to recognize a complication that results in the loss of a patient's life. Previous research has focused on differences between novices and experts during simulated tasks such as developing a plan of care. More recently, attention has focused on the early recognition of patient complications. Little research has been conducted on surveillance, especially with respect to the intervention during the delivery of care. The purpose of this study was to explore the nursing intervention of surveillance in the care of stroke patients.

Rodrigues, R. A., Marques, S., Kusumota, L., et al. (2013). "Transition of care for the elderly after cerebrovascular accidents--from hospital to the home." Rev Lat.Am Enfermagem. **21 Spec No**: 216-224.

OBJECTIVE: to examine the transition of care in families caring for elderly persons who suffered the first episode of a cerebrovascular accident. METHODOLOGY: an instrumental ethnographic case study was used. The sample comprised 20 subjects: 10 caregivers and 10 elderly persons aged 65 or over, of both sexes, with diagnoses of first episode of cerebrovascular accident, capable of communicating, and requiring care from a main carer in their family. The data was collected through interviews, observation, existing documentation and field notes. Qualitative analysis techniques were used to codify and classify the data and to formulate significant categories, which generated typologies of care. RESULTS AND DISCUSSION: The central idea was the Transition of Care and showed the context in three typologies: The care process for the dependent elderly person, Strategies for the care process and Impact and acceptance of the limitations. CONCLUSION: The data indicates that caring for an elderly person after a cerebrovascular accident is a challenge for the family. The data permitted it possible to elaborate a proposal for a model for the organization of the work, with a view to holistic care delivery in the health services, forming a care network, which constitutes an advance for the area of nursing

Rose, D. K., Schafer, J. et Conroy, C. (2013). "Extending the continuum of care poststroke: creating a partnership to provide a community-based wellness program." J Neurol.Phys.Ther. **37**(2): 78-84. PM:23703370

Opportunities for individuals poststroke to continue to exercise once formal rehabilitation has ended are limited and, in many cases, do not exist. Given the incidence of recurrent stroke, and the known and important role exercise plays in reducing stroke risk factors, extending the continuum of care beyond outpatient and home health services to include life-long fitness opportunities for those living with poststroke disability is needed. This article first describes the creation of a partnership between a health care system and a local fitness center to provide an affordable, accessible, safe, community-based exercise program for individuals poststroke and the subsequent development of the flagship program. The second section of this article describes the program's current operations. This includes the referral process, the physical therapists' role in the program's structure and operation, and both program and participant outcomes. This article is intended to provide a roadmap for others who desire to extend the continuum of care for stroke survivors in their community so that

these individuals may remain healthy in the presence of disability and reduce their risk for recurrent stroke.

Sabini, R. C., Dijkers, M. P. et Raghavan, P. (2013). "Stroke survivors talk while doing: development of a therapeutic framework for continued rehabilitation of hand function post stroke." J Hand Ther. **26**(2): 124-130.

STUDY DESIGN: Qualitative study to identify themes and explore mechanisms underlying recovery of hand function post stroke for individuals discharged from rehabilitation services. PURPOSE OF THE STUDY: Post-stroke hemiparesis frequently results in persistent hand dysfunction; the mechanisms of functional recovery are however poorly understood. We assessed the perspectives of community-dwelling individuals with chronic stroke on their hand function limitations and recovery to explore the feasibility of developing a theoretical framework for understanding the process of continued post-stroke recovery.

Sansonetti, D. et Hoffmann, T. (2013). "Cognitive assessment across the continuum of care: the importance of occupational performance-based assessment for individuals post-stroke and traumatic brain injury." Aust.Occup.Ther.J **60**(5): 334-342.

When working with individuals following stroke or traumatic brain injury, an important role of the occupational therapist is to assess the impact of cognitive impairment on their ability to engage in occupations and resume important life roles. The aim of this study was to survey therapists' reasons for selection of and challenges with using various cognitive assessment approaches, across the continuum of care, when working with individuals following stroke and traumatic brain injury.

Sheppard, J. P., Mellor, R. M., Greenfield, S., et al. (2013). "The association between prehospital care and in-hospital treatment decisions in acute stroke: a cohort study." Emerg.Med J. **32**(2):93-9.

BACKGROUND: Hospital prealerting in acute stroke improves the timeliness of subsequent treatment, but little is known about the impact of prehospital assessments on in-hospital care. OBJECTIVE: Examine the association between prehospital assessments and notification by emergency medical service staff on the subsequent acute stroke care pathway. METHODS: This was a cohort study of linked patient medical records. Consenting patients with a diagnosis of stroke were recruited from two urban hospitals. Data from patient medical records were extracted and entered into a Cox regression analysis to investigate the association between time to CT request and recording of onset time, stroke recognition (using the Face Arm Speech Test (FAST)) and sending of a prealert message. RESULTS: 151 patients (aged 71+/-15 years) travelled to hospital via ambulance and were eligible for this analysis. Time of symptom onset was recorded in 61 (40%) cases, the FAST test was positive in 114 (75%) and a prealert message was sent in 65 (44%). Following adjustment for confounding, patients who had time of onset recorded (HR 0.73, 95% CI 0.52 to 1.03), were FAST-positive (HR 0.54, 95% CI 0.37 to 0.80) or were prealerted (HR 0.26, 95% CI 0.18 to 0.38), were more likely to receive a timely CT request in hospital. CONCLUSIONS: This study highlights the importance of hospital prealerting, accurate stroke recognition, and recording of onset time. Those not recognised with stroke in a prehospital setting appear to be excluded from the possibility of rapid treatment in hospital, even before they have been seen by a specialist

Wissel, J., Olver, J. et Sunnerhagen, K. S. (2013). "Navigating the poststroke continuum of care." J Stroke Cerebrovasc.Dis. **22**(1): 1-8.

Stroke is a significant source of death and disability worldwide. The increasing prevalence of stroke survivors forecasts substantial socioeconomic burden and a greater need for comprehensive poststroke rehabilitative services. Despite the rapidly rising burden of cerebrovascular disease, particularly in developing countries, there has been limited implementation of multidisciplinary stroke units, a proven care modality in reducing patient mortality and improving functional outcomes. Transitioning from these acute inpatient settings to in- and outpatient rehabilitation or long-term care environments has consistently been identified as an obstacle to quality stroke rehabilitation. To address the barriers preventing the seamless delivery of poststroke care, an evaluation of patient-caregiver perspectives, treatment challenges, and system-wide shortcomings is presented. The fragmentation of the current poststroke chain of care could benefit from the introduction of case managers or "navigators," discharge planning, electronic medical records, and evidence-based neurorehabilitation guidelines. By aiding in successful care transitions, these proposed efforts could advance post-acute stroke patients along the care continuum to achieve their rehabilitative goals

Baeza, J. I., Boaz, A., Fraser, A., et al. (2012). "The importance of normative integration in stroke services: case study evidence from Sweden and England." Health Serv Manage.Res **25**(4): 155-161.

OBJECTIVES: A number of evidence-based interventions are now available for stroke patients. Good-quality stroke care involves a range of health professionals located across ambulance, hospital, community and primary care services. This study examined the perspectives of health-care workers involved in stroke care in Sweden and England on the integration challenges stroke care presents. METHODS: Four qualitative case studies were carried out in Sweden and England, including 95 semistructured interviews with clinicians and managers associated with four different hospitals providing specialized stroke services. FINDINGS: High levels of organizational, functional, service and clinical integration among clinicians that deliver emergency and acute stroke care were identified. This is frequently lacking among professionals delivering postacute care. These findings are linked to the prevalence or lack of normative and systemic integration in each respective stage of care. CONCLUSIONS: Emphasis on the need to treat stroke as an emergency condition in both countries has created a context in which normative and systemic integration often occurs among clinicians that deliver emergency and acute stroke care, aiding the development of organizational, functional, service and clinical integration across the case study sites. In contrast, integration between hospital and community (rehabilitation and general practice) care is frequently less successful

Bray-Hall, S. T. (2012). "Transitional care: focusing on patient-centered outcomes and simplicity." Ann Intern Med **157**(6): 448-449.

Chang, K. C., Lee, H. C., Huang, Y. C., et al. (2012). "Cost-effectiveness analysis of stroke management under a universal health insurance system." J Neurol Sci **323**.
http://dx.doi.org/10.1016/j.jns.2012.09.018

Cheung, D., McKellar, J., Parsons, J., et al. (2012). "Community re-engagement and interprofessional education: the impact on health care providers and persons living with stroke." Top.Stroke Rehabil. **19**(1): 63-74.

PURPOSE: This study evaluated the impact of an educational intervention that integrates concepts of a community re-engagement framework (CR) and interprofessional collaboration

(IPC) on health care providers' (HCP) practice with persons living with stroke (PLS). METHOD: A mixed-methods design was used in which HCPs (n = 67) and PLS (n = 29) participated from 9 organizations across the care continuum. Pre- and postintervention surveys and interviews were conducted with the HCPs. One-on-one interviews with stroke clients were also conducted pre and post intervention. Quantitative responses were analyzed in SPSS (Chicago, Illinois, USA) for descriptive frequencies and differences between pre- and postintervention groups. Qualitative open-ended responses were thematically coded using NVivo7. RESULTS: Significant increases occurred in HCPs' knowledge of CR, confidence levels in working with PLS, enhanced understanding of the complex needs of PLS, and positive self-reported impacts on practice. PLS reported positive perceptions of care pre and post intervention. CONCLUSIONS: The intervention provided HCPs with a common language and framework to work collaboratively and holistically in delivering care consistent with stroke best practices

Cumbler, E., Zaemisch, R., Graves, A., et al. (2012). "Improving stroke alert response time: applying quality improvement methodology to the inpatient neurologic emergency." J Hosp.Med **7**(2): 137-141.

BACKGROUND: Stroke often leaves its victims with devastating disabilities if not treated promptly. Guidelines recommend that brain imaging be obtained within 25 minutes, yet this benchmark is rarely achieved for the in-hospital stroke. PURPOSE: To reduce time to evaluation for strokes occurring in patients already hospitalized, through systematic analysis of current processes and application of standardized quality improvement methodology. METHODS: Improving the quality of care for in-hospital stroke patients involved 4 key steps: (1) creation of a detailed process map to identify inefficiencies in the current process for identifying and treating hospitalized stroke patients, (2) development of an optimized care pathway, (3) implementation of a checklist of optimal practices for the acute stroke response team and nursing staff, and (4) real-time feedback. Time from stroke alert to initiation of computed tomography (CT) scan was prospectively tracked for the 6-month period prior to intervention. After a 3-month interval for intervention roll-out, the response times for the pre-intervention period were compared to a 6-month post-intervention evaluation period. RESULTS: Pre-intervention median inpatient stroke alert-to-CT time was 69.0 minutes, with 19% meeting the goal of 25 minutes from alert to CT time. Post-intervention median inpatient stroke alert-to-CT time was reduced to 29.5 minutes, with 32% at goal ($P < 0.0001$). CONCLUSIONS: This inpatient stroke alert quality improvement initiative decreased median inpatient alert-to-CT time by 57%, and demonstrated that speed of in-hospital stroke evaluation can be improved through systematic application of quality improvement principles

Eason, K., Dent, M., Waterson, P., et al. (2012). "Bottom-up and middle-out approaches to electronic patient information systems: a focus on healthcare pathways." Inform.Prim Care **20**(1): 51-56.

