Containing Ontario's hospital costs under universal insurance in the 1980s: What was the record?

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In recent years the Ontario government has been concerned that the proportion of public expenditures devoted to health care is at an all-time high. In addition, the media have devoted considerable attention to specific incidents that may represent inadequate funding of hospital services. To shed light on the debate on health care expenditures we analysed the trend in expenditures of Ontario's hospital sector in the 1980s in terms of the amount of inputs (e.g., labour) used to produce hospital services (e.g., a patient-day or admission) and after adjustment for general inflation. As in the 1970s the number of inputs grew relatively slowly during the 1980s. Inputs per patient-day grew at an annual rate of 0.46% and inputs per admission at an annual rate of 2.4%. Cost increases were largely accounted for by hospital wage increases; this could have been due to Ontario's rapidly expanding economy. These findings indicate that Ontario has continued to be successful in containing the number of inputs used in the hospital sector. However, after two decades of substantial success with publicly acceptable cost control, the government faces increased scrutiny as the media and the public focus attention on several areas of perceived inadequate funding in health care services.

Depuis quelques années le gouvernement ontarien s'inquiète de ce que la portion des dépenses publiques consacrée à la santé a atteint un sommet. D'un autre côté les media ont insisté sur certains incidents donnant à penser que les hôpitaux sont insuffisamment financés. Afin d'éclairer le débat nous analysons les tendances dans les dépenses hospitalières en Ontario durant les années 80. On exprime ces dépenses sous forme d'éléments (v.g. les salaires) entrant dans la production de services (v.g. journées-malades ou périodes d'hospitalisation), compte tenu du taux général d'inflation. Tout comme dans les années 70, le nombre d'éléments a crû lentement dans les années 80, soit annuellement de 0,46% par journée-malade et 2,4% par période d'hospitalisation. L'augmentation des coûts provient surtout de celle des salaires, conséquence possible de la rapide croissance économique de l'Ontario. La province a donc réussi à contenir le nombre d'éléments de production, et donc les coûts, dans le domaine hospitalier, ce dont le public devrait lui savoir gré, ce qui n'empêche pas celui-ci, ni les media, d'examiner de plus près certaines insuffisances présumées du financement des services de santé.

Hospital costs have accounted for approximately 50% of health care expenditures over the last 30 years. Therefore, trends in hospital costs are an important measure of economic activity in the health care sector.

In 1983 and 1986 our group reported on the Ontario experience during the 1970s with "global budgeting"[1,2] — a prospective system of hospital funding implemented in 1969. In 1969 the base budgets of hospitals were determined by the level of

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funding in 1968. Since 1969 the Ontario Ministry of Health has increased annual hospital budgets after consultation with the provincial treasury; the ministry gives the same percentage increase in base budgets to all hospitals in the province. Since 1972 the ministry has also tried to restrict the total number of hospital employee working hours.

Our group used a traditional economic model to describe the trends in hospital costs from 1968 to 1981 and to examine the components of cost inflation. Hospitals can be thought of as production units similar to other manufacturing and service industries. Production units convert *inputs* into *outputs.* Inputs are usually divided into labour and nonlabour units. In a hospital nurses, technicians, administrators and support staff represent the labour units; buildings, machines and supplies represent the nonlabour units. Hospital outputs can be measured as hospital inpatient days, ambulatory care services or episodes of illness treated.

The increased costs for any production unit can be the result of two components: increased number of inputs to produce each unit of output (i.e., a higher *quantity* of inputs) and increased *prices* to hire those same inputs. Little growth occurred in the amount of inputs used in the hospital sector after the introduction of global budgeting in Ontario. From 1969 to 1981 the number of hospital inputs increased by 0.68% annually per patient.[1] In particular, the amount of labour used to produce one patient-day of hospital care grew very slowly, a marked contrast to the US experience, in which the amount of inputs used in the hospital sector has steadily increased.[3] In fact, Feldstein and Taylor[3] have shown that most of the increase in US hospital costs since the Second World War is attributable to an increase in the inputs used in the hospital sector.

We closed our initial analysis with the following question.

