

**THE NACA POSITION ON
HEALTH CARE TECHNOLOGY AND AGING**

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HEALTH CARE TECHNOLOGY AND AGING**

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National Advisory Council on Aging

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The Division of Aging and Seniors provides operational support to the National Advisory Council on Aging.

THE NACA POSITION ON... is a series of policy papers presenting NACA's opinions and recommendations on the needs and concerns of seniors and issues related to the aging of the population.

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WHAT IS THE NATIONAL ADVISORY COUNCIL ON AGING?

The National Advisory Council on Aging (NACA) was created by Order-in-Council on May 1, 1980 to assist and advise the Minister of Health on issues related to the aging of the Canadian population and the quality of life of seniors. NACA reviews the needs and problems of seniors and recommends remedial action, liaises with other groups interested in aging, encourages public discussion and publishes and disseminates information on aging.

The Council has a maximum of 18 members from all parts of Canada. Members are appointed by Order-in-Council for two- or three-year terms and are selected for their expertise and interest in aging. They bring to Council a variety of experiences, concerns and aptitudes.

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NACA BELIEFS

NACA believes that:

- Canada must guarantee the same rights and privileges to all its citizens, regardless of their age.
- Seniors have the right to be autonomous while benefitting from interdependence and to make their own decisions even if it means 'living at risk'.
- Seniors must be involved in the development of policies and programs and these policies and programs must take into account their individuality and cultural diversity.
- Seniors must be assured of adequate income protection, universal access to health care, and the availability of a range of programs and services in all regions of Canada that support their autonomy.

THE NACA POSITION ON HEALTH CARE TECHNOLOGY AND AGING

INTRODUCTION

Health care technology can improve the speed and accuracy of diagnosis, cure disease, lengthen survival, alleviate pain, facilitate rehabilitation and maintain independence. Indeed, technological advances in health care are eagerly embraced by health professionals and the public for the promise they hold of a longer and better life. However, despite their benefits, health care technologies are not used as appropriately as they could be, especially in the care of seniors. Issues related to their effective use must be resolved to derive the most that technology has to offer and to keep Canada's health care system affordable.

Health care technologies include devices, drugs and procedures used to diagnose, treat and manage disease or disability, as well as mechanisms to monitor the delivery of health care. Some involve the use of equipment, tools or other products, such as walkers, hearing aids, drugs, pacemakers, dialysis machines or scanning and imaging devices. Others refer to procedures that may or may not rely on equipment, for example, organ transplants and laser surgery. The application of computers to monitor and manage all health care services performed is another form of technology considered by the National Advisory Council on Aging (NACA).

The contribution of technology to the costs of health care in Canada¹ is known only indirectly through the global measure of service intensity, which includes aspects such as nursing hours, physician services, use of equipment and materials and so on. The introduction of new technologies adds to service intensity, for example, by increasing the nursing, technician or physician time and skills required to conduct a

procedure or use equipment, interpret the findings and operate and maintain the equipment. As well, technological interventions increase the number of services performed for a patient by a physician and perhaps the number of hospital days to undergo a diagnostic or treatment procedure or to recover from it. Between 1980 and 1990, increases in service intensity accounted for 15 % of the increase in hospital costs; in the same decade, the number of services performed by physicians increased by over 50%.²

Although technological developments account for a significant proportion of the cost of health care, NACA is concerned that seniors are not appropriately served by these advances. Many 'low-tech' assistive technologies that could improve the functional capacities of disabled seniors are poorly known, not readily accessible and insufficiently used. Seniors are subject to a disproportionate application of 'high-tech' health care which does not measurably improve their life expectancy or quality of life. Alternatively, they may be deprived of potentially beneficial technological interventions. Finally, the absence of an efficient and comprehensive computerized system for monitoring the use of health care services, including the prescription of drugs, is one factor contributing to the inappropriate use of medications among seniors.

Through its recommendations, NACA aims to achieve a more appropriate utilization of health care technology to produce optimum health outcomes, especially for seniors, and to control health care costs. The first section of this report examines the use of assistive technologies to support seniors with disabilities. In Sections 2, 3 and 4, issues related to the assessment, adoption and utilization of technologies in the health care system are reviewed, especially as they affect seniors. Finally, Section 5 considers the computerization of health service delivery as a means to improve the quality of health care for seniors, and indeed, for the entire Canadian population.