BACKGROUND: A study is reported that examines the use of electronic health record (EHR) systems in two UK local health communities. OBJECTIVE: These systems were developed locally and the aim of the study was to explore how well they were supporting the coordination of care along healthcare pathways that cross the organisational boundaries between the agencies delivering health care. RESULTS: The paper presents the findings for two healthcare pathways; the Stroke Pathway and a pathway for the care of the frail elderly in their own homes. All the pathways examined involved multiple agencies and many locally tailored EHR systems are in use to aid the coordination of care. However, the ability to share electronic patient information along the pathways was patchy. The development of systems

that did enable effective sharing of information was characterised by sociotechnical system development, i.e. associating the technical development with process changes and organisational changes, with local development teams that drew on all the relevant agencies in the local health community and on evolutionary development, as experience grew of the benefits that EHR systems could deliver. CONCLUSIONS: The study concludes that whilst there may be a role for a national IT strategy, for example, to set standards for systems procurement that facilitate data interchange, most systems development work needs to be done at a 'middle-out' level in the local health community, where joint planning between healthcare agencies can occur, and at the local healthcare pathway level where systems can be matched to specific needs for information sharing

Fearon, P. et Langhorne, P. (2012). "Services for reducing duration of hospital care for acute stroke patients." Cochrane Database Syst Rev **9**: CD000443.

BACKGROUND: Stroke patients conventionally receive a substantial part of their rehabilitation in hospital. Services have now been developed which offer patients in hospital an early discharge with rehabilitation at home (early supported discharge (ESD)). OBJECTIVES: To establish the effects and costs of ESD services compared with conventional services. SEARCH METHODS: We searched the trials registers of the Cochrane Stroke Group (January 2012) and the Cochrane Effective Practice and Organisation of Care (EPOC) Group, MEDLINE (2008 to 7 February 2012), EMBASE (2008 to 7 February 2012) and CINAHL (1982 to 7 February 2012). In an effort to identify further published, unpublished and ongoing trials we searched 17 trial registers (February 2012), performed citation tracking of included studies, checked reference lists of relevant articles and contacted trialists. SELECTION CRITERIA: Randomised controlled trials recruiting stroke patients in hospital to receive either conventional care or any service intervention which has provided rehabilitation and support in a community setting with an aim of reducing the duration of hospital care. DATA COLLECTION AND ANALYSIS: The primary patient outcome was the composite end-point of death or long-term dependency recorded at the end of scheduled follow-up. Two review authors scrutinised trials and categorised them on their eligibility. We then sought standardised individual patient data from the primary trialists. We analysed the results for all trials and for subgroups of patients and services, in particular whether the intervention was provided by a co-ordinated multidisciplinary team (co-ordinated ESD team) or not. MAIN RESULTS: Outcome data are currently available for 14 trials (1957 patients). Patients tended to be a selected elderly group with moderate disability. The ESD group showed significant reductions ($P < 0.0001$) in the length of hospital stay equivalent to approximately seven days. Overall, the odds ratios (OR) (95% confidence interval (CI)) for death, death or institutionalisation, death or dependency at the end of scheduled follow-up were OR 0.91 (95% CI 0.67 to 1.25, $P = 0.58$), OR 0.78 (95% CI 0.61 to 1.00, $P = 0.05$) and OR 0.80 (95% CI 0.67 to 0.97, $P = 0.02$) respectively. The greatest benefits were seen in the trials evaluating a co-ordinated ESD team and in stroke patients with mild to moderate disability. Improvements were also seen in patients' extended activities of daily living scores (standardised mean difference 0.12, 95% CI 0.00 to 0.25, $P = 0.05$) and satisfaction with services (OR 1.60, 95% CI 1.08 to 2.38, $P = 0.02$) but no statistically significant differences were seen in carers' subjective health status, mood or satisfaction with services. The apparent benefits were no longer statistically significant at five-year follow-up. AUTHORS' CONCLUSIONS: Appropriately resourced ESD services provided for a selected group of stroke patients can reduce long-term dependency and admission to institutional care as well as reducing the length of hospital stay. We observed no adverse impact on the mood or subjective health status of patients or carers

Kissela, B. M., Khoury, J. C., Alwell, K., et al. (2012). "Age at stroke: temporal trends in stroke incidence in a large, biracial population." Neurology **79**. http://dx.doi.org/10.1212/WNL.0b013e318270401d

Langhorne, P., Dennis, M., Kalra, L., et al. (2012). "WITHDRAWN: Services for helping acute stroke patients avoid hospital admission." Cochrane Database Syst Rev **1**: CD000444.

BACKGROUND: Stroke patients are usually admitted to hospital for their acute care and rehabilitation. Services to help acute stroke patients avoid admission to hospital ('hospital-at-home') have now been developed. OBJECTIVES: To establish the costs and effects of such services compared with conventional services. SEARCH METHODS: We searched the Cochrane Stroke Group Trials Register in March 1999 and supplemented this through discussion with colleagues and trialists. SELECTION CRITERIA: Controlled clinical trials recruiting stroke patients who have not been admitted to hospital and compare (1) services which provided support with an aim of helping prevent admission to hospital with (20 conventional services (which could include hospital admission). DATA COLLECTION AND ANALYSIS: Two independent review authors determined the eligibility and methodological quality of trials. Trialists were then contacted to obtain standardised descriptive and outcome data. MAIN RESULTS: Four trials are included in the review, of which three currently have outcome data available (921 patients; 857 from one controlled trial, 64 from two randomised trials). There were no statistically significant differences between the patient and carer outcomes of the intervention and control groups either within individual trials or in pooled analyses. There was a trend toward greater hospital bed use and increased costs in the intervention groups. AUTHORS' CONCLUSIONS: There is currently no evidence from clinical trials to support a radical shift in the care of acute stroke patients from hospital-based care

Leys, D. et Goldstein, P. (2012). "[Primary emergencies: management of acute ischemic stroke]." Bull Acad.Natl Med **196**(4-5): 909-925.

The emergency diagnostic strategy for acute ischemic stroke consists of:-identification of stroke, based on clinical examination (sudden onset of a focal neurological deficit);--identification of the ischemic or hemorrhagic nature by MRI or CT;--determination of the early time-course (clinical examination) and the cause. In all strokes (ischemic or hemorrhagic), treatment consists of:-the same general management (treatment of a life-threatening emergency, ensuring normal biological parameters except for blood pressure, and prevention of complications);--decompressive surgery in the rare cases of intracranial hypertension. For proven ischemic stroke, other therapies consist of: rt-PA for patients admitted with 4.5 hours of stroke onset who have no contraindications, and aspirin (160 to 300 mg) for patients who are not eligible for rt-PA. These treatments should be administered within a few hours. A centralized emergency call system (phone number 15 in France) is the most effective way of achieving this objective

Ottenbacher, K. J., Graham, J. E., Ottenbacher, A. J., et al. (2012). "Hospital readmission in persons with stroke following postacute inpatient rehabilitation." J Gerontol.A Biol.Sci Med Sci **67**(8): 875-881.

BACKGROUND: Readmission is an important quality indicator following acute care hospitalization. We examined factors associated with hospital readmission in persons with stroke following postacute inpatient rehabilitation.

Persson, H. C., Parziali, M., Danielsson, A., et al. (2012). "Outcome and upper extremity function within 72 hours after first occasion of stroke in an unselected population at a stroke unit. A part of the SALGOT study." BMC Neurol. **12**: 162.

BACKGROUND: Reduced upper extremity function is one of the most common impairments after stroke and has previously been reported in approximately 70-80% of patients in the acute stage. Acute care for stroke has changes over the last years, with more people being admitted to a stroke unit as well as use of thrombolysis. The aim of the present study was to describe baseline characteristics, care pathway and discharge status in an unselected group of patients with first occasion of stroke who were at a stroke unit within 72 hours after stroke and also to investigate the frequency of impaired arm and hand function. A second aim was to explore factors associated with impaired upper extremity function and the impact of impairment on the patient's outcome.

Prvu, B. J., Alexander, K. P., Dolor, R. J., et al. (2012). "Transitional care after hospitalization for acute stroke or myocardial infarction: a systematic review." Ann Intern Med **157**(6): 407-416.

BACKGROUND: Transitional care is a time-limited service to prevent discontinuous care and adverse outcomes, including rehospitalization. PURPOSE: To describe transitional care interventions and evidence of benefit or harm in patients hospitalized for acute stroke or myocardial infarction (MI). DATA SOURCES: Cumulative Index to Nursing and Allied Health Literature, MEDLINE, Cochrane Database of Systematic Reviews, and EMBASE, supplemented with manual searches of reference lists of relevant studies and review articles (January 2000 to March 2012). STUDY SELECTION: 6 reviewers screened 5857 citations to identify English-language reports of trials or observational studies that compared transitional care with usual care among adults hospitalized for stroke or MI and that reported patient, caregiver, process, or systems outcomes within 1 year of hospital discharge. DATA EXTRACTION: Data on study design, quality, population, intervention characteristics, and patient- and system-level outcomes were extracted by 3 reviewers and confirmed by 1 additional reviewer. DATA SYNTHESIS: 62 articles representing 44 studies of transitional care for either acute stroke (27 studies) or MI (17 studies). Four intervention types were studied: hospital-initiated support (n = 14), patient and family education (n = 7), community-based support (n = 20), and chronic disease management (n = 3). Most studies (68%) were of fair quality. Overall, moderate-strength evidence showed that hospital-initiated support reduced length of stay for patients who had a stroke, and low-strength evidence showed that it reduced mortality for patients who had an MI. Evidence about benefits of other interventions and harms from transitional care services was insufficient. LIMITATIONS: Few studies had high-quality research designs. The usual care comparator was often poorly defined. Applicability to U.S. clinical practice was limited; only 6 studies were conducted in the United States. CONCLUSION: Available evidence shows that hospital-initiated transitional care can improve some outcomes in adults hospitalized for stroke or MI. Finding additional transitional care interventions that improve functional outcomes and prevent rehospitalizations and adverse events is a high priority for the growing population of patients who have an MI or a stroke. PRIMARY FUNDING SOURCE: Agency for Healthcare Research and Quality

Wright, L., Hill, K. M., Bernhardt, J., et al. (2012). "Stroke management: updated recommendations for treatment along the care continuum." Intern Med J **42**(5): 562-569.