> Where will the hospital sector go from here? . . . Some have suggested that the lid has been on too long, and that the build-up of pressures in the hospital sector will inevitably cause an explosion in the not too distant future. Others have suggested that if government is unwilling to increase the public resources available to the hospital sector in Ontario, those resources will be extracted from the private sector.[1]

Several policy developments, including the Canada Health Act and the Ontario Health Care Accessibility Act, have had an impact on health care financing in the 1980s.[4-7] In the hospital sector the Ontario Ministry of Health has adopted a carrot-and-stick approach: hospitals are allowed to keep operating surpluses, but the ministry no longer covers hospital deficits. Even as the government attempts to control health care expenditures the media have begun to focus public attention on several areas in which there is a perceived shortage of services in Ontario.

These developments led us to ask: What has been the actual trend of hospital costs in Ontario during the 1980s? In this article we document the trend and discuss its implications in view of the current policy debate.

Methods

We applied the same method of measuring hospital costs as described in our previous articles.[1,2] Hospital costs were measured in three ways: total expenditures (total gross operating revenues for all hospitals in Ontario), average cost per patient-day and average cost per admission. We adjusted for the growth in hospital activities accounted for by ambulatory patients by converting ambulatory visits to "equivalent patient-days". As outlined in the Ontario Ministry of Health's formula, one emergency visit or one outpatient visit is equal to one-third of an inpatient day, and one visit to a medical day-care or a surgical day-care suite is equal to 2 inpatient days. Total patient-days are the sum of inpatient-days and equivalent patient-days.

An examination of the trend in hospital costs using current undeflated dollars would not be particularly helpful: the purchasing power of the Canadian dollar in 1987 was not equivalent to that of the dollar in 1980. Thus, we examined the trends using two types of "price deflators". The first, the Consumer Price Index (CPI), which reflects the price of goods and services in the general economy, was used to document increases in hospital costs relative to general inflation. The second, the Hospital Input Price Index (HIPI), which reflects the prices paid for specific inputs used in the hospital sector, was used to document the increases in inputs used by the hospital sector to produce its output. These inputs, also called "service intensity", are a measure of costs defined in terms of the factors used to produce a good or service. The variety of factors was expressed in dollar units that reflect the relative price of labour and nonlabour inputs; these dollar units were then summed to provide a measure of total hospital inputs. By deflating the hospital costs in current dollars by the HIPI one is left with a measure of the change in inputs used in the sector. An analogy can be made to trends in expenditures on consumer goods. For instance, changes in gasoline expenditures can be accounted for by changes in two factors: the price per litre of gasoline and the number of litres purchased. The HIPI is analogous to the price per litre of gasoline, whereas the amount of inputs

used in the hospital sector represents the number of litres purchased.

The HIPI was derived in the manner described previously.[1] It involved a simple weighted average of labour and nonlabour prices for the hospital sector; the weights were calculated from the proportion of total hospital costs accounted for by the labour and nonlabour components. The index of labour prices was derived from average annual salaries for full-time-equivalent (FTE) hospital employees and therefore indicates changes in wages paid in the hospital sector rather than wages paid in the general economy. Nonlabour prices were reflected by the Implicit Price Deflator. Data sources included annual reports of the Ontario Ministry of Health (on public and private hospitals [1976 to 1986–87]), the Ontario Hospital Services Commission (1964 to 1971) and Statistics Canada (on consumer prices and price indexes [1964 to 1987–88], national income and expenditure accounts [1964 to 1987–88] and hospital statistics [1976 to 1986–87]) and personal communications (Dan LeMaire, Conference Board of Canada, Ottawa, 1988; William Croson, Ontario Hospital Association, Ottawa, 1989; and Barbara Green, Fiscal Resources Branch, Ontario Ministry of Health, Toronto, 1989). All of the costs are expressed in Canadian dollars.

Table 1 shows the annual percentage increases in the CPI and the HIPI.

