INEGALITES GEOGRAPHIQUES ET ALLOCATION DE RESSOURCE

Restructuring the medical care landscape via telemedicine : prospects and problems

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Introduction

The purpose of this paper is to present a synopsis of a presentation pertaining to the prospects and problems pertaining to the use of telemedicine to restructure the medical care landscape. Improving access to medical care remains a problem in most societies and the landscapes of medical care comprised of the distribution of physicians, hospitals and other medical care remain uneven. Despite substantial strides in medical science, problems persist in delivering basic as well as specialized medical care to populations living in remote areas. Over the years, numerous attempts have been made to solve this problem. These include programs to recruit physicians to underserved areas, building facilities in remote areas to attract physicians and other means to physically redistribute medical personnel. In some societies there has been some success in redistributing primary care to underserved areas. However, in many situations, primary as well as secondary and tertiary care remain concentrated in larger towns and in medical centers that are located in large urban centers.

Using a time-space framework originally proposed by Hagerstrand, the concept of telemedicine is described and assessed. It is demonstrated here that telemedicine does have the potential to restructure the medical care landscape. However, rather than making distance irrelevant, telemedicine, as presently configured, actually makes the distance component more complex. Also considered briefly here is the fact that telemedicine will force us to reconsider our traditional notions of what constitutes and how to determine a medical care region.

1. Telemedicine

Over the past decade, telemedicine (the delivery of medical care at a distance) has re-emerged as a potential solution to the problem of medical care accessibility. Telemedicine is described as having the potential to electronically transport patients from remote areas to distant medical centers. Using advanced telemetry and biometry technology coupled with improved communication networks, proponents of telemedicine suggest that physicians located at distant medical centers can examine patients in remote locations « as if they were present ». While this point can be argued, proponents also suggest that telemedicine « has made distance irrelevant » in the provision of and access to medical care. It is this latter statement that is considered here.

To date, there is no general agreement as to the meaning of telemedicine. In part, this derives from the relatively recent development of the concept as well as the variety of elements and technology encompassed by the notion of telemedicine. In practice telemedicine can be limited to a simple « Picasso » telephone that can be used to store and then forward images from one location to another. Or, the more sophisticated telemedicine networks involve two-way interactive audio-visual communication and « real time » electronically transferred data and images derived from locally or remote controlled zoom-cameras coupled with electronic stethoscopes, otoscopes, laparoscopes,

and microscopes. And, telemedicine may involve the linkage of a single remote clinic to a single hospital or a hierarchical network involving multiple remote primary care facilities linked with secondary and, ultimately, tertiary care facilities in a virtual regional network that covers thousands of square miles. Finally, a telemedicine linkage can involve a clinic located several blocks or miles from a hospital, or a clinic and hospital located thousands of miles apart. Thus, the content and complexity of what comprises telemedicine contributes to problems pertaining to definition. Regardless of the level of complexity being considered, it is important to consider telemedicine, this medicine at a distance from a spatial-temporal perspective.

2. Telemedicine in Time and Space

According to Hagerstrand, the Swedish geographer, people, places and objects have paths through time and space. We have paths, for example, that include our travel from home to work, school, shopping and for medical care. Places, too, have time-space paths, though they are less interesting than ours. A medical facility, for example, has a time-space path. While its geographic location is fixed, its temporal path or availability is restricted to only a portion of the day and only certain days of the week. In order for us to satisfy our daily needs our paths must intersect those of other individuals and places.

The telemedicine landscape consists of the locations and paths of physicians, patients, medical clinics/hospitals and equipment, and facilitators. Moreover, the paths involved are both physical and virtual or electronic. Compared to telemedicine, the traditional, in-person medical care process is relatively simple involving the travel of a patient to a physician located in an office, clinic or hospital. In the space-time framework, the process of the merging of paths in order to exchange information or transfer goods is referred to as *coupling* and the merged paths as a *bundle*.

As most commonly configured today, telemedicine involves the physical movement or relocation of primary and specialist physicians as well as patients. It is necessary for each of these actors to travel to a facility in which telemedicine equipment is located. In most cases, an additional person, the « facilitator » is necessary at both ends of the telemedicine exchange. Thus, in the traditional medical care process *three* paths must be considered, namely, that of the physician, the patient and the medical care setting in which the medical care exchange takes place.