The Australian Clinical Guidelines for Stroke Management 2010 represents an update of the Clinical Guidelines for Stroke Rehabilitation and Recovery (2005) and the Clinical Guidelines for Acute Stroke Management (2007). For the first time, they cover the whole spectrum of

stroke, from public awareness and prehospital response to stroke unit and stroke management strategies, acute treatment, secondary prevention, rehabilitation and community care. The guidelines also include recommendations on transient ischaemic attack. The most significant changes to previous guideline recommendations include the extension of the stroke thrombolysis window from 3 to 4.5 h and the change from positive to negative recommendations for the use of thigh-length antithrombotic stockings for deep venous thrombosis prevention and the routine use of prolonged positioning for contracture management

Allison, R., Shelling, L., Dennett, R., et al. (2011). "The effectiveness of various models of primary care-based follow-up after stroke: a systematic review." Prim Health Care Res Dev. **12**(3): 214-222.

AIM: To systematically review studies reporting the effectiveness of various models of follow-up in primary care on a range of outcomes (physical, psychological, social functioning, or quality of life) for survivors of stroke and their caregivers. BACKGROUND: Stroke is a major cause of disability globally. Current UK policy calls for a primary care-based review of healthcare and social-care needs at six weeks and six months after hospital discharge and then annually. METHODS: Trials meeting the pre-defined inclusion criteria were identified by the systematic searching of electronic databases. Data were extracted by two independent researchers. Studies were rated using the McMaster University Quality Assessment Tool. FINDINGS: Nine randomised controlled trials that met the inclusion criteria were identified. These studies included interventions using stroke support workers, care coordinators or case managers. The methodological quality of the studies was variable, and models of care demonstrated inconsistent working relationships with general practitioners. Patients and caregivers receiving formal primary care-based follow-up did not show any gains in physical function, mood, or quality of life when compared with those who did not. Patients and caregivers receiving follow-up were generally more satisfied with some aspects of communication and had a greater knowledge of stroke. CONCLUSIONS: The limited quality of these studies and the lack of a sound theoretical basis for the development of interventions together highlight the urgent need for high-quality research studies in this area

Child, N., Barber, P. A., Fink, J., et al. (2011). "New Zealand National Acute Stroke Services Audit 2009: organisation of acute stroke services in New Zealand." N Z Med J **124**(1340): 13-20.

AIMS: To characterise the nature of acute stroke services provided by District Health Boards (DHBs) in New Zealand. METHODS: An audit of all 21 DHBs was carried out in 2009 via an online survey examining the structural and process elements of acute stroke service provision. A clinical audit involving a retrospective review of consecutive admitted stroke patients is reported separately. RESULTS: The organisational survey found that most patients (82%) are admitted to hospitals in the 13 large and medium DHBs. Only 8 DHBs had stroke units and 5 of the large and medium DHBs did not have stroke units. On audit day, only 39% of all New Zealand patients were being managed in a stroke unit, compared with 51% of all Australian patients. Even in the 8 DHBs with stroke units, only 64% of patients were being managed in the stroke unit on the day of the audit. New Zealand compared favourably with Australia in aspects of TIA management and in access to brain imaging. CONCLUSION: There is significant regional variation in the provision of organised stroke care and the level of stroke unit care is low by international standards. This audit provides a benchmark against which to compare future changes in the delivery of stroke care

Hakkennes, S. J., Brock, K. et Hill, K. D. (2011). "Selection for inpatient rehabilitation after acute stroke: a systematic review of the literature." Arch Phys.Med Rehabil. **92**(12): 2057-2070.

OBJECTIVE: To identify patient-related factors that have been found to correlate with functional outcomes post acute stroke to guide clinical decision making regarding rehabilitation admission after acute stroke. DATA SOURCES: We systematically searched the scientific literature between 1966 and January 2010. The primary source of studies was the electronic databases Medline, CINAHL, and Embase. The search was supplemented with citation tracking. STUDY SELECTION: Two reviewers independently applied the inclusion criteria to identify relevant articles from the citations obtained through the literature search. Eligible studies included systematic reviews of prognostic indicators, studies of prognostic indicators of acute discharge disposition, and studies of rehabilitation admission criteria after acute stroke. Of the 8895 studies identified, 83 articles, representing 79 studies, were included in the review.

Horgan, F., McGee, H., Hickey, A., et al. (2011). "From prevention to nursing home care: a comprehensive national audit of stroke care." Cerebrovasc.Dis. **32**(4): 385-392.

BACKGROUND: Many countries are developing national audits of stroke care. However, these typically focus on stroke care from acute event to hospital discharge rather than the full spectrum from prevention to long-term care. We report on a comprehensive national audit of stroke care in the community and hospitals in the Republic of Ireland. The findings provide insights into the wider needs of people with stroke and their families, a basis for developing stroke-appropriate health strategies, and a global model for the evaluation of stroke services. METHODS: Six national surveys were completed: general practitioners (prevention and primary care), hospital organisational and clinical audit of 2,570 consecutive stroke admissions (acute and hospital care), allied health professionals and public health nurses (discharge to community care), nursing homes (needs of patients discharged to long-term care), and patient and carers (post-hospital phase of rehabilitation and ongoing care). RESULTS: The audit identified substantial deficits in a number of areas including primary prevention, emergency assessment/investigation and treatment in hospital, discharge planning, rehabilitation and ongoing secondary prevention, and communication with patients and families. There was a lack of coordination and communication between the acute and community services, with a dearth of therapy services in both home and nursing home settings. CONCLUSION: This multi-faceted national stroke audit facilitated multiple perspectives on the continuum of stroke prevention and care. An overall synthesis of surveys supports the development of a multidisciplinary perspective in planning the development of comprehensive stroke services at the national level, and may assist in regional and global development of stroke strategies

Howrey, B. T., Kuo, Y. F. et Goodwin, J. S. (2011). "Association of care by hospitalists on discharge destination and 30-day outcomes after acute ischemic stroke." Med Care **49**(8): 701-707.

OBJECTIVES: The use of hospitalists is increasing. Hospitalists have been associated with reductions in length of stay and associated costs while not negatively impacting outcomes. We examine care for stroke patients because it requires complex care in the hospital and has high post discharge complications. We assessed the association of care provided by a hospitalist with length of stay, discharge destination, 30-day mortality, 30-day readmission, and 30-day emergency department visits. METHODS: This study used the 5% Medicare sample from 2002 to 2006. Models included demographic variables, prior health status, type of admission and hospital, and region. Multinomial logit models, generalized estimating equations, Cox proportional hazard models, and propensity score analyses were explored in the analysis. RESULTS: After adjusting models for covariates, hospitalists were associated with increased odds of discharge to inpatient rehabilitation or other facilities compared with

discharge home (Odds Ratio, 1.24; 95% CI, 1.07-1.43 and Odds Ratio, 1.34; 95% CI 1.05-1.69, respectively). Mean length of stay was 0.37 days lower for patients in hospitalist care compared to nonhospitalist care. This reduction in length of stay was not appreciably changed after adjusting for discharge destination. Hospitalist care was not associated with differences in 30-day emergency department use or mortality. Readmission rates were higher for patients in hospitalist care (Hazard, 1.30; 95% CI, 1.11-1.52). CONCLUSIONS: Hospitalists are associated with reduced length of stay and higher rates of discharge to inpatient rehabilitation. The higher readmission rates should be further explored

Hwang, T. G., Lee, Y. et Shin, H. (2011). "Structure-oriented versus process-oriented approach to enhance efficiency for emergency room operations: what lessons can we learn?" J Healthc.Manag **56**(4): 255-267.

The efficiency and quality of a healthcare system can be defined as interactions among the system structure, processes, and outcome. This article examines the effect of structural adjustment (change in floor plan or layout) and process improvement (critical pathway implementation) on performance of emergency room (ER) operations for acute cerebral infarction patients. Two large teaching hospitals participated in this study: Korea University (KU) Guro Hospital and KU Anam Hospital. The administration of Guro adopted a structure-oriented approach in improving its ER operations while the administration of Anam employed a process-oriented approach, facilitating critical pathways and protocols. To calibrate improvements, the data for time interval, length of stay, and hospital charges were collected, before and after the planned changes were implemented at each hospital. In particular, time interval is the most essential measure for handling acute stroke patients because patients' survival and recovery are affected by the promptness of diagnosis and treatment. Statistical analyses indicated that both redesign of layout at Guro and implementation of critical pathways at Anam had a positive influence on most of the performance measures. However, reduction in time interval was not consistent at Guro, demonstrating delays in processing time for a few processes. The adoption of critical pathways at Anam appeared more effective in reducing time intervals than the structural rearrangement at Guro, mainly as a result of the extensive employee training required for a critical pathway implementation. Thus, hospital managers should combine structure-oriented and process-oriented strategies to maximize effectiveness of improvement efforts

Jones, E. M., Albright, K. C., Fossati-Bellani, M., et al. (2011). "Emergency department shift change is associated with pneumonia in patients with acute ischemic stroke." Stroke **42**(11): 3226-3230.

BACKGROUND AND PURPOSE: Emergency department (ED) nurses play a pivotal role in early acute ischemic stroke patient management. We hypothesized that patients exposed to ED nursing shift changes (SC) may develop pneumonia (PNA) more frequently and have worse early outcomes than do patients who have continuity of care until stroke unit admission. METHODS: Consecutive acute ischemic stroke patients presenting to our ED were studied using chart review and prospectively collected registry data. We evaluated the association of patient presence during an ED SC (ie, 07:00-08:00, 19:00-20:00) with length of stay in the ED, PNA rates, and early outcome measures (discharge disposition, modified Rankin Scale score, and death). RESULTS: Three hundred sixty-six consecutive acute ischemic stroke patients met the criteria. Of those, 54.9% were present during an SC. After adjusting for baseline National Institutes of Health Stroke Scale, admission glucose, and intravenous tissue-type plasminogen activator, patients present during SC were half as likely to be discharged home or to inpatient rehab (OR, 0.50; 95% CI, 0.26-0.96; P=0.04) and were 2.5 times more likely to develop PNA (OR, 2.54; 95% CI, 1.02-6.30; P=0.045). After additional adjustment for time in

the ED, the difference in favorable discharge disposition was no longer significant, but SC was associated with 5 times the odds of PNA (OR, 5.35; 95% CI, 1.34-21.39; P=0.018) compared with patients with continuity of care. CONCLUSIONS: In our center, acute ischemic stroke patients present during an ED nursing SC experienced higher rate of PNA and had decreased rates of favorable discharge disposition compared with patients with continuity of care. Strategies to prevent PNA and improve hand-off communication during SC may reduce this risk

Lazzarino, A. I., Palmer, W., Bottle, A., et al. (2011). "Inequalities in stroke patients' management in English public hospitals: a survey on 200,000 patients." PLoS One **6**(3): e17219.