Table 1: Annual percentage increases in price deflators in Ontario

Year	Consumer Price Index (CPI)	Hospital Input Price Index (HIPI)
1964	2.4	5.0
1965	3.5	6.6
1966	3.7	8.9
1967	4.1	11.4
1968	4.5	12.8
1969	3.3	10.3
1970	2.9	9.2
1971	4.7	8.0
1972	7.7	11.4
1973	10.9	20.5
1974	10.8	21.4
1975	7.5	16.5
1976	10.2	9.3
1977–78	9.1	6.4
1978–79	9.1	6.9
1979–80	10.9	10.6
1980–81	12.3	17.7
1981–82	9.7	11.4
1982–83	5.2	7.7
1983–84	4.0	4.7
1984–85	4.1	5.2
1985–86	4.1	5.8
1986–87	7.3	–

Results

Total expenditures

Table 2 shows the percentage increase in total expenditures (including inpatient and ambulatory services) and population growth for two 7-year periods. The growth in inputs used in the sector was greater during the second period.

Average cost per patient-day

Fig. 1 shows the growth in the average cost per

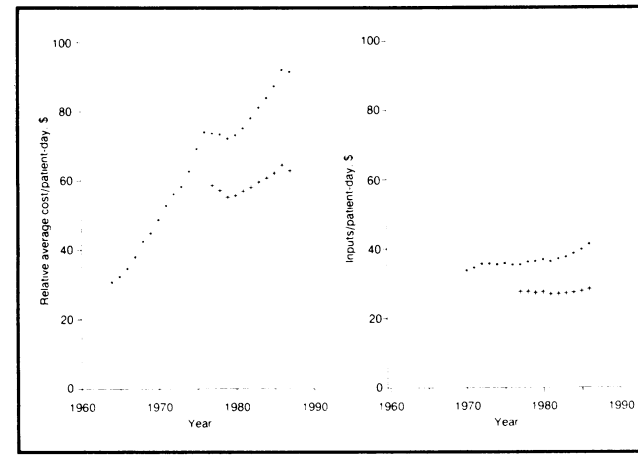

Fig. 1: Left: Ontario trends in relative average cost per patient-day (i.e., costs deflated by Consumer Price Index [CPI]). Right: Inputs per patient-day (i.e., costs deflated by Hospital Input Price Index [HIPI]). * = cost per total patient-days (including inpatient and ambulatory activities); + = cost per inpatient-day (excluding ambulatory activity).

Table 2: Percentage increases in total hospital expenditures in Ontario from 1972 to 1986–87

Year	Expenditures			Population growth
	Undeflated	Relative to general inflation*	Inputs†	
1972 to 1979–80	139	28.3	1.7	10.7
1979–80 to 1986–87	124.2	38.0	23.2	7.8

*Deflated by the CPI.
†Deflated by the HIPI.

inpatient-day, as deflated by the CPI (the relative average cost per patient-day) and the HIPI (inputs per patient-day). From 1977 to 1987 the hospitals' ambulatory activities were recorded in equivalent patient-days. We calculated the average cost per total patient-days as the sum of inpatient and outpatient activities, which are shown as the lower curves in Fig. 1. When the ambulatory activities were not considered, the relative average cost per patient-day appeared to rise dramatically; this increase was much less notable if the ambulatory activities were considered. The difference between the two curves reflected the growth in the proportion of total patient-days accounted for by ambulatory patients, which increased from 18.9% in 1977 to 28.9% in 1986. Inputs per patient-day were relatively unchanged in the 1980s; this was similar to the trend in the 1970s.

Table 3 shows that the proportion of hospital cost increases beyond general inflation that was accounted for by growth in real inputs (i.e., the number in column 2 divided by the number in column 1) was again relatively small (18.9%). Therefore, most of the inflation was accounted for by increases in the prices paid for inputs, not by hiring or using more inputs. This result is in sharp contrast to the US figure: 80% of cost increases above general inflation are accounted for by increases in the amount of inputs used.

Average cost per admission

The relative average cost per admission seemed to increase substantially (Fig. 2) and mirrored the rise in the relative average cost per inpatient-day (Fig. 1). However, these curves failed to consider the growth in ambulatory activities. We were unable to convert ambulatory visits into admission equivalents in a manner similar to the conversion of ambulatory visits into patient-day equivalents. Therefore, the average cost per admission attributed all costs to inpatient activities and is somewhat misleading.