1. IMPROVING THE USE OF ASSISTIVE TECHNOLOGIES

The Health and Activity Limitation Survey conducted in 1986 and 1987 identified many seniors with disabilities who confront barriers to participation in the normal activities of daily life.³ Approximately 46 % of persons aged 65 + have some form of disability; for 64% of these people, the disability is moderate or severe. Most seniors with disabilities (i.e., about 84%) reside in the community. For many, the presence of a disability limits their outings as well as their leisure activities and recreation.⁴

Assistive technologies include any article, piece of equipment or structural adaptation (e.g., lighting, door handles, handrails, ramps) that is used to maintain or improve the functional capacities of persons with disabilities. These technologies have great potential for enhancing the independence and quality of life for disabled seniors and for supporting informal caregivers. Although most seniors with disabilities in Canada have the assistive technologies they require, a significant minority do not.⁵ Moreover, the optimal use of these technologies may be impeded by technical or attitudinal barriers.

An important reason why assistive technologies may not be used as widely as they could is the lack of knowledge regarding the existence of these aids among seniors, their families and even health care professionals. Indeed, the need for better dissemination of information on available assistive devices is judged to be "a more important need than the development of new devices."⁶ Strides have been made in the dissemination of information regarding assistive technologies, through, for example Ontario's Access Place. The Canada Mortgage and Housing Corporation (CMHC) also has devoted considerable effort to educating the public and the building industry on housing adaptations for persons with disabilities.⁷ Nevertheless, Canada lacks a

central clearinghouse devoted to increasing the awareness of available assistive technologies among professionals and consumers.⁸ Such a clearinghouse could provide comparative information on existing technologies for various disabilities, their cost and how they can be obtained. This information would be particularly beneficial to health professionals who assess and refer persons with disabilities to assistive devices programs. The information could also help overcome the hesitation of seniors who delay purchasing a device because they are not sure that they really need it or that the device will work if they get it.⁹

NACA recommends that:

- **The federal and provincial/territorial governments collaborate in the establishment of a national clearinghouse to disseminate widely consumer information on assistive technologies across Canada and to sponsor educational programs on the use of assistive devices.**

Attitudinal resistance is another factor explaining why assistive technologies are not used by seniors with disabilities to the extent possible. A sense of resignation and helplessness in the face of increasing disability may lead some seniors to discount the potential benefits of assistive aids. Alternatively, they may prefer to deny their impairment or they may feel embarrassed by having to use a device. Another possibility is that seniors may fear losing social contact with caregivers if they become 'self-sufficient' by means of a device.¹⁰ Professionals and service providers who work with seniors with disabilities and their families should be sensitive to the various attitudes that hinder the adoption of useful devices and should provide ongoing encouragement to help them overcome resistance. Skills in these areas should be taught in professional and para-professional training programs. Furthermore,

educational programs geared to the consumers of assistive devices could pay particular attention to reassuring people with attitudinal difficulties, for instance, by providing positive role models.

NACA recommends that:

- **Professional programs for rehabilitation professionals and community service providers train students to work with clients in overcoming attitudinal barriers to assistive technologies.**
- **Rehabilitation centres and professionals who produce educational materials and programs on assistive technologies for consumers address issues of attitudinal resistance.**

A number of government programs provide financial help to persons with disabilities who require assistive devices or home adaptations. The Canada Mortgage and Housing Corporation (CMHC) provides assistance for home adaptations to low-income persons through the Residential Rehabilitation Assistance Program for Persons with Disabilities. Federal tax assistance for costs incurred in purchasing assistive devices or making home adaptations is provided through the non-refundable Medical Expenses Tax Credit. Provincial/territorial assistive devices programs provide many, but not all devices that may be required by seniors to maintain independent living.

Nevertheless, cost is a major reason given for not having a needed assistive device. Many aids, such as lift and transfer devices and batteries for electric wheelchairs are often not covered by provincial/territorial assistive devices programs.¹¹ Alternative funding sources may exist, for instance service clubs or charities, but

seniors may lack information about these alternatives or they may be less favoured for funding than younger persons with disabilities.¹² Because the Medical Expenses Tax Credit is non-refundable, persons with disabilities who pay little or no income tax do not benefit from this measure. To enhance seniors' independence in the community and reduce the risk of costly institutionalization, public programs in support of persons with disabilities should be improved.