BACKGROUND: According to clinical guidelines, every patient affected by stroke should be given a brain-imaging scan (BIS) - Computerized Tomography or Magnetic Resonance Imaging - immediately after being admitted to hospital. AIM OF THE STUDY: To describe the variation in use of BIS among English public hospitals and identify any patient groups being excluded from appropriate care. METHODS: We collected hospital administrative data for all patients admitted to any English public hospital with a principal diagnosis of stroke from 2006 to 2009. We calculated the proportion of patients treated with BIS in the whole sample and after stratification by hospital. We compared hospitals' performance using funnel plots. We performed a multiple logistic regression analysis using BIS as outcome and age, gender, socio-economic deprivation, and comorbidity as covariates. RESULTS: In English public hospitals there are about 70,000 emergency admissions for stroke per year. Nationally, only 35% receive a BIS immediately, and only 84% receive it within the admission. There is large variation in the use of BIS for stroke patients among English public hospitals, with some of them approaching the recommended 100% and some having very low rates. Young (P<0.001), male (P = 0.012), and least socio-economically deprived patients (P = 0.001), as well as patients with fewer comorbidities (P<0.001) appear to have more chance of being selected for a brain scan. CONCLUSION: Some English public hospitals appear to be falling well below the clinical guideline standards for scanning stroke patients and inappropriate patient selection criteria may be being applied, leading to health inequalities

Olson, D. M., Bettger, J. P., Alexander, K. P., et al. (2011). "Transition of care for acute stroke and myocardial infarction patients: from hospitalization to rehabilitation, recovery, and secondary prevention." Evid.Rep Technol.Assess.(Full.Rep)(202): 1-197.

OBJECTIVES: To review the available published literature to assess whether evidence supports a beneficial role for coordinated transition of care services for the postacute care of patients hospitalized with first or recurrent stroke or myocardial infarction (MI). This review was framed around five areas of investigation: (1) key components of transition of care services, (2) evidence for improvement in functional outcomes, morbidity, mortality, and quality of life, (3) associated risks or potential harms, (4) evidence for improvement in systems of care, and (5) evidence that benefits and harms vary by patient-based or system-based characteristics.

Raffe, F., Jacquin, A., Milleret, O., et al. (2011). "Evaluation of the possible impact of a care network for stroke and transient ischemic attack on rates of recurrence." Eur Neurol. **65**(4): 239-244.

We aimed to demonstrate that a stroke network is able to reduce the proportion of recurrent cerebrovascular events. In 2003, we set up a care network with the aim to reduce the proportion of stroke recurrence. For the statistical analysis, recurrent cerebrovascular events observed from 1985 to 2002 within the population of Dijon made it possible to model

trends using Poisson logistic regression. From 1985 to 2002, we recorded 172 recurrent cerebrovascular events which were used to model trends before the creation of the care network. Within the period 2003-2007, we observed 162 recurrent cerebrovascular events compared with 196.7 expected cerebrovascular events with a significant standardized incidence rate of 0.82 (0.70-0.96; p = 0.01). After eliminating the role of some environmental factors, the possible hypothesis for the fall in recurrent stokes is probably the positive effect of the stroke care network

Svendsen, M. L., Ehlers, L. H., Frydenberg, M., et al. (2011). "Quality of care and patient outcome in stroke units: is medical specialty of importance?" Med Care **49**(8): 693-700.

BACKGROUND: Specialized stroke unit care improves outcome in stroke patients. However, it is uncertain whether the units should be placed in a neurological or non-neurological (eg, internal medicine or geriatric) setting. OBJECTIVES: To assess whether stroke unit setting (neurological/non-neurological) is associated with quality of care and outcome among patients with stroke, and whether these associations depend on the severity of comorbidity. METHODS: In a nationwide population-based follow-up study, we identified 45,521 patients admitted to stroke units in Denmark between 2003 and 2008. Outcomes were quality of care (whether patients received evidence-based processes of acute stroke care), mortality, length of stay, and readmission. Charlson comorbidity index was used to assess comorbidity, and comparisons were adjusted for patient and hospital characteristics. RESULTS: Patients admitted to stroke units in neurological settings had higher odds for early antiplatelet therapy (odds ratio, 1.68; 95% confidence interval, 1.10-2.56) and early computed tomographic scan or magnetic resonance imaging (odds ratio, 1.77; 95% confidence interval, 1.29-2.45) compared with patients in non-neurological settings. No other differences were found when studying quality of care and patient outcomes. However, patients with moderate comorbidity admitted to stroke units in neurological settings had higher odds for 1-year mortality, but comparisons across strata of comorbidity were not statistical significant. CONCLUSIONS: Except for early antiplatelet therapy and early computed tomographic scan or magnetic resonance imaging, the medical setting was not associated with differences in processes of acute stroke care and patient outcome. No medical setting related differences were found according to comorbidity, although indications of a worse outcome in patients with moderate comorbidity in neurological settings warrant further investigation

Kerr, E., Arulraj, N., Scott, M., et al. (2010). "A telephone hotline for transient ischaemic attack and stroke: prospective audit of a model to improve rapid access to specialist stroke care." BMJ **341**: c3265.

PROBLEM: Patients with transient ischaemic attack or stroke benefit from early diagnosis, specialist assessment, and treatment with thrombolysis, and from stroke unit care and secondary prevention. The challenge with such patients is to minimise delays and ensure that treatment is appropriate, and to provide this care with the available resources. DESIGN: An ongoing prospective audit of a transient ischaemic attack and stroke clinic (1 January 2005 to 30 September 2009), as part of the Scottish Stroke Care Audit, and a three month targeted audit of immediate telephone access to a specialist stroke consultant (1 February 2009 to 30 April 2009). SETTING: Stroke and transient ischaemic attack services in Lothian, a region of Scotland with a population of 810,000. KEY MEASURES FOR IMPROVEMENT: Delays to assessment at a rapid access transient ischaemic attack and stroke clinic; delays to appropriate treatment. STRATEGY FOR CHANGE: In February 2007 we introduced a 24 hours a day, seven days a week hotline to a consultant, who provided immediate advice on

diagnosis, investigation, and emergency treatment for patients with transient ischaemic attack or stroke, and suggested the most appropriate care pathway, which might include an early appointment in a transient ischaemic attack and stroke clinic. EFFECTS OF CHANGE: The introduction of the hotline was associated with an immediate and sustained reduction in delays to assessment (from 13 to three days) and treatment. The proportion of participants taking statins at the time of visiting the clinic increased from 40% before the introduction of the hotline to 60% after the hotline was in place. Also, the hotline contributed to a reduction in the delay from last event to carotid surgery, from 58 days to 21.5 days. A total of 376 calls were received during the three month audit. Of the 273 (88%) referrers who responded to our questionnaire, 257 (94%) were very satisfied with the advice given over the hotline. LESSONS LEARNT: Although associated with some disruption to the activities of the consultants, a 24 hours a day, seven days a week telephone hotline to a consultant is a feasible and effective means of reducing delays to specialist assessment and treatment of patients with transient ischaemic attack or stroke

Lee, K. (2010). "Management of acute stroke and transient ischemic stroke-an integrated, systematic approach from the emergency department to the inpatient setting to discharge." Am Heart Hosp.J **8**(2): E91-E98.

In the past two decades, we have seen major advances in the treatment of transient ischemic attack (TIA) and acute ischemic stroke. Unfortunately, these advances have not benefited the majority of TIA and stroke patients. Reasons vary and include the failure of patients and providers to recognize the severity of early symptoms, resulting in critical delays in treatment. Other reasons include the inability of isolated emergency departments (EDs) to acquire life-saving technology or enhance provider expertise in recent medical advances. Effective treatment of TIA and stroke requires an integrated, systematic approach that begins in the ED, continues in the inpatient setting, and is maintained after discharge

Lichtman, J. H., Leifheit-Limson, E. C., Jones, S. B., et al. (2010). "Predictors of hospital readmission after stroke: a systematic review." Stroke **41**(11): 2525-2533.

BACKGROUND AND PURPOSE: Risk-standardized hospital readmission rates are used as publicly reported measures reflecting quality of care. Valid risk-standardized models adjust for differences in patient-level factors across hospitals. We conducted a systematic review of peer-reviewed literature to identify models that compare hospital-level poststroke readmission rates, evaluate patient-level risk scores predicting readmission, or describe patient and process-of-care predictors of readmission after stroke. METHODS: Relevant studies in English published from January 1989 to July 2010 were identified using MEDLINE, PubMed, Scopus, PsycINFO, and all Ovid Evidence-Based Medicine Reviews. Authors of eligible publications reported readmission within 1 year after stroke hospitalization and identified >/= 1 predictors of readmission in risk-adjusted statistical models. Publications were excluded if they lacked primary data or quantitative outcomes, reported only composite outcomes, or had < 100 patients. RESULTS: Of 374 identified publications, 16 met the inclusion criteria for this review. No model was specifically designed to compare risk-adjusted readmission rates at the hospital level or calculate scores predicting a patient's risk of readmission. The studies providing multivariable models of patient-level and/or process-of-care factors associated with readmission varied in stroke definitions, data sources, outcomes (all-cause and/or stroke-related readmission), durations of follow-up, and model covariates. Few characteristics were consistently associated with readmission. CONCLUSIONS: This review identified no risk-standardized models for comparing hospital readmission performance or predicting readmission risk after stroke. Patient-level and

system-level factors associated with readmission were inconsistent across studies. The current literature provides little guidance for the development of risk-standardized models suitable for the public reporting of hospital-level stroke readmission performance

Lutz, B. J. et Young, M. E. (2010). "Rethinking intervention strategies in stroke family caregiving." Rehabil.Nurs. **35**(4): 152-160.

Stroke is a condition that affects both patients and family members who provide care and support. Because stroke is an unexpected traumatic event that suddenly forces family members into a caregiving role, caregivers often experience an overwhelming sense of burden, depression, and isolation; a decline in physical and mental health; and reduced quality of life. Caregiver health is inextricably linked to a stroke survivor's physical, cognitive, and psychological recovery. Evidence suggests that informational interventions alone are not as effective in meeting the complex needs of stroke caregivers as interventions that combine information with other support services. This article discusses issues related to stroke caregiving and proposes comprehensive strategies designed to meet the poststroke recovery needs of both patients and caregivers. Suggested strategies include a comprehensive assessment specific to caregiver needs, skills, and resources and case management services designed to provide continuity of care across the stroke-recovery trajectory

Martinez-Sanchez, P., Fuentes, B., Medina-Baez, J., et al. (2010). "[Development of an acute stroke care pathway in a hospital with stroke unit]." Neurologia. **25**(1): 17-26.
PM:20388457

INTRODUCTION: Care pathways (CP) are tools for standardizing the management of patient in certain diseases with a predictable course, and they have demonstrated usefulness in clinical practice. In-hospital stroke CP have been implemented in departments of Neurology, General Medicine or Rehabilitation, however there are few studies developing an integrated CP in hospitals with an acute Stroke Unit (SU). The aim is to develop a CP capable of organizing and homogenizing the stroke assistance, and integrating the quality standards, in a hospital with an Acute Stroke Unit (SU). METHODS: Members of the Neurology, Rehabilitation, Emergency and Preventive Medicine departments established a schedule of nine fortnightly meetings. Several documents that compound the CP were elaborated following the FOCUS-PDCA model, according with the scientific evidence and the in force clinical guides. RESULTS: The following documents were elaborated: scientific-technical framework which integrates all processes; information document for patient/relatives on-admission; nurses protocols (social risk, disphagya, falling down risk and pressure ulcers); stroke rehabilitation guidelines for staff; treatment, care and monitoring sheets; recommendations at discharge for patient/relatives; stroke rehabilitation guidelines for patient/relatives; specific didactic units for patient/relatives; patient/relatives satisfaction survey; and quality standard document. CONCLUSIONS: A stroke CP in a hospital with SU potentially promotes a more organized and efficient stroke care, as well as improve the patient/relatives satisfaction

van, R. A., Groothuis, S., van der Aa, R., et al. (2010). "Shifting stroke care from the hospital to the nursing home: explaining the outcomes of a Dutch case." J Eval Clin Pract **16**(6): 1203-1208.