The proportion of the growth in the average cost per admission beyond inflation that was accounted for by growth in inputs was higher than that for patient-days (Table 3).

Ontario hospital labour inputs

To corroborate the finding of relative stability in the amount of inputs per admission (2.4% growth per year) and patient-day (0.46% growth per year) we tracked the growth in the number of FTE employees per inpatient-day.[1] We measured labour inputs in physical terms of FTE employees per patient-day rather than in dollars. The number of FTE employees per total patient-days (including the equivalent patient-days accounted for by ambulatory care) remained constant in the 1980s (Table 4). This figure corroborates the finding of minimal growth in the number of inputs per total patient-days when inputs are measured in dollars.

Table 4 also shows the continued growth in the relative average wage of hospital workers, as compared with the general Ontario wage index. In the 1980s the average annual wage increases in the hospital sector exceeded the increases, especially the relatively large ones, in the general economy (Fig. 3). These average increases for all hospital workers were consistent with the wage settlements of three unions that we examined — the Ontario Nurses Association, the Ontario Public Service Employees Union and the Canadian Union of Public Employees.

Inputs measured in dollars and in number of

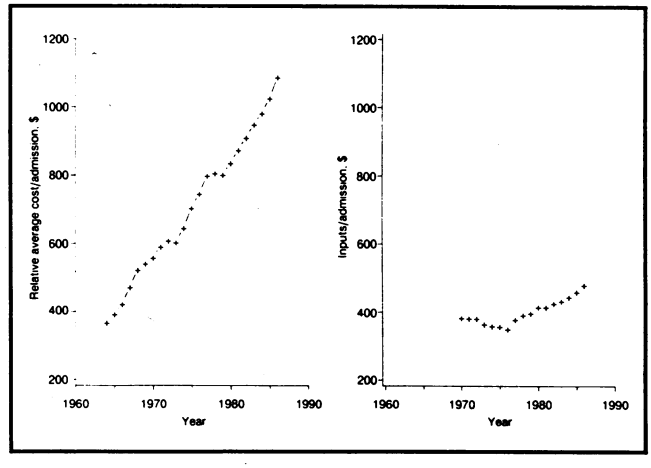

Fig. 2: Left: Ontario trends in relative average cost per admission (i.e., costs deflated by CPI). Right: Inputs per admission (i.e., costs deflated by HIPI).

Table 3: Increases (%) in relative average cost and inputs per total patient-days and admissions in Ontario from 1980 to 1987*

Variable	Mean annual increase (and standard deviation)		Increase in relative average cost accounted for by increased inputs†
	Relative average cost	Inputs	
Total patient-days	0.0243 (0.007)	0.0046 (0.015)	18.9
Admissions	0.045 (0.008)	0.024 (0.015)	53

*The relative average cost is the average cost deflated by the CPI. Inputs are the average costs deflated by the HIPI for Ontario.
†Calculated by dividing mean annual increase in inputs by mean annual increase in relative average cost.

Table 4: Hospital labour costs in Ontario from 1964 to 1988

Year	No. of full-time-equivalent (FTE) employees/total patient-days	Ontario Industrial Composite Wage, $	Average wage for FTE employees, $	Employee wage divided by industrial composite wage
1964	–	4 669	2 953	0.633
1965	–	4 909	3 134	0.639
1966	–	5 167	3 401	0.658
1967	–	5 504	3 785	0.688
1968	–	5 900	4 372	0.741
1969	–	6 321	5 100	0.807
1970	–	6 837	5 732	0.838
1971	–	7 438	6 329	0.851
1972	–	8 056	6 848	0.850
1973	–	8 616	7 753	0.900
1974	–	9 434	9 351	0.991
1975	–	10 653	11 443	1.074
1976	–	11 894	13 478	1.133
1977–78	1.494	13 169	14 688	1.115
1978–79	1.483	13 992	15 591	1.114
1979–80	1.455	15 192	17 186	1.131
1980–81	1.451	16 614	18 989	1.143
1981–82	1.399	18 593	22 554	1.213
1982–83	1.426	20 200	25 022	1.239
1983–84	1.423	21 793	26 564	1.219
1984–85	1.418	22 907	28 418	1.241
1985–86	1.418	23 935	29 861	1.248
1986–87	1.425	24 903	32 083	1.288
1987–88	–	25 619	–	–