NACA recommends that:

- **Provincial/territorial assistive devices programs increase the scope of assistive technologies eligible for funding.**
- **The federal government change the Medical Expenses Tax Credit from a non-refundable to a refundable tax credit.**

Abandonment of assistive devices by users is commonly observed. Reasons include a lack of knowledge on how to use the device properly, problems with the device itself (for instance, a reaching device may be too heavy to manipulate easily), further deterioration in the person's condition or the presence of other disabilities that impede use of the device.¹³ In the design of some assistive devices, the needs of older adults may not be sufficiently considered. Because seniors constitute a large portion of the disabled population, research and development of assistive technologies should pay special attention to their needs and abilities to use devices. It would be beneficial as well to ensure professional follow-up of seniors who receive assistive devices to help them master use of the aids. To recognize the changing nature of impairments in later life, it would be useful to establish technology leasing or lending programs.

NACA recommends that:

- **The assistive technology industry work with gerontology research centres and seniors' associations to design assistive devices that correspond to the needs and capacities of older persons.**

- **Professional follow-up with seniors who acquire assistive devices be assured to help them master the technology.**

- **Provincial/territorial governments establish assistive device leasing and lending programs to permit seniors with changing levels and kinds of impairments to return or exchange aids.**

2. IMPROVING THE ASSESSMENT OF HEALTH TECHNOLOGY

Technology assessment refers to the production and synthesis of evidence on the clinical efficacy and economic costs of health care technologies.¹⁴ The assessment yields information on:

- how well a given technology improves diagnosis or treatment outcomes in terms of the length or quality of life compared to other technologies (for instance, the accuracy of the CT scan (computerized tomography) in comparison with a thorough neurological examination in diagnosing brain tumours);
- how much it costs to achieve this clinical outcome in relation to its value (i.e., cost-benefit); for example, the cost of performing a heart transplant is examined in relation to its benefits in terms of the length or quality of life added by the procedure;

- how much it costs relative to other alternatives that are equally effective clinically (i.e., cost-effectiveness); for example, if angioplasty and bypass surgery are similar in terms of length and quality of life added, the more cost-effective technology is the one which costs less.
- The goals of technology assessment are to ensure that:
 - health care technologies are effective and applied in the appropriate cases and conditions; and
 - the least costly technology is used to achieve a particular outcome.

However, until very recently, minimal attention was paid to assessing technological developments in health care. As NACA observed in *The NACA Position on Determining Priorities in Health Care: The Seniors' Perspective* (1995), the lack of rigorous evaluation in the health care system as a whole has impeded the development of effective and efficient health care. With the exception of pharmaceutical products, whose introduction is closely regulated by Health Canada, technologies have been introduced into the health care system with only superficial knowledge of their safety, effectiveness and Cost.¹⁵ Typically, a new technology has been accepted by provincial insurance schemes on the recommendation of physicians who learn of the technology through reports in which it has been tested a few times under ideal practice conditions.¹⁶ For physicians and hospitals, the sense of accomplishment and the prestige associated with being recognized as innovators contribute to the lure of new technologies.¹⁷ The influence of the technology manufacturers and the public might be felt as well, particularly if there is a well-publicized 'miracle technology' or if the health problem is a serious public concern (such as AIDS). Once introduced into the health care system, technologies are not discarded unless subsequent rigorous evaluation shows them to be clearly ineffective

or dangerous;¹⁸ most often, they simply fall into disuse as newer technologies arrive on the scene.

Concerned with the role of technology in increasing health care costs and with indications of the inefficient and inappropriate use of many technologies,¹⁹ the federal and provincial governments have supported the recent creation of several health technology assessment agencies and health services research centres and are investing more money in technology assessment and research on health services.²⁰ However, most technology assessment consists of developing and disseminating syntheses of primary research on a given technology, which may be conducted outside Canada. Because the conditions of clinical practice in Canada may differ substantially from those of the country in which a particular technology was developed and assessed, the applicability of these findings in Canada may be uncertain, especially with respect to cost-effectiveness.²¹ Technology assessment centres could devote greater effort to adapting out-of-country studies to the Canadian health care context. As well, little original research in the form of controlled clinical trials is being conducted by Canadian technology assessment agencies. Although it makes sense to use and adapt original research conducted elsewhere whenever possible, there may not be adequate information from other sources on some important technologies.

