Rapid progress is being made in computer hardware development. Computer equipment is becoming progressively more powerful, less expensive, more compact, and less dependent on specially controlled environments. Software development almost by definition follows hardware development, often after considerable delay. New software tools and development techniques are being examined as a major source of future savings in time and cost of technology development.

Medical applications require both hardware and software development. The medical community must be constantly assessing the hardware and software which becomes available to determine what will be useful in medical care. In this session, a sampling of hardware and software innovations will be examined for their potential impact on medicine. In addition, some obstacles in the way of utilization of technology will be explored, and the need for standards will be described as a step in the ultimate optimal exploitation of computers in medicine.

The paper by Kehl describes recent progress in hardware development and predicts future capability. Software development is identified as the "real problem" in exploiting available hardware. Several new approaches to software development, including the embedding of software within hardware are suggested.

Lauterbur's paper describes another technology, nuclear magnetic resonance imaging, which is dependent on computers for image reconstruction and display. This technique has great potential as a non-invasive medical diagnostic tool.

The paper by Reggia describes the need for artificial intelligence technology in medicine, applications which should benefit from future hardware developments. In the future we may see the integration of knowledge-based systems with patient record and other patient care systems to create a new type of "intelligent" library for the physician and medical user.

With rapid changes in the scope of medical knowledge and the potential of computers to aid in handling that knowledge, new approaches to medical education will be required which stress the interpretation and use of information and the problem-solving skills needed for clinical decision making. Barnett's paper describes the potential of computer-based patient simulations and computer-based teaching/testing programs to improve the medical education process.

Recently, prospective reimbursement methods for hospital costs have been proposed and are being tested in various states. The paper by Simborg discusses the possible curtailing influence these reimbursement methods may have on the development, assessment, and ultimate utilization of computer-based technologies.

Standards have proved valuable and beneficial in many areas of technological development. They are more helpful if they are adopted early in the development process. Medical computing is becoming a mature field and must begin to concern itself with the need for standards to fully exploit new technology. The paper by Kurihara discusses existing and proposed standards which may affect health care applications.

These are by no means the only new technologies which medicine should be assessing. The remainder of this Proceedings describes many other exciting developments. One section is devoted to imaging and image analysis, where the impact of computers is barely beginning to be felt. Advances in large scale picture storage and in image analysis techniques may change the operation of various hospital departments. Implantable devices are still in their infancy but hold great potential as direct administrators of patient care, with the possibility of reducing personnel requirements for this type of care. Databases continue to develop and become accessible to a wide range of users because of user-friendly interfaces and remote access capabilities. Information systems are being refined and put to practical tests. Genetic engineering and research, itself a technology which holds great promise as a changing force in the practice of medicine, is being made practical through the use of computers to handle the vast amounts of information generated.

As of yet, we have barely approached the potential impact of computers on patient care. Like any other field, research and development are expensive but the potential usefulness of the resulting technology is worth exploration. Also, like other areas of science, basic research may prove critical to the practical application of computer technology in medicine.