The telemedicine experience is obviously much more complex in that it involves up to seven paths necessary to complete the medical care bundle. In other words physicians must travel to telemedicine facilities in which the telemedicine equipment is located. Here a facilitator who operates or oversees the equipment being used in the telecare process usually meets each physician. And, of course, the patient must travel to the remote facility. In some situations, the situation is even more complex as, in order for the telemedicine encounter to take place, a line of communication must be established through the intervention of a telephone operator.

Thus, in order for a successful telemedicine encounter to take place the paths of seven or more individuals and/or equipment must come together (couple) in a bundle. The bundle necessary for the successful telemedicine encounter is much more complex than that formed in the traditional medical care experience. Importantly, the increased complexity of the telemedicine bundle increases the problem of scheduling and, most importantly, the likelihood that the telemedicine encounter will not take place. The failure of any one of the paths to merge or couple with the others will render the bundle incomplete. In other words, if one of the physicians does not appear at the appropriate location at the designated time; if the patient does not arrive as scheduled, if one of the facilitators fails to appear ; or, if the equipment malfunctions at either end of the linkage, the telemedicine encounter will not be successful.

It is obvious from this brief discussion, therefore, that telemedicine has not made distance irrelevant as some have said. As in the traditional or in-person medical care experience, the patient must travel to a physician. However, patient travel may be reduced if it becomes clear, through the use of telemedicine, that travel to a distant specialist is not required. At the same time, at least in most telemedicine systems as currently configured, travel by physicians is required. In order to use telemedicine most remote physicians must travel from their office to a clinic that houses the telemedicine facility. And, specialists at remote tertiary hospitals must travel to a telemedicine facility/room within the medical center. This can be located within the hospital or in a separate building. Facilitators, necessary to operate or oversee the operation of telemedicine equipment, must also travel to the telemedicine stations. Therefore, while travel for the patient may be reduced, there is additional travel involved for the other participants in the medical care process.

It may be concluded, therefore, that telemedicine can lead to a restructuring of the medical care landscape. It can « bring » patients from remote locations to physicians located at distant medical centers (or vice versa) through electronic communications' linkages and networks. Thus, it has the potential to redistribute medical care more successfully than previous attempts to physically relocate medical care facilities and personnel. However, rather than making distance « irrelevant », telemedicine imposes new and additional distances that must be considered. And, the medical care process is rendered much more complex under telemedicine as the number of paths that must be coupled into a bundle for the successful exchange of medical care is multiplied.

3. Beyond Distance Considerations

What has been considered here is only one impact of telemedicine, namely, new distances and complexities derived from the implementation of telemedicine. Beyond these, telemedicine has implications on our traditional notions of regionalization of medical care. We spend much time in health care planning dealing with the problem of matching resources to needs, however the latter are identified. Also, we continually strive to define the regionalization of resources using ever more sophisticated methodologies that require drawing one or another boundary.

The restructured medical care landscape means that we must also reconsider traditional concepts and measures of needs and regionalization. The traditional physical geographic considerations of regions are no longer sufficient in the era of telemedicine. As telemedicine proliferates, and it is proliferating, our traditional concepts of regionalization and medical care geography must be revised. We now must consider « virtual » regions of medical care that transcend physical distances. For example, via telemedicine, it is now possible to link patients in small villages in France with specialists in the leading medical centers in the United States. In effect, we can anticipate global virtual medical care regions. However, in the age of telemedicine, if it indeed comes to pass, the virtual medical care region, of necessity, will need to be linked with the more traditional « ground-based » notion of regionalized medical care. In other words, patients seen globally will still need to be treated locally.

It is incumbent upon us to consider the impact of telemedicine and to contribute to development of efficient and effective medical care delivery in the age of electronic communication. At the same time, if telemedicine is to be successful in improving the spatial equity and delivery of medical care, its proponents and developers must be made aware of and include a careful geographical assessment of the restructured landscape of medical care fostered by telemedicine. They must be made to see that telemedicine, in fact, does not make distance irrelevant to the medical care process. On the contrary, new distance considerations must be recognized and accounted for in a more complex medical care process.