NACA recommends that:

- **The federal and provincial/territorial governments fund technology assessment centres to adapt research studies developed in other countries to the context of the Canadian health care system and to conduct controlled clinical trials, especially with seniors where appropriate, on important technologies that have not been adequately assessed elsewhere.**

Priorities set by governments determine which technologies will be reviewed by the technology assessment agencies. Thus, under the direction of the federal and provincial/territorial governments, the Canadian Coordinating Office on Health Technology Assessment (CCOHTA) devotes more effort to assessing expensive, low volume technologies (such as Magnetic Resonance Imaging (MRI) equipment) than low-cost, high volume technologies (such as routine diagnostic testing) or technologies used to treat or manage chronic illnesses and disabling conditions.²² This situation is not unique to Canada. As American ethicist A.R. Caplan observes, "Whether it be for low back pain or for rehabilitation after a massive stroke, the efficacy of standard treatments for chronic conditions is not known."²³ Although assessment of relatively inexpensive technologies may seem less imperative, overly-frequent and unnecessary use of these technologies in clinical practice (many of which are diagnostic technologies such as routine cholesterol testing or X-rays in persons without disease symptoms) may cost the health care system as much or more than the 'big ticket' items.²⁴ Because age-related sensory and mobility problems and chronic diseases will increase as the number and proportion of seniors in the population increase, higher priority must be placed on assessing technologies designed to address these conditions.

NACA recommends that:

- **The federal and provincial/territorial governments place a higher priority on funding the assessment of technologies intended for chronic diseases and disabling conditions associated with aging and on assessing low-cost, high-volume technologies.**

3. SETTING PRIORITIES FOR THE ADOPTION OF NEW TECHNOLOGIES IN HEALTH CARE

Because the results of technology assessment are vital in making rational decisions regarding the adoption of new technologies in the health care system, timely and well-targeted dissemination of technology assessment findings is necessary. CCOHTA is currently developing a strategy to disseminate its reports as widely as possible to decision-makers and health practitioners who use health technologies or are in a position to recommend their adoption.

However, decisions concerning the adoption of technologies require judicious use of research findings and consideration of ethical issues. Decision-makers must often judge how much more clinically effective a technology must be to warrant higher costs, or alternatively, how much less clinical effectiveness is acceptable to reduce costs. Rational guidelines for technology adoption and utilization have been proposed to assist decision-makers in using the clinical and economic evaluations.²⁵ Beyond the consideration of research findings and objective guidelines, decision-making must also include ethical reflection. Establishing service priorities based solely on objective evidence can lead to discrimination against persons with disabilities and seniors because the clinical gains expected from technological innovations to diagnose and treat the health conditions of these persons may be less important than those of technologies directed to the health needs of other groups. Because setting priorities for the introduction of new technologies requires weighing the potential benefits and harms of various options to the whole population, all stakeholders must be meaningfully involved.

NACA recommends that:

- **Any proposed determination of priorities among technological services based on clinical and economic evaluations be submitted for open discussion by all stakeholders, including seniors and their organizations, to achieve common agreement on priorities and to avoid discrimination.**

4. MANAGING THE UTILIZATION OF TECHNOLOGIES IN CLINICAL PRACTICE

Canada's publicly-insured health care system has encouraged the proliferation of technologies in the system because neither the patient nor the health service provider is accountable for the costs of technological services. Although the need to control costs and to provide the best value for each health care dollar spent has now made it more difficult to introduce new technologies into the health care system without prior assessment, many technologies already accepted into the health care system are used inappropriately or excessively. Health professionals are criticized for being unaware of the costs and real effectiveness of the tests and treatments they prescribe.²⁶

Regulation to remove certain existing technologies from the health care system does not appear to be the approach of choice to manage the utilization of health care technology. A more promising strategy to promote the appropriate and cost-effective use of health technologies is to provide incentives to institutions and practitioners to use technology assessment information to guide their decisions.²⁷

Changes to the financing of health care, as well as to the management of services, have been proposed to promote the use of information from technology

assessment. The fee-for-service method of reimbursement of physician services is thought to encourage the provision of excess services, including for instance, an overuse of technological services.²⁸ As pointed out in the *NACA Position on Determining Priorities in the Health Care: The Seniors' Perspective* (1995), reimbursement by salary or capitation (that is, paying a physician a fixed amount for each patient enrolled in his/her practice) reduces service excess. To encourage physicians to provide extra technological services where more than a minimum is needed, salary or capitation could be combined with financial incentives for special services.