FTE employees per patient-day did not account for changes in the type of labour employed in the hospitals. These measures might not adequately reflect change in the service intensity in the hospital sector during the 1980s. In the late 1970s a shift had occurred in the skill mix of labour inputs; this had resulted in higher proportional growth in the number of highly skilled workers. This may have been due to changes in hospital technology or in the hiring policies of nursing departments regarding qualifications. This shift toward more highly skilled workers continued throughout the 1980s (Table 5). Our estimate of FTE employees per inpatient-day (Table 4) did not reflect this shift. In terms of the previous gasoline analogy, an increase in quality-adjusted inputs would be like buying a higher octane gasoline, which costs more per litre. Similarly, the shift in skill mix may have accounted in part for the increases in the average wages of hospital labour during this period.

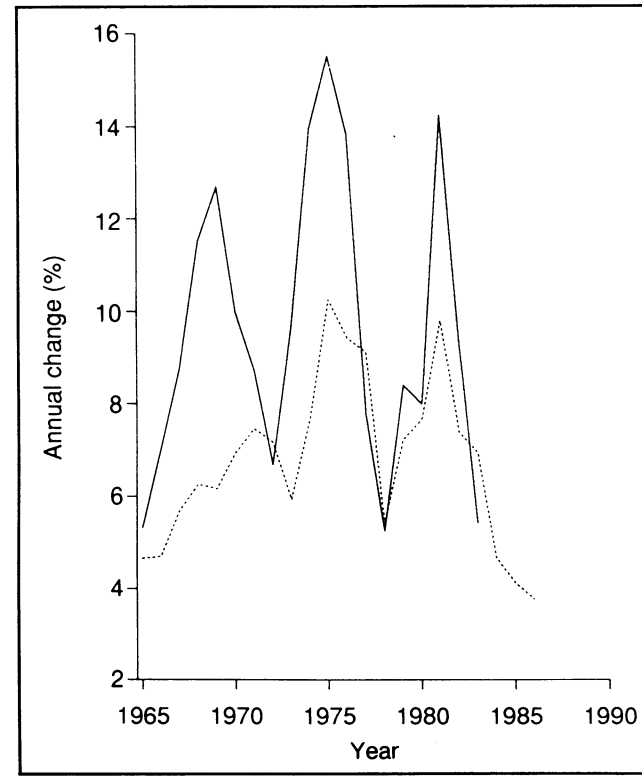

Fig. 3: Annual percentage increases in average wages for full-time-equivalent hospital employees (solid line) and for general public (dotted line) according to Ontario Industrial Composite Wage Index.

Summary

We observed the following.

- The total amount of inputs employed in the hospital sector grew at a faster rate from 1979–80 to 1986–87 than from 1972 to 1979–80.
- In view of general inflation and the growth in ambulatory activities, the average cost per patient-

Table 5: Level of skill among FTE hospital employees in Ontario

Position*	Year; no. of FTE employees 1979–81	1986–88	% change between 1979–81 and 1986–88
High-wage employees			
Professional nursing	31 109	40 298	29.5
Professional support	3 609	4 833	33.9
Technical	5 864	7 442	26.9
Low-wage employees			
Nursing support	20 731	21 120	1.9
Service support	23 824	26 029	9.2

*Professional nursing included nursing directors, supervisors and graduate nurses; nursing support included nursing assistants, orderlies and other nursing personnel; professional support included psychologists, pharmacists, physiotherapists, occupational therapists, speech therapists, audiologists, social workers and dietitians; technical employees included medical records, laboratory and radiology technicians; service support included medical records librarians, food-service supervisors, and laundry, linen, housekeeping and maintenance personnel.

day increased at a modest rate. Inputs and the amount of labour used per patient-day remained relatively constant in the 1980s.