Les aspects géographiques du parcours de soins

En France

Mariet, A. S., Giroud, M., Benzenine, E., et al. (2021). "Hospitalizations for Stroke in France During the COVID-19 Pandemic Before, During, and After the National Lockdown." Stroke **52**(4): 1362-1369.

BACKGROUND AND PURPOSE: In France, the entire population was put under a total lockdown from March 17 to May 11, 2020 during the peak of the coronavirus disease 2019 (COVID-19) pandemic. Whether the lockdown had consequences on the management of medical emergencies such as stroke and transient ischemic attack (TIA) has yet to be fully evaluated. This article describes hospitalization rates for acute stroke in 2 French regions that experienced contrasting rates of COVID-19 infection, before, during, and after the nationwide lockdown (January to June 2020). METHODS: All patients admitted for acute stroke/TIA into all public and private hospitals of the 2 study regions were included. Data were retrieved from the National Hospitalization Database (PMSI). In the most affected region (Grand-Est), the hospitalization rates observed in April 2020 were compared with the rates in the same period in the least affected region (Occitanie) and in the 3 prior years (2017-2019). RESULTS: There was a significant decline in hospitalization rates for stroke/TIA within the region most affected by COVID-19 during the month of April 2020 compared with previous years, while no significant change was seen in the least affected region. After lockdown, we observed a fast rebound in the rate of hospitalization for stroke/TIA in the most affected region, contrasting with a slower rebound in the least affected region. In both regions, patients with COVID-19 stroke more frequently had ischemic stroke, a nonsignificant greater prevalence of diabetes, they were less frequently admitted to stroke units, and mortality was higher than in patients without COVID-19. CONCLUSIONS: Our results demonstrates a significant drop in stroke/TIA hospitalizations and a fast recovery after the end of the French lockdown in the most affected region, while the least affected region saw a nonsignificant drop in stroke/TIA hospitalizations and a slow recovery. These results and recommendations could be used by the health authorities to prepare for future challenges.

Padilla, C. M., Foucault, A., Grimaud, O., et al. (2021). "Gender difference of geographic distribution of the stroke incidence affected by socioeconomic, clinical and urban-rural factors: an ecological study based on data from the Brest stroke registry in France." BMC Public Health **21**(1): 39.

BACKGROUND: Mapping the spatial distribution of disease occurrence is a strategy to identify contextual factors that could be useful for public health policies. The purpose of this ecological study was to examine to which extent the socioeconomic deprivation and the urbanization level can explain gender difference of geographic distribution in stroke incidence in Pays de Brest, France between 2008 and 2013. METHODS: Stroke cases aged 60 years or more were extracted from the Brest stroke registry and combined at the census block level. Contextual socioeconomic, demographic, and geographic variables at the census block level come from the 2013 national census. We used spatial and non-spatial regression models to study the geographic correlation between socioeconomic deprivation, degree or urbanization and stroke incidence. We generated maps using spatial geographically weighted models, after longitude and latitude smoothing and adjustment for covariates. RESULTS: Stroke incidence was comparable in women and men (6.26 ± 3.5 vs 6.91 ± 3.3 per 1000 inhabitants-year, respectively). Results showed different patterns of the distribution of stroke risk and its association with deprivation or urbanisation across gender. For women, stroke incidence was spatially homogeneous over the entire study area, but was associated with deprivation level in urban census blocks: age adjusted risk ratio of high versus low deprivation = 1.24, [95%CI 1.04-1.46]. For men, three geographic clusters were identified. One located in the northern rural and deprived census blocks with a 9-14% increase in the risk of stroke. Two others clusters located in the south-eastern (mostly urban part) and south-western (suburban and rural part) with low deprivation level and associated with

higher risk of stroke incidence between (3 and 8%) and (8.5 and 19%) respectively. There were no differences in profile of cardiovascular risk factors, stroke type and stroke severity between clusters, or when comparing clusters cases to the rest of the study population. CONCLUSIONS: Understanding whether and how neighborhood and patient's characteristics influence stroke risk may be useful for both epidemiological research and healthcare service planning.

Freyssenge, J. (2020). "Spatial distribution and differences of stroke occurrence in the Rhone department of France (STROKE 69 cohort)." Neurology **10**(1): 9910.

In France, 110,000 patients are admitted to hospital per year for stroke. Even though the relationship between stroke and risk factors such as low socio-economic status is well known, research in the spatial distribution (SD) of stroke as a contributing risk factor is less documented. Understanding the geographic differences of the disease may improve stroke prevention. In this study, a statistical spatial analysis was performed using a French cohort (STROKE 69) to describe spatial inequalities in the occurrence of stroke. STROKE 69 was a cohort study of 3,442 patients, conducted in the Rhône department of France, from November 2015 to December 2016. The cohort included all consecutive patients aged 18 years or older, with a likelihood of acute stroke within 24 hours of symptoms onset. Patients were geolocated, and incidence standardized rates ratio were estimated. SD models were identified using global spatial autocorrelation analysis and cluster detection methods. 2,179 patients were selected for analysis with spatial autocorrelation methods, including 1,467 patients with stroke, and 712 with a transient ischemic attack (TIA). Within both cluster detection methods, spatial inequalities were clearly visible, particularly in the northern region of the department and western part of the metropolitan area where rates were higher. Geographic methods for SD analysis were suitable tools to explain the spatial occurrence of stroke and identified potential spatial inequalities. This study was a first step towards understanding SD of stroke. Further research to explain SD using socio-economic data, care provision, risk factors and climate data is needed in the future.

Gabet, A., Chatignoux, É., Grimaud, O., et al. (2020). "Disparités départementales de la létalité à 30 jours après un accident vasculaire cérébral ischémique en France, 2013-2015." Bull Epidemiol Hebd(5): 108-114.

L'objectif de notre étude était de décrire les disparités départementales de la létalité à 30 jours (létalité précoce) suite à une hospitalisation pour un accident vasculaire cérébral (AVC) ischémique en France métropolitaine. Méthode - Les données ont été extraites du Système national des données de santé (SNDS). Pour chaque année de 2013 à 2015, les patients hospitalisés pour un AVC ischémique âgés de 18 ans ou plus, affiliés au régime général de l'Assurance maladie et résidant en France métropolitaine ont été sélectionnés à partir des codes I63 de la Classification internationale des maladies - 10e révision. Les taux de létalité standardisés sur l'âge et le sexe ont été calculés par département. L'étude de leur variabilité interdépartementale a été réalisée à l'aide de modèles de régression logistique multivariée à effets mixtes avec une constante aléatoire par département. Résultats - Au niveau national, la létalité à 30 jours parmi les 163 596 AVC ischémiques hospitalisés entre 2013 et 2015 s'élevait à 10,4%. Les taux de létalité précoce standardisés variaient entre les départements de 8,1% (Paris) à 14,2% (Vosges). L'âge, la présence d'un déficit moteur, les comorbidités, un antécédent d'AVC, la prise d'un traitement antihypertenseur, la défaveur sociale ainsi que la densité de lits USINV (unités de soins intensifs neurovasculaires) et l'admission dans ces unités expliquaient 43% de la variabilité entre les départements. Après prise en compte de ces facteurs, la variabilité demeurait importante. Si certains départements conservaient une

létalité basse (Finistère, Moselle, Maine-et-Loire, Ille-et-Vilaine, Haute-Garonne et Manche) ou élevée (Vosges, Alpes-Maritimes, Var, Seine-Maritime et Dordogne) après tous les ajustements, d'autres voyaient leurs taux de létalité évoluer vers une létalité plus élevée ou plus basse après ajustement. Conclusions - D'importantes disparités départementales de la létalité à 30 jours suivant une hospitalisation pour un AVC ischémique ont été mises en évidence en France métropolitaine. Un quart de la variabilité interdépartementale de la létalité à 30 jours s'expliquait par les facteurs individuels et 17% par des différences de prise en charge, notamment l'admission en USINV, le reste de la variabilité restant inexpliquée.

Maillard, L. p. (2020). Panorama des ORU : activité des structures d'urgence 2019, Paris : Fedoru http://www.fedoru.fr/wp-content/uploads/2021/01/PANORAMA_FEDORU_2019_VF_compressed.pdf

Cette publication rassemble les données 2019 des observatoires régionaux des urgences : description de l'offre de soins, données d'activité des services d'urgence, qualité des données, ainsi que les travaux menés dans chaque région.

Grimaud, O., Lachkhem, Y., Gao, F., et al. (2019). "Stroke Incidence and Case Fatality According to Rural or Urban Residence." Stroke **50**(10): 2661-2667. https://www.ahajournals.org/doi/abs/10.1161/STROKEAHA.118.024695

Background and Purpose—Recent findings suggest that in the United States, stroke incidence is higher in rural than in urban areas. Similar analyses in other high-income countries are scarce with conflicting results. In 2008, the Brest Stroke Registry was started in western France, an area that includes about 366 000 individuals living in various urban and rural settings. Methods—All new patients with stroke included in the Brest Stroke Registry from 2008 to 2013 were classified as residing in town centers, suburbs, isolated towns, or rural areas. Poisson regression was used to analyze stroke incidence and 30-day case fatality variations in the 4 different residence categories. Models with case fatality as outcome were adjusted for age, stroke type, and stroke severity. Results—In total, 3854 incident stroke cases (n=2039 women, 53%) were identified during the study period. Demographic and socio-economic characteristics and primary healthcare access indicators were significantly different among the 4 residence categories. Patterns of risk factors, stroke type, and severity were comparable among residence categories in both sexes. Age-standardized stroke rates varied from 2.90 per thousand (95% CI, 2.59–3.21) in suburbs to 3.35 (95% CI, 2.98–3.73) in rural areas for men, and from 2.14 (95% CI, 2.00–2.28) in town centers to 2.34 (95% CI, 2.12–2.57) in suburbs for women. Regression models suggested that among men, stroke incidence was significantly lower in suburbs than in town centers (incidence rate ratio =0.87; 95% CI, 0.77–0.99). Case fatality risk was comparable across urban categories but lower in rural patients (relative risk versus town centers: 0.76; 95% CI, 0.60–0.96). Conclusions—Stroke incidence was comparable, and the 30-day case fatality only slightly varied in the 4 residence categories despite widely different socio-demographic features covered by the Brest Stroke Registry.

Santos, F., Gabet, A., Carcaillon-Bentata, L., et al. (2020). "Disparités départementales d'années potentielles de vie perdues prématurément par maladies cardiovasculaires en France (2013-2015)." Bull Epidemiol Hebd(24): 490-500.