Therefore, NACA repeats its earlier recommendation that:

- **Provincial/territorial governments adopt methods of reimbursing physician services that combine salary or capitation with incentives for the appropriate use of health care technologies.**

Another suggestion is to introduce a system of prospective payment, by which health insurance payments would be made not on the basis of an itemized bill for services already rendered but on an *a priori* amount that depends on the patient's diagnosis at the time of admission and other characteristics that affect treatment (such as age, sex, prior health status).²⁹ A third proposal is to use technology assessment information to develop clinical protocols to guide practice so that each technology would be matched to its appropriate use; for instance, surgeons might be informed that certain procedures are to be performed only on patients with certain specific diagnoses and/or characteristics.³⁰ Although these methods may appear attractive in theory, they have not been adequately evaluated in practice. Widespread implementation of these and similar measures may be discriminatory, perhaps even directly harmful, if they do

not take into account diverse health care needs. For example, if prospective payment schemes motivate hospitals to treat patients at the lowest possible cost, persons with multiple pathologies or who present complications may be ill-served; situations such as these would frequently apply to seniors.

NACA recommends that:

- **Provincial/territorial departments of health assess different methods of promoting the use of technology assessment information in clinical practice and adopt the methods that are both most effective and responsive to the needs of persons with complex health care needs.**

In addition to modifying the structure of the incentives within the health care system, consideration should be given to educating physicians and other health practitioners to remain abreast of assessments of health technologies to guide their use of these technologies.³¹ Certainly, the acquisition of a critical approach to health technology and skills in the evaluation of research evidence pertaining to new (and existing) technologies is imperative in basic health professional training programs, both in coursework and in clinical practicums and internships. Teaching hospitals and clinics are called upon to be leaders in this respect.

NACA recommends that:

- **Health education programs in universities and colleges, including teach' 9 hospitals and clinics, teach students the importance of keeping abreast of health technology assessments and of modifying their use of technologies accordingly.**

As was pointed out in the *NACA Position on Determining Priorities in Health Care: The Seniors' Perspective* (1995), changing established modes of practice among professionals requires more than the provision of new information in journals or continuing education programs. Methods that may promote greater utilization of health technology assessment information by professionals in practice include external practice audits and opportunities for case discussion, rehearsal of new practice behaviours and the example of local opinion leaders.³² As health economist David Feeny observes, "To be effective, technology assessment information must be deliberately and energetically marketed."³³ To promote the use of technology assessment information in clinical practice, **NACA thus reiterates its recommendation that:**

- **Professional associations and health care institutions establish continuing education programs, peer review committees, external practice audits and other effective methods to guide health care practitioners in the appropriate use of health care technologies.**

5. SERVING SENIORS WITH HEALTH TECHNOLOGY: STRIKING A BALANCE

A serious consequence of the uncritical use of technology in health care is the increasing intensity with which the health care system is treating seniors. Evidence from British Columbia showed that from 1969 to 1987, hospitalization of seniors increased by 14% although the rate of hospitalization of non-seniors decreased by 16%.³⁴ Most of this increase was due to an increase in surgical procedures performed on seniors, some of which are of questionable effectiveness.

The excessive and inappropriate use of health technology in diagnosing and treating seniors is one of the elements contributing to the increase in service intensity and hence the rise in expenditures for the care of seniors.³⁵ Besides costing more, the increased high technology care is unwanted by many seniors. The fear of being subjected to heroic high-technology measures that would increase the duration of life at the expense of the quality of life is prompting many people to demand the legalization of advance health care directives (including living wills) and other means of refusing treatment. Another consequence is a reinforcement of the misconception that aging per se (and not inappropriate and inefficient use of the health care system) is a major factor accounting for the rising costs of health care.³⁶ This dubious argument has already been used to justify arbitrary discrimination against seniors in the allocation of health care resources.³⁷

Although seniors are most likely to be at risk of too much health care, they are also, paradoxically, at risk of receiving too little care. For example, physicians Carl Kjekkstrand and Henry Moody recently showed that the rates of acceptance of persons aged 65 + into dialysis programs in Canada are much lower than in the United States, despite the fact that older dialysis patients are happier than younger patients and more readily accept the limited lifestyle the treatment imposes.³⁸ The reason invoked by these authors is that resource limitations oblige physicians to ration access to technological interventions-and the most common rationing criterion is age. Physicians may consider a patient's age, even when it is not a determining factor in the prognosis, to decide how aggressively to pursue treatment. To ensure that seniors receive appropriate care, health analysts Helen Kapila and Nicholas Cori suggest that "physicians must strike a precarious balance which, on the one hand, protects the

patient against the over-zealous intensivists and on the other hand insures he or she is not condemned to second-class service starved of the undoubted benefits of current medical advances.”³⁹

