From the Guest Editor

Current Developments in Telemedicine

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Although the simplest form of telemedicine, the remote interpretation of electrocardiograms (ECGs) through a public telephone network, was established almost 40 years ago, the current aim of telemedicine is to provide expert-based health care to remote sites through modern telecommunication and information technologies. At present, the number of sites and variety of clinical applications are increasing. However, the volume of patients receiving services that use telemedicine and physicians' acceptance of telemedicine remain relatively low. This situation may be due in part to the relatively recent introduction of these enabling technologies. The expansion of telemedicine can be anticipated as telecommunication and information technologies continue to advance and as research on the medical benefits and cost-effectiveness is rigorously demonstrated.

This special issue begins with an overview introducing telemedicine; that is, the use of telecommunications for medical diagnosis, treatment, and patient care. It is followed by articles that address specific systems, technologies, or user domains. In particular, the article by Shimizu describes the theoretical and practical feasibility of a prototype mobile telemedicine system. Real-time transmission of multiple medical data that includes an audio signal, color images, ECG, and blood pressure was demonstrated using a moving ambulance, a navigating ship, and a flying airplane. Stamford, et al., report on their experience with telemedicine using a high-speed asynchronous transmission mode connection between the emergency departments of a rural hospital and a major medical center. Their experiences with quality of care and system utilization are very interesting. They found that with increased usage of the telemedicine facility, remote health care can be significantly improved. Heneghan, et al., consider the application of telemedicine in otolaryngology and report their clinical findings on the accuracy and reliability of diagnoses related to the ear, nose, and throat using a high-speed fiber-optic connection. The high degree of reliability in commonly occurring pathologies leads them to suggest that tele-otolaryngology may become a prime telemedicine application in the next few years.

Interest in home care is increasing for economic and sociological reasons for both the aged and the infirm. Its widespread adoption would be, in large measure, predicated on medical efficacy and cost-effectiveness. Two articles are devoted to applications in this area. The article by Bai, et al., focuses on an easy-to-use, cost-effective telemonitoring system for ECG and blood pressure for the elderly at home. The system consists of portable ECG and blood pressure monitors and a desktop base station connected through the public telephone network to the hospital's monitoring center. The feasibility of telemanagement of asthmatic and lung transplant patients is demonstrated in the article by Morlion, et al. Patients at home are provided with a user-friendly PC-based system that allows them to perform spirometry measurements. The results are automatically sent to their physician by means of an electronic messaging service through the public switched telephone network. The article by Barro, et al., represents a different platform for telemedicine and describes the implementation of an approach to intelligent patient monitoring on a networked system in a hospital coronary-care unit.

It should be mentioned that the choice of topics was made to represent the diverse applications of telemedicine worldwide. With the impending introduction of low-earth-orbit communication satellites, telemedicine service may become accessible to remote areas even without adequate land-based telephone coverage. It is my sincere hope that this special issue will help to increase the awareness and promote the exploration of telemedicine by biomedical engineers and physicians to alleviate unnecessary pain and suffering, to bring greater technological benefits to humankind, and to enhance the quality of life for all.

Finally, I would like to take this opportunity to acknowledge the tremendous effort of the reviewers: R. Ansari, B. He, W. Hu, C. Lin, W. O'Neill, M. Shahidi, and D. Schonfeld. Their generosity of time and expertise has allowed this special issue to become a reality.

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