Introduction - Les maladies cardiovasculaires (MCV) constituent la deuxième cause de mortalité en France et la troisième cause de mortalité prématurée. L'objectif de notre étude était de décrire les disparités départementales de mortalité prématurée pour l'ensemble des

MCV, et plus spécifiquement pour l'accident vasculaire cérébral (AVC) et l'infarctus du myocarde (IDM), en France en prenant en compte l'âge au décès. Méthode - Les données de mortalité ont été extraites de la base nationale des causes médicales de décès (CépiDc-Inserm). Différents indicateurs standardisés sur l'âge ont été estimés au niveau national en 2015 : mortalité totale, mortalité prématurée (décès survenant avant 65 ans) et années potentielles de vie perdues prématurément (APVPp). Les APVPp ont ensuite été déclinées au niveau départemental pour les décès survenus entre 2013 et 2015. Résultats - En 2013-2015, en France, la mortalité prématurée par MCV représentait 8,9% de la mortalité globale par MCV. Le nombre moyen d'APVPp par MCV était de 10,4 ans par personne. D'importantes disparités départementales étaient observées sur le territoire. Globalement, le croissant Nord/Nord-Est de la France métropolitaine ainsi que les DROM présentaient un nombre d'APVPp plus important que le niveau moyen national. En revanche, plusieurs départements d'Île-de-France et de la région Auvergne-Rhône-Alpes avaient des taux APVPp plus bas que la moyenne nationale. Discussion - D'importantes disparités territoriales de mortalité prématurée par MCV persistent sur le territoire français et concordent avec la distribution des facteurs de risque cardiovasculaires modifiables. La prise en compte de l'âge au décès permet une meilleure estimation au niveau départemental du fardeau cardiovasculaire lié à la mortalité. La poursuite d'actions de dépistage et de prévention de ces facteurs de risque semble prioritaire dans les départements présentant un excès d'APVPp et pourrait permettre de diminuer la part évitable liée à ces pathologies.

Freyssenge, J., Renard, F., Schott, A. M., et al. (2018). "Measurement of the potential geographic accessibility from call to definitive care for patient with acute stroke." Int J Health Geogr **17**(1): 1.

BACKGROUND: The World Health Organization refers to stroke, the second most frequent cause of death in the world, in terms of pandemic. Present treatments are only effective within precise time windows. Only 10% of thrombolysis patients are eligible. Late assessment of the patient resulting from admission and lack of knowledge of the symptoms is the main explanation of lack of eligibility. METHODS: The aim is the measurement of the time of access to treatment facilities for stroke victims, using ambulances (firemen ambulances or EMS ambulances) and private car. The method proposed analyses the potential geographic accessibility of stroke care infrastructure in different scenarios. The study allows better considering of the issues inherent to an area: difficult weather conditions, traffic congestion and failure to respect the distance limits of emergency transport. RESULTS: Depending on the scenario, access times vary considerably within the same commune. For example, between the first and the second scenario for cities in the north of Rhône county, there is a 10 min difference to the nearest Primary Stroke Center (PSC). For the first scenario, 90% of the population is 20 min away of the PSC and 96% for the second scenario. Likewise, depending on the modal vector (fire brigade or emergency medical service), overall accessibility from the emergency call to admission to a Comprehensive Stroke Center (CSC) can vary by as much as 15 min. CONCLUSIONS: The setting up of the various scenarios and modal comparison based on the calculation of overall accessibility makes this a new method for calculating potential access to care facilities. It is important to take into account the specific pathological features and the availability of care facilities for modelling. This method is innovative and recommendable for measuring accessibility in the field of health care. This study makes possible to highlight the patients' extension of care delays. Thus, this can impact the improvement of patient care and rethink the healthcare organization. Stroke is addressed here but it is applicable to other pathologies.

Lachkhem, Y., Minvielle, É. et Rican, S. (2018). "Geographic Variations of Stroke Hospitalization across France: A Diachronic Cluster Analysis." Stroke Res Treat **2018**: 1897569.

https://www.hindawi.com/journals/srt/2018/1897569/

BACKGROUND: This study evaluates the clustering of hospitalization rates for stroke and compares this clustering with two different time intervals 2009-2010 and 2012-2013, corresponding to the beginning of the French National Stroke Plan 2010-2014. In addition, these data will be compared with the deployment of stroke units as well as socioeconomic and healthcare characteristics at zip code level. METHODS: We used the PMSI data from 2009 to 2013, which lists all hospitalizations for stroke between 2009 and 2013, identified on the most detailed geographic scale allowed by this database. We identify statistically significant clusters with high or low rates in the zip code level using the Getis-Ord statistics. Each of the significant clusters is monitored over time and evaluated according to the nearest stroke unit distance and the socioeconomic profile. RESULTS: We identified clusters of low and high rate of stroke hospitalization (23.7% of all geographic codes). Most of these clusters are maintained over time (81%) but we also observed clusters in transition. Geographic codes with persistent high rates of stroke hospitalizations were mainly rural (78% versus 17%, P < .0001) and had a least favorable socioeconomic and healthcare profile. CONCLUSION: Our study reveals that high-stroke hospitalization rates cluster remains the same during our study period. While access to the stroke unit has increased overall, it remains low for these clusters. The socioeconomic and healthcare profile of these clusters are poor but variations were observed. These results are valuable tools to implement more targeted strategies to improve stroke care accessibility and reduce geographic disparities.

De Peretti, C., Gabet, A., Lecoffre, C., et al. (2017). "Disparités régionales de prise en charge hospitalière des accidents vasculaires cérébraux en 2015." Etudes Et Résultats (Drees)(1010) http://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/publications/etudes-et-resultats/article/disparites-regionales-de-prise-en-charge-hospitaliere-des-accidents-vasculaires

[BDSP. Notice produite par MIN-SANTE 8R0x7888. Diffusion soumise à autorisation]. En 2015, près de 116 000 adultes résidant en France ont eu une prise en charge hospitalière pour un accident vasculaire cérébral (AVC) survenu avant l'admission ou, plus rarement, lors d'une hospitalisation pour un autre motif. Parmi eux, 72% ont eu un infarctus cérébral, près d'un quart un AVC hémorragique et 4% un AVC de type non précisé.

Roussot, A., Cottenet, J., Gadreau, M., et al. (2016). "The use of national administrative data to describe the spatial distribution of in-hospital mortality following stroke in France, 2008-2011." Int J Health Geogr **15**(1): 2.

BACKGROUND: In the context of implementing the National Stroke Plan in France, a spatial approach was used to measure inequalities in this disease. Using the national PMSI-MCO databases, we analyzed the in-hospital prevalence of stroke and established a map of in-hospital mortality rates about the socio-demographic structure of the country. METHODS: The principal characteristics of patients identified according to ICD10 codes relative to stroke (in accordance with earlier validation work) were studied. A map of standardized mortality rates at the level of PMSI geographic codes was established. An exploratory analysis (principal component analysis followed by ascending hierarchical classification) using INSEE socio-economic data and mortality rates was also carried out to identify different area profiles. RESULTS: Between 2008 and 2011, the number of stroke patients increased by 3.85 %, notably for ischemic stroke in the 36-55 years age group (60 % of men). Over the same period, in-hospital mortality fell, and the map of standardized rates illustrated the diagonal of high mortality extending from the north-east to the south-west of the country. The most

severely affected areas were also those with the least favorable socio-professional indicators. CONCLUSIONS: The PMSI-MCO database is a major source of data on the health status of the population. It can be used for the area-by-area observation of the performance of certain healthcare indicators, such as in-hospital mortality, or to follow the implementation of the National Stroke Plan. Our study showed the interplay between social and demographic factors and stroke-related in-hospital mortality. The map derived from the results of the exploratory analysis illustrated a variety of areas where social difficulties, aging and high mortality seemed to meet. The study raises questions about access to neuro-vascular care in isolated areas and in those in demographic decline. Telemedicine appears to be the solution favored by decision makers. The aging of the population managed for stroke must not mask the growing incidence in younger people, which raises questions about the development of classical (smoking, hypertension) or new (drug abuse) risk factors.

Roussot, A., Cottenet, J., Combier, E., et al. (2015). "Distribution spatiale de la mortalité hospitalière par AVC en France, 2008-2011." Journal de gestion et d'économie médicales **33**(4-5): 301-320

Introduction : Le Plan national AVC prévoit l'utilisation des bases de données médico-administratives pour établir et suivre certains indicateurs de prise en charge des AVC. À partir du PMSI-MCO 2008-2011, nous avons établi une analyse descriptive des AVC hospitalisés en France, ainsi qu'une cartographie des taux de mortalité hospitalière. Matériel et méthodes : Les principales caractéristiques des patients victimes d'AVC ont été étudiées. Une cartographie des taux de mortalité standardisés a été effectuée à l'échelle des codes géographiques PMSI. Une analyse exploratoire utilisant les données socio-professionnelles INSEE et les taux de mortalité a également été menée. Résultats : Entre 2008 et 2011, le nombre d'AVC a augmenté de 3,85%. La moyenne d'âge des patients a également augmenté malgré une hausse significative des hospitalisations chez les 36 - 55 ans. La mortalité hospitalière a reculé sur la période, la cartographie des taux standardisés illustre la prégnance d'une diagonale de surmortalité du nord-est au sud-ouest du pays. Discussion : Le vieillissement de la population victime d'AVC ne doit pas faire oublier l'accroissement de "jeunes" patients, ce qui interroge sur le développement des facteurs de risques classiques (tabagisme, hypertension) ou nouveaux (stupéfiants). Le traitement cartographique des données permet d'établir une typologie socio-sanitaire des territoires qui pourrait être reproduite à une échelle plus fine. Conclusion : Le PMSI-MCO peut être utilisé pour l'observation territorialisée de certains indicateurs de performance du système de soins, comme la mortalité hospitalière, autant que pour le suivi de la mise en œuvre du Plan national de lutte contre les AVC.