The way to accomplish this is to weigh the benefits and risks of each technological health intervention on a case-by-case basis, regardless of age (or any other social characteristic), taking into account the individual patient's physical, social and psychological resources and personal values. For seniors, this assessment can be effectively provided by a multidisciplinary geriatric assessment team.⁴⁰

NACA thus reiterates the recommendation made in *The NACA Position on Canada's Oldest Seniors: Maintaining the Quality of their Lives* (1993) that:

- **Geriatric assessment and treatment units, or their equivalent, staffed by interdisciplinary teams, be provided in every region to act as a resource to primary-care physicians and specialists.**

As well, health professionals need to know how to communicate an unbiased assessment of the benefits and risks completely and clearly to older patients so they can participate fully in making the decision regarding technological procedures.

NACA recommends that:

- **University and college health education programs combat stereotypes that may bias clinical judgments regarding seniors and train professionals to communicate clinical information completely and clearly to older patients to inform their decisions regarding technological interventions.**

Instruments of patient self-determination such as advance directives and living wills can limit the use of technological procedures that prolong life at the expense of the quality of life. Nevertheless, as *The NACA Position on Determining Priorities in Health Care: The Seniors' Perspective* (1995) cautioned, these instruments must not be subverted to deny seniors potentially beneficial treatments on the grounds that they are too expensive or too limited to 'waste' on an older person. Given the gravity of the consequences of over and under-use of technological interventions in the care of seniors, **NACA reiterates the recommendations made in its previous position paper.**

- **Provincial and territorial governments legally recognize measures that enhance an individuals capacity to make self-determined decisions regarding health care.**
- **Provincial and territorial governments ensure that ethics committees are available in all hospitals and long-term care facilities to monitor the use of advance directives, living wills and power of attorney for personal care to ensure that their purpose is not subverted to deny legitimate treatment to individuals in need of care.**

6. IMPROVING THE HEALTH CARE SYSTEM THROUGH INFORMATION TECHNOLOGY

The computerization of health records is underway in most provinces/territories.

A comprehensive health information system has many advantages,⁴¹ including:

- accurate cost accounting of all health services, including health technologies;
- prevention of fraudulent use of health insurance cards;

- continuity of patient information and protection against inappropriate treatments (including multiple or incompatible drug prescriptions); and
- extraction of comprehensive epidemiological information for health care planning.

At present, the majority of provinces are experimenting with the use of technology through the individual 'smart card', primarily to monitor drug prescription practices. By providing accurate data on prescription practices, computerized health records will inform strategies to reduce the well-documented problem of inappropriate and excessive medication use among seniors.⁴² Only through full implementation of computerized health records, however, will the potential benefits of this technology be realized on the utilization of all medical services, including diagnostic and treatment technologies.

NACA recommends that:

- **Provincial/territorial departments of health monitor the delivery of all insured health services through a comprehensive computerized system to protect individuals from inappropriate and excessive services.**

CONCLUSION

Technological advances in health care can substantially improve survival, quality of life and independence, as well as contribute to keeping health care affordable if they are implemented judiciously, promoted effectively and applied to the right person at the right time. Because assistive technologies can contribute substantially to enhancing the independence of seniors in the community and the well-being of both seniors and

informal caregivers, more needs to be done to adapt them to senior users and to make them more widely known, more accessible and more acceptable to users. Efforts to improve the cost-effectiveness of the health care system have led to a more critical approach to the introduction of new technologies. Further measures are required, however, to encourage health professionals to use health technologies appropriately, especially in the care of seniors. Finally, effective computerized systems to monitor health care delivery need to be widely implemented to protect seniors against the inappropriate use of health technologies.

NOTES

- 1) In the United States, it has been estimated that new technologies have contributed 25% to the increase in the cost of health care, while in the United Kingdom, the estimate ranges between 30% and 40%.

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Jennett, B. *High technology medicine*. Oxford: Oxford University Press, 1986.

- 2) Angus, D. E. et al. *Sustainable health care for Canada*. Ottawa: Queen's-University of Ottawa Economic Projects, 1995.

- 3) Statistics Canada. *Barriers confronting seniors with disabilities in Canada*. Catalogue 82-615, Vol. 1. Ottawa: 1990.

- 4) Statistics Canada, op. cit.
Mann, W.C. et al. Assistive devices for home-based elderly persons with cognitive impairments. *Topics in Geriatric Rehabilitation*, 8, 2, (1992): 35-52.