(2014). Les projets régionaux de santé : un cadre peu opérationnel. Rapport sur l'application des lois de financement de la sécurité sociale., Paris : Cour des Comptes**:** 331-357
https://www.ccomptes.fr/sites/default/files/EzPublish/rapport_securite_sociale_2014_projets_regionaux_sante.pdf

La loi du 21 juillet 2009 « Hôpital, Patients, Santé et Territoires » (dite loi HPST) a entendu inscrire la politique de santé dans la double perspective d'un parcours assurant un continuum de prise en charge depuis la prévention jusqu'aux structures médico-sociales et d'une territorialisation de l'organisation des soins, avec pour objectif d'améliorer l'égalité des chances et la qualité des prises en charge . À cette fin, les agences régionales de santé (ARS) créées par cette même loi se sont vu confier, parmi leurs premières missions, celle de mettre en œuvre au niveau régional la politique de santé publique dont la loi du 9 août 2004 relative à la santé publique précise qu'elle a notamment pour objectif « la réduction des inégalités de santé, par la promotion de la santé, par le développement de l'accès aux soins et aux

diagnostics sur l'ensemble du territoire ». Le cadre de régulation de la politique régionale de santé a été modifié en conséquence. Le projet régional de santé (PRS) unifie dorénavant l'ensemble des démarches des différents acteurs -État et assurance maladie au premier chef - dans les domaines de la prévention, des soins hospitaliers et ambulatoires et de l'action médico-sociale. À l'issue de la phase d'élaboration de ces derniers et au début de leur mise en œuvre, la Cour a cherché à analyser comment cet exercice de programmation avait entendu répondre à ses objectifs : réduire les inégalités en santé, assurer une meilleure coordination des parcours de soins et permettre une plus grande efficience des politiques de santé publique. Elle a constaté que cette démarche n'est pas parvenue, malgré un travail et une mobilisation considérables, à rendre opérationnelle une approche intégrée au niveau régional, comme l'illustrent les deux exemples de la prévention et de la prise en charge de l'obésité et des accidents vasculaires cérébraux. Les capacités d'action des ARS sont entravées par de nombreuses difficultés, qu'il s'agisse de l'absence de priorités nationales claires, du manque de leviers financiers à la disposition directe des ARS ou du défaut d'affirmation de leur rôle de pilote face à d'autres acteurs au niveau local . L'élaboration de nouveaux projets régionaux de santé en 2016 devra nécessairement s'engager dans un cadre institutionnel à repenser.

Gabet, A., Olie, V., Chin, F., et al. (2014). "Disparités régionales de la mortalité prématurée par maladie cardiovasculaire en France (2008-2010) et évolutions depuis 2000-2002." Bulletin Epidémiologique Hebdomadaire(26): 430-438.
http://beh.santepubliquefrance.fr/beh/2014/26/2014_26_1.html

Introduction : les maladies cardiovasculaires représentent la 3e cause de mortalité prématurée en France. L'objectif de cette étude était de décrire les disparités régionales de mortalité cardiovasculaire prématurée pour les cardiopathies ischémiques (CPI), les maladies cérébrovasculaires (MCV), l'insuffisance cardiaque (IC) et l'embolie pulmonaire (EP), en 2008-2010, et d'étudier les évolutions temporelles. Méthodes : les données ont été extraites des bases nationales des causes médicales de décès. Pour chaque pathologie, les taux annuels moyens régionaux de 2008-2010 ont été standardisés puis comparés au taux national. Leurs évolutions depuis 2000-2002 ont été analysées par des régressions de Poisson. Résultats : d'importantes disparités régionales ont été observées. Les régions Nord-Pas-de-Calais, Picardie, Haute-Normandie, Champagne-Ardenne, Auvergne et Limousin présentaient des taux de mortalité prématurée plus élevés que la moyenne nationale pour les quatre pathologies considérées. La mortalité prématurée par MCV, EP et IC était plus élevée dans les départements d'outremer qu'en métropole. Depuis 2000-2002, la mortalité prématurée a diminué de manière hétérogène selon la région et la pathologie. Discussion : malgré une diminution de la mortalité prématurée par maladie cardiovasculaire durant la dernière décennie, des disparités régionales demeurent. Elles sont possiblement liées à une variabilité géographique des principaux facteurs de risque et de la prise en charge. La contribution respective de ces différents facteurs reste à établir.

Bohic, N. (2012). "Prévention des accidents vasculaires cérébraux et vieillissement. Impact des inégalités sociales et territoriales de santé." Gérontologie Et Société: 217-227

L'accident vasculaire cérébral (AVC) est fréquent et grave. Il concerne trois fois sur quatre une personne de 65 ans et plus. Cet article traite de deux niveaux de prévention, la lutte contre les principaux facteurs de risque de l'AVC au cours du vieillissement (hypertension artérielle, tabagisme, obésité abdominale, alimentation trop riche, manque d'activité physique) et l'appel au 15 lors de sa survenue pour réduire les risques de séquelles. Ils sont impactés par les inégalités sociales de santé (conditions de vie, isolement.) et peuvent être

améliorés (contrôle tensionnel, accès aux soins). La prévention de l'AVC, enjeu majeur de santé publique, contribue à considérer la qualité de vie comme un objectif central tout au long de la vie. (R.A.).

Evain, F. (2011). "À quelle distance de chez soi se fait-on hospitaliser ?" Etudes et résultats DREES (754)

Grimaud, O., Bejot, Y., Heritage, Z., et al. (2011). "Incidence of stroke and socioeconomic neighborhood characteristics: an ecological analysis of Dijon stroke registry." Stroke **42**. http://dx.doi.org/10.1161/STROKEAHA.110.596429

A l'étranger

Ader, J., Wu, J., Fonarow, G. C., et al. (2019). "Hospital distance, socioeconomic status, and timely treatment of ischemic stroke." **93**(8): e747-e757.

OBJECTIVE: To determine whether lower socioeconomic status (SES) and longer home to hospital driving time are associated with reductions in tissue plasminogen activator (tPA) administration and timeliness of the treatment. METHODS: We conducted a retrospective observational study using data from the Get With The Guidelines-Stroke Registry (GWTG-Stroke) between January 2015 and March 2017. The study included 118,683 ischemic stroke patients age ≥18 who were transported by emergency medical services to one of 1,489 US hospitals. We defined each patient's SES based on zip code median household income. We calculated the driving time between each patient's home zip code and the hospital where he or she was treated using the Google Maps Directions Application Programing Interface. The primary outcomes were tPA administration and onset-to-arrival time (OTA). Outcomes were analyzed using hierarchical multivariable logistic regression models. RESULTS: SES was not associated with OTA (p = 0.31) or tPA administration (p = 0.47), but was associated with the secondary outcomes of onset-to-treatment time (OTT) (p = 0.0160) and in-hospital mortality (p = 0.0037), with higher SES associated with shorter OTT and lower in-hospital mortality. Driving time was associated with tPA administration (p < 0.001) and OTA (p < 0.0001), with lower odds of tPA (0.83, 0.79-0.88) and longer OTA (1.30, 1.24-1.35) in patients with the longest vs shortest driving time quartiles. Lower SES quintiles were associated with slightly longer driving time quartiles (p = 0.0029), but there was no interaction between the SES and driving time for either OTA (p = 0.1145) or tPA (p = 0.6103). CONCLUSIONS: Longer driving times were associated with lower odds of tPA administration and longer OTA; however, SES did not modify these associations.

Claxton, J. N. S., Lutsey, P. L., MacLehose, R. F., et al. (2019). "Geographic Disparities in the Incidence of Stroke among Patients with Atrial Fibrillation in the United States." Journal of Stroke and Cerebrovascular Diseases **28**(4): 890-899. https://www.sciencedirect.com/science/article/pii/S1052305718307043

Aim: To determine whether regional variation in stroke incidence exists among individuals with AF. Methods: Using healthcare utilization claims from 2 large US databases, MarketScan (2007-2014) and Optum Clinformatics (2009-2015), and the 2010 US population as the standard, we estimated age-, sex-, race- (only in Optum) standardized stroke incidence rates by the 9 US census divisions. We also used Poisson regression to examine incidence rate ratios (IRR) of stroke and the probability of anticoagulation prescription fills across divisions.

Results: Both databases combined included 970,683 patients with AF who experienced 15,543 strokes, with a mean follow-up of 23 months. In MarketScan, the age- and sex-standardized stroke incidence rate was highest in the Middle Atlantic and East South Central divisions at 3.8/1000 person-years (PY) and lowest in the West North Central at 3.2/1000 PY. The IRR of stroke and the probability of anticoagulation fills were similar across divisions. In Optum Clinformatics, the age-, sex-, and race-standardized stroke incidence rate was highest in the East North Central division at 5.0/1000 PY and lowest in the New England division at 3.3/1000 PY. IRR of stroke and the probability of anticoagulation fills differed across divisions when compared to New England. Conclusions: These findings suggest regional differences in stroke incidence among AF patients follow a pattern that differs from the hypothesized trend found in the general population and that other factors may be responsible for this new pattern. Cross-database differences provide a cautionary tale for the identification of regional variation using health claims data.

Lynch, E. A., Cadilhac, D. A. et Luker, J. A. (2017). "Inequities in access to inpatient rehabilitation after stroke: an international scoping review." **24**(8): 619-626.

Background Inequities in accessing inpatient rehabilitation after stroke have been reported in many countries and impact on patient outcomes. Objective To explore variation in international recommendations regarding which patients should receive inpatient rehabilitation after stroke and to describe reported access to rehabilitation. Methods A scoping review was conducted to identify clinical guidelines with recommendations regarding which patients should access inpatient rehabilitation after stroke, and data regarding the proportion of patients accessing stroke rehabilitation. Four bibliographic databases and grey literature were searched. Results Twenty-eight documents were included. Selection criteria for post-acute inpatient rehabilitation were identified for 14 countries or regions and summary data on the proportion of patients receiving inpatient rehabilitation were identified for 14 countries. In Australia, New Zealand, and the United Kingdom, it is recommended that all patients with stroke symptoms should access rehabilitation, whereas guidelines from the United States, Canada, and Europe did not consistently recommend rehabilitation for people with severe stroke. Access to inpatient rehabilitation ranged from 13% in Sweden to 57% in Israel. Differences in availability of early supported discharge/home rehabilitation programs and variations in reporting methods may influence the ability to reliably compare access to rehabilitation between regions. Conclusion Recommendations regarding which patients with moderate and severe strokes should access ongoing rehabilitation are inconsistent. Clinical practice guidelines from different countries regarding post-stroke rehabilitation do not always reflect the evidence regarding the likely benefits to people with stroke. Inequity in access to rehabilitation after stroke is an international issue.

Berlin, C. et Panczak, R. (2016). "Do acute myocardial infarction and stroke mortality vary by distance to hospitals in Switzerland? Results from the Swiss National Cohort Study." **6**(11): e013090.

OBJECTIVE: Switzerland has mountains and valleys complicating the access to a hospital and critical care in case of emergencies. Treatment success for acute myocardial infarction (AMI) or stroke depends on timely treatment. We examined the relationship between distance to different hospital types and mortality from AMI or stroke in the Swiss National Cohort (SNC) Study. DESIGN AND SETTING: The SNC is a longitudinal mortality study of the census 2000 population of Switzerland. For 4.5 million Swiss residents not living in a nursing home and older than 30 years in the year 2000, we calculated driving time and straight-line distance from their home to the nearest acute, acute with emergency room, central and university

hospital (in total 173 hospitals). On the basis of quintiles, we used multivariable Cox proportional hazard models to estimate HRs of AMI and stroke mortality for driving time distance groups compared to the closest distance group. RESULTS: Over 8 years, 19 301 AMI and 21 931 stroke deaths occurred. Mean driving time to the nearest acute hospital was 6.5 min (29.7 min to a university hospital). For AMI mortality, driving time to a university hospital showed the strongest association among the four types of hospitals with a hazard ratio (HR) of 1.19 (95% CI 1.10 to 1.30) and 1.10 (95% CI 1.01 to 1.20) for men and women aged 65+ years when comparing the highest quintile with the lowest quintile of driving time. For stroke mortality, the association with university hospital driving time was less pronounced than for AMI mortality and did not show a clear incremental pattern with increasing driving time. There was no association with driving time to the nearest hospital. CONCLUSIONS: The increasing AMI mortality with increasing driving time to the nearest university hospital but not to any nearest hospital reflects a complex interplay of many factors along the care pathway.