Mann, W.C., Hurren, D. and M. Tomita. Assistive device needs of home-based elderly persons with hearing impairments. *Technology and Disability*, 3, 1, (1994): 47-61.

- 5) According to the Health and Activity Limitation Survey, 31 % of seniors who require hearing aids, 10% who require visual aids and 27% of seniors with impairments requiring housing adaptations do not have them.

Statistics Canada, op. cit.

- 6) Mann, W.C. et al. (1992), op. cit.

- 7) For example, CMHC published a report entitled *Housing choices for Canadians with disabilities* (Ottawa: 1992). The Corporation has also exhibited the 'Open House' which incorporates many features adapted for disabled persons in major cities across Canada.

- 8) Chappell, N. Technology and aging. *Journal of Canadian Studies*, 28, 1, (1993): 45-58.
- 9) Mann, W. C., Hurren, D. and M. Tomita. Comparison of assistive device use and needs of home-based older persons with different impairments. *American Journal of Occupational Therapy*, 47, 11, (1993): 980-987.
- 10) Chappell, N., op. cit.
- 11) Chappell, N., op. cit.
- 12) Ellis-Hale, K. et al. *Policy and service implications of economic barriers to AAC services for older adults*. Presentation made at the International Conference on Communication, Aging and Health, Hamilton, Ontario, May 13, 1994.
- 13) Mann, W. C., Hurren, D. and M. Tomita, op. cit.
- 14) Feeny, D. Technology assessment and health policy in Canada. In *Limits to care: Reforming Canada's health system in an age of restraint*, Blomqvist, A., and D.M. Brown (eds.). Toronto: C.D. Howe Institute, 1994: 295-326.
- 15) Feeny, D., Guyatt, G. and P. Tugwell (eds.). *Health care technology: Effectiveness, efficiency and public policy*. Montreal: Institute for Research on Public Policy, 1986.
- 16) "Usually, a new diagnostic test or therapy is performed on a few patients who appear to be good candidates for success. Then their condition is compared to what it was prior to the procedure, or their condition might be compared to other, similar patients who were treated in the past ... The problem is that these kinds of studies are likely to greatly overstate the usefulness of the new procedure."

Rachlis, M. and C. Kushner. *Strong medicine: How to save Canada's health care system*. Toronto: Harper Collins, 1994: 107.
- 17) Feeny, D., op. cit.

- 18) An example of technology that was evaluated only after it had been widely accepted in medical practice is the case of extracranial-intracranial arterial bypass surgery for the prevention of stroke. The idea was that if partially-blocked arteries in the head were surgically bypassed, patients would be less likely to suffer fatal or debilitating strokes. Leading surgeons throughout the world developed and refined the surgical techniques. But when the surgery was subjected to clinical evaluation, with random assignment of patients to either standard medical care or surgery, it was discovered that the patients who received standard medical care were more likely to survive.

Feeny, D., op. cit., p. 302.

- 19) Rachlis, M. and C. Kushner. *Second opinion: What's wrong with Canada's health care system and how to fix it*. Toronto: Collins, 1989.
- 20) Among the health technology assessment agencies are: the Conseil d'évaluation des technologies de la santé, the Canadian Coordinating Office for Health Technology Assessment (CCOHTA), the B.C. Office of Health Technology Assessment and the health technology office within the Alberta Ministry of Health. The health services research centres include: the Institute for Clinical Evaluative Studies at the University of Toronto, the Centre for Health Economics and Policy Analysis at McMaster, the Manitoba Centre for Health Policy and Evaluation at the University of Manitoba and the Centre for Health Services and Policy Research at the University of British Columbia.

Feeny, D., op. cit.

- 21) Feeny, D., op. cit.
- 22) Personal communication with David Menon, Executive Director of CCOHTA, June 1994. Also, a review of the *Directory of Health Technology Assessment Projects in Canada* (3rd ed., 1994), listed fewer than 20 out of 200 assessment projects that dealt with technologies for chronic conditions. The projects that were conducted included devices and procedures used for neck and back pain, hypertension, migraines, sleep disorders, sensory and mobility problems and arthritis.
- 23) Caplan, A.R. *If I were a rich man, could I buy a pancreas?* Bloomington, Illinois: Indiana University Press, 1992: 221.

- 24) Laupacis, A. et al. How attractive does a new technology have to be to warrant adoption and utilization? Tentative guidelines for using clinical and economic evaluations. *Canadian Medical Association Journal*, 146, 4, (1992): 473-481.
- 25) *Ibid.*
- 26) Vilardelli, F. Ethical problems of medical technology. *Bulletin of PAHO*, 24, 4, (1990): 379-385.
- Rachlis, M. and C. Kushner (1989), op. cit.
- 27) Feeny, D., op. cit. states that: "Regulatory approaches to technology policy miss the key issue. Most health care technologies are relatively appropriate in some circumstances and relatively inappropriate in others. The key issue for better managing the health care system is to match each technology to its appropriate uses. Regulation could be useful in removing the ineffective from the array of technologies available, but the bulk of the management challenge would still be left unaddressed. " (p. 319)
- 28) "It's quite possible that Canada's higher rates for various surgeries and diagnostic tests are a reflection of the perverse economic incentives inherent in our fee schedules."
- Rachlis, M. and C. Kushner (1989), op. cit., p. 38.
- 29) Blomqvist, A. Introduction: Economic issues in Canadian health care. In *Limits to care: Reforming Canada's health system in an age of restraint*, Blomqvist, A., and D.M. Brown (eds.). Toronto: C.D. Howe Institute, 1994: 3-50.
- 30) Soderstrom, L. Health care reform in Canada: Restructuring the supply side. In *Limits to care: Reforming Canada's health system in an age of restraint*, Blomqvist, A., and D.M. Brown (eds.). Toronto: C.D. Howe Institute, 1994: 217-265.
- 31) The Canadian Coordinating Office on Health Technology Assessment widely distributes a regular newsletter with information on available health technology assessment reports and symposia.

- 32) Davis, D.A. et al. Evidence for the effectiveness of CME: A review of 50 randomized trials. *Journal of the American Medical Association*, 268, 9, (1992): 1111-1117.

Shroeder, S.A. et al. The failure of physician education as a cost-containment strategy. *Journal of the American Medical Association*, 252, 2, (1984): 225-230.

- 33) Feeny, D., op. cit., p. 321.

- 34) Anderson, G. M. et al. Acute care hospitalization under Canadian national insurance: The British Columbia experience. *Inquiry*, 27 (Winter 1990): 352-358.

- 35) The intensity with which seniors are treated by the health care system is shown in the increased frequency and duration of hospitalization, as well as in the proportionately greater use of technologies in their care.

Anderson G. M. et al., op. cit.

Hertzman, C. et al. Flat on your back or back to your flat: Sources of increased hospital utilization among the elderly in British Columbia. *Social Science Medicine*, 30, 7, (1990): 819-828.

- 36) According to Morris Barer and other health economists, "If there is a crisis, it is the disproportionate growth in the use of physician-driven health care services by the elderly, not the growth in the number of potential elderly users." (p. 861)

Barer, M. et al. Aging and health utilization: New evidence on old fallacies. *Social Science Medicine*, 24, 10, (1987): 851-862.

An estimation of the factors accounting for the increase in health care costs between 1980 and 1990 showed that the aging of the population had a marginal effect, contributing less than 5 %, although in some sectors more than others.

Angus, D. E. et al. *Sustainable health care for Canada*. Ottawa: Queen's - University of Ottawa Economic Projects, 1995.

- 37) Callaghan, D. *Setting limits: Medical goals in an aging society*. New York: Simon & Shuster, 1987.

- 38) Kjellstrand, C. M. and H. Moody. Hemodialysis in Canada: a first-class medical crisis. *Canadian Medical Association Journal*, 150, 7 (1994): 1067-1071.

Ottawa geriatrician Dr. William Dalziel notes as well in a personal communication that: "There are certainly examples of underuse of technology. If you include influenza vaccination as a technology, despite evidence from Minnesota studies of savings of more than \$100 US in health care costs per vaccination, this technology is still sadly underused. "

- 39) Kapila, H. and N. Cori. The application of modern diagnostic and therapeutic techniques to aged patients. *Ageing and Society*, 9, 1 (1989): 175.
- 40) Gayton, D. The philosophy and purpose of geriatric assessment. In *Geriatric assessment: The Canadian experience*, National Advisory Council on Aging (ed.). Ottawa: 1991: 23-41.
- 41) MacIntosh, R. *Information technology for health care in Ontario*. C. D. Howe Institute Backgrounder, January 12, 1995.
- 42) Angus, D. E. et al., op. cit.

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