Karp, D. N., Wolff, C. S., Wiebe, D. J., et al. (2016). "Reassessing the Stroke Belt: Using Small Area Spatial Statistics to Identify Clusters of High Stroke Mortality in the United States." Stroke **47**(7): 1939-1942.

BACKGROUND AND PURPOSE: The stroke belt is described as an 8-state region with high stroke mortality across the southeastern United States. Using spatial statistics, we identified clusters of high stroke mortality (hot spots) and adjacent areas of low stroke mortality (cool spots) for US counties and evaluated for regional differences in county-level risk factors. METHODS: A cross-sectional study of stroke mortality was conducted using Multiple Cause of Death data (Centers for Disease Control and Prevention) to compute age-adjusted adult stroke mortality rates for US counties. Local indicators of spatial association statistics were used for hot-spot mapping. County-level variables were compared between hot and cool spots. RESULTS: Between 2008 and 2010, there were 393 121 stroke-related deaths. Median age-adjusted adult stroke mortality was 61.7 per 100 000 persons (interquartile range=51.4-74.7). We identified 705 hot-spot counties (22.4%) and 234 cool-spot counties (7.5%); 44.5% of hot-spot counties were located outside of the stroke belt. Hot spots had greater proportions of black residents, higher rates of unemployment, chronic disease, and healthcare utilization, and lower median income and educational attainment. CONCLUSIONS: Clusters of high stroke mortality exist beyond the 8-state stroke belt, and variation exists within the stroke belt. Reconsideration of the stroke belt definition and increased attention to local determinants of health underlying small area regional variability could inform targeted healthcare interventions.

Heijink, R., Engelfriet, P., Rehnberg, C., et al. (2015). "A Window on Geographic Variation in Health Care: Insights from EuroHOPE." Health Econ **24 Suppl 2**: 164-177. https://onlinelibrary.wiley.com/doi/10.1002/hec.3287

The aim of EuroHOPE was to provide new evidence on the performance of healthcare systems, using a disease-based approach, linkable patient-level data and internationally standardized methods. This paper summarizes its main results. In the seven EuroHOPE countries, the Acute Myocardial Infarction (AMI), stroke and hip fracture patient populations were similar with regard to age, sex and comorbidity. However, non-negligible geographic variation in mortality and resource use was found to exist. Survival rates varied to similar extents between countries and regions for AMI, stroke, hip fracture and very low birth weight. Geographic variation in length of stay differed according to type of disease.

Regression analyses showed that only a small part of geographic variation could be explained by demand and supply side factors. Furthermore, the impact of these factors varied between countries. The findings show that there is room for improvement in performance at all levels of analysis and call for more in-depth disease-based research. In using international patient-level data and a standardized methodology, the EuroHOPE approach provides a promising stepping-stone for future investigations in this field. Still, more detailed patient and provider information, including outside of hospital care, and better data sharing arrangements are needed to reach a more comprehensive understanding of geographic variations in health care. Copyright (c) 2015 John Wiley

Kim, A. S., Cahill, E. et Cheng, N. T. (2015). "Global Stroke Belt. Geographic Variation in Stroke Burden Worldwide." Stroke **46**(12): 3564-3570.
https://www.ahajournals.org/doi/abs/10.1161/STROKEAHA.115.008226

Over the past several decades, much of the developed world has experienced a sustained reduction in age-standardized stroke mortality and morbidity rates.1 For many of these countries, these improvements have translated into declines in absolute stroke mortality and morbidity as well. For example, stroke had been the third-leading cause of death in the United States for >70 years until 2008, when it became the fourth leading cause of death.2,3 Just 5 years later, stroke became the fifth leading cause of death4—a drop that reflected the >60% decline in the age-adjusted mortality rate from stroke over just the past few decades.

Ripley, D. C., Kwong, P. L., Vogel, W. B., et al. (2015). "How does geographic access affect in-hospital mortality for veterans with acute ischemic stroke?" Med Care **53**(6): 501-509.

OBJECTIVE: To examine the relationship between estimated travel time to admitting hospital and mortality for veterans with acute ischemic stroke, controlling for patient demographic, clinical, facility-level variables, as well as select in-hospital treatments and procedures. METHODS: A longitudinal observational population-based study. Information on all veterans discharged from a Veterans Administration Medical Center (VAMC) with an ischemic stroke diagnosis between October 1, 2006 and September 30, 2008 were examined. A total of 10,430 patients met the inclusion criteria for the study. Unadjusted differences between patients who died during the hospital stay versus those patients who were discharged alive, used chi analyses or Student t tests, as appropriate. Multivariable logistic regression was used to control for confounding effects of patient, treatment, and facility characteristics to examine the relationship between travel time and the bivariate outcome of in-hospital mortality. RESULTS: Travel time to the admitting VAMC, our primary variable of interest regarding the effect on in-hospital mortality, after adjusting for the patient, treatment, and facility characteristics showed that longer travel times significantly increased the odds of in-hospital mortality. Travel times >/=90 minutes had increased odds of in-hospital mortality (OR=1.476; 95% CI, 1.067-2.042) as compared with <30 minutes. CONCLUSIONS: Even after adjusting for the confounding effects of patient, treatment, and facility characteristics, travel time from home to admitting VAMC was significantly associated with in-hospital mortality.

Rafnsson, S. B., Bhopal, R. S., Agyemang, C., et al. (2013). "Sizable variations in circulatory disease mortality by region and country of birth in six European countries." Eur J Public Health **23**(4): 594-605.

BACKGROUND: Circulatory disease mortality inequalities by country of birth (COB) have been demonstrated for some EU countries but pan-European analyses are lacking. We examine inequalities in circulatory mortality by geographical region/COB for six EU countries.

METHODS: We obtained national death and population data from Denmark, England and Wales, France, the Netherlands, Scotland and Sweden. Mortality rate ratios (MRRs) were constructed to examine differences in circulatory, ischaemic heart disease (IHD) and cerebrovascular disease mortality by geographical region/COB in 35-74 years old men and women. RESULTS: South Asians in Denmark, England and Wales and France experienced excess circulatory disease mortality (MRRs 1.37-1.91). Similar results were seen for Eastern Europeans in these countries as well as in Sweden (MRRs 1.05-1.51), for those of Middle Eastern origin in Denmark (MRR = 1.49) and France (MRR = 1.15), and for East and West sub-Saharan Africans in England and Wales (MRRs 1.28 and 1.39) and France (MRRs 1.24 and 1.22). Low ratios were observed for East Asians in France, Scotland and Sweden (MRRs 0.64-0.50). Sex-specific analyses showed results of similar direction but different effect sizes. The pattern for IHD mortality was similar to that for circulatory disease mortality. Two- to three-fold excess cerebrovascular disease mortality was found for several foreign-born groups compared with the local-born populations in some countries. CONCLUSIONS: Circulatory disease mortality varies by geographical region/COB within six EU countries. Excess mortality was observed for some migrant populations, less for others. Reliable pan-European data are needed for monitoring and understanding mortality inequalities in Europe's multiethnic

Schwamm, L. H., Reeves, M. J., Matsouaka, R. A., et al. (2013). "Community-level cardiovascular risk factors impact geographic variation in cardiovascular disease hospitalizations for women." Neurology **38**(3): 451-457.

Prior work has shown significant geographic variation in cardiovascular (CV) risk factors including metabolic syndrome, obesity, and hypercholesterolemia. However, little is known about how variations in CV risk impact cardiovascular disease (CVD)-related hospitalizations. Community-level CV risk factors (hypertension, dyslipidemia, hyperglycemia, and elevated waist circumference) were assessed from community-wide health screenings sponsored by Sister to Sister (STS) from 2008 to 2009 in 17 major US cities. Using data from the Healthcare Cost and Utilization Project's Nationwide Inpatient Sample (HCUP-NIS), CVD hospitalizations were identified based on ICD-9 codes for acute myocardial infarction (AMI), congestive heart failure (CHF), and stroke. We linked STS data with HCUP-NIS hospitalizations based on common cities and restricted the analysis to women discharged from hospitals inside the STS cities. Using hierarchical models with city as the random intercept, we assessed the impact of city-specific CV risk factors on between-city variance of AMI, CHF, and stroke. Analyses were also adjusted for patient age and clinical comorbidities. Our analysis yielded a total of 742,445 all-cause discharges across 70 hospitals inside of 13 linked cities. The overall city-specific range proportion of AMI, CHF, and stroke hospitalizations were 1.13 % (0.75-1.59 %), 2.57 % (1.44-3.92 %), and 1.24 % (0.66-1.84 %), respectively. After adjusting for city-specific CV risk factors, between-city variation was no longer statistically significant for all CVD conditions explored. In conclusion, we found that geographic variations in AMI, CHF, and stroke hospitalizations for women may be partially explained by community-level CV risk factors. This finding suggests that interventions to reduce CVD should be tailored to the unique risk profile and needs of high-risk communities.

Pedigo, A., Aldrich, T. et Odoi, A. (2011). "Neighborhood disparities in stroke and myocardial infarction mortality: a GIS and spatial scan statistics approach." BMC Public Health **11**. http://dx.doi.org/10.1186/1471-2458-11-644

Pedigo, A., Seaver, W. et Odoi, A. (2011). "Identifying unique neighborhood characteristics to guide health planning for stroke and heart attack: fuzzy cluster and discriminant analyses approaches." PLoS One **6**.

http://dx.doi.org/10.1371/journal.pone.0022693

Walcott, B. P., Nahed, B. V., Kahle, K. T., et al. (2011). "Determination of geographic variance in stroke prevalence using Internet search engine analytics." Neurosurg Focus **30**(6): E19.

Previous methods to determine stroke prevalence, such as nationwide surveys, are labor-intensive endeavors. Recent advances in search engine query analytics have led to a new metric for disease surveillance to evaluate symptomatic phenomenon, such as influenza. The authors hypothesized that the use of search engine query data can determine the prevalence of stroke.

Ressources électroniques

Dossier sur l'AVC sur le site du ministère chargé de la santé :
https://solidarites-sante.gouv.fr/soins-et-maladies/maladies/maladies-cardiovasculaires/accident-vasculaire-cerebral-avc/

Espace du site de Santé Publique France consacré à l'AVC
https://www.santepubliquefrance.fr/maladies-et-traumatismes/maladies-cardiovasculaires-et-accident-vasculaire-cerebral

France AVC
https://www.franceavc.com/

Filière AVC de la Région Normandie
https://www.avc-normandie.fr/

European stroke Organizatiion
https://eso-stroke.org/

Stroke Alliance for Europe
https://www.safestroke.eu