- The number of inputs per admission grew in the 1980s, but this observation was difficult to interpret because ambulatory activities, which contributed to the numerator (i.e., costs), were not included in the denominator (i.e., admissions).
- The proportion of hospital activity accounted for by ambulatory care continued to rise, even in the absence of strong incentives such as the Diagnosis-Related Group (DRG) strategy for cost-containment in the United States.
- Most of the cost increases, beyond general inflation, were accounted for by increases in the prices paid for hospital inputs (largely wages) rather than the number of inputs used. This finding was tempered by the mix in skill levels among hospital employees, which would justify wage increases and indicate that the number of quality-adjusted inputs grew at a faster rate than indicated by our figures.
- Hospital wages increased at a rate that exceeded wages in the general economy during the 1980s.

Discussion

The hospital wage increases may have been related to the persistent economic expansion in southern Ontario over the same period. It is unlikely that hospital administrators or the government could have controlled the growth in hospital wages and still have competed with the general economy for specialized technical labour. Given the shortage of nurses willing to work in hospitals, one might even argue that wages did not increase to a sufficient level to attract enough labour into this sector.

Our findings support the concept that global budgetary constraints for hospitals remain a moderately effective means to contain overall costs. This method of cost-containment transfers the responsibility for allocation of limited resources to the medical profession and hospital administrators. Therefore, the government's use of global budgetary constraints may be described as enforcing a system of "implicit rationing".[8,9] This system is in contrast to "explicit rationing", in which specific policies limiting services are openly debated and promulgated by government as society's agent.[8,9] The benefit to the government is that it is able to contain costs while largely evading direct responsibility for any curtailment of services. The latter is possible for two reasons. First, the lack of explicit rationing policies allows the government to argue that physicians and hospitals must be held accountable for the use — and abuse — of health care dollars. Second, information about the extent and nature of rationing is limited.

Indeed, global budgeting has probably hindered the development of sophisticated information systems at both an institutional and a government level. Institutions are not driven by the need to maximize revenue or output: they are compelled to work within a predetermined annual funding envelope. Hence, information needs are more limited than in the United States, where prospective, case-based public funding and competitive private billings have encouraged the compilation of detailed comparative performance profiles. It may be in the interest of all parties, including government, institutions and clinicians, to have the facts remain unknown; in that way rhetoric and "orchestrated outrage"[7] can be freely used without fear of being proven wrong.

The lack of information extends to the entire area of "quality of care". There are currently no overall measures of quality of care in Ontario hospitals and no systematic outcome analyses. By default, perceptions of how funding affects the quali-

ty of care may rest on the availability of new technologies, rates of surgical procedures and lengths of waiting lists in comparison with the United States.

New technologies

Many of the health care technologies that have emerged in the last 20 years require expensive capital equipment and technically sophisticated labour that could greatly increase hospital costs. It is therefore interesting that the increase in total inputs in the hospital sector was greater in the 1980s than in the 1970s. We have also been able to document a shift in skill mix consistent with the impact of new technologies in the Ontario system.

On the other hand, US policymakers would probably find the availability of visible technologies, such as magnetic resonance imaging (MRI), cardiac surgery and lithotripsy, to be surprisingly low in Ontario. For example, Metropolitan Toronto, a city of almost 3 million people serving a catchment area of more than 5 million, has only two MRI facilities, four cardiac surgery units and one lithotripsy unit.

Although the diffusion of new technologies has probably been contained relative to the United States, there are exceptions. For example, the decision to recommend complete conversion from high-osmolar to low-osmolar radiocontrast media in Ontario was made despite evidence suggesting that complete conversion was not cost-effective.[10] Therefore, it is incorrect to assume that a central, single payor that is able to contain costs will do so with consistent, rational criteria.

Procedure rates

The Ontario rates for a variety of surgical procedures were for the most part comparable to or lower than the US rates (Table 6). Although some observers may take these findings as indicative of implicit rationing in Ontario, the difficult question, as always, becomes: Which rate is better?

Waiting lists for such procedures as hip replacement and cataract surgery have generated considerable media attention, which in turn has increased public awareness about these issues. Despite campaigns about underfunding by the Ontario Medical Association and publicity about waiting lists, there has been a paucity of hard evidence to suggest that the overall quality of health care has been compromised. However, in mid-1989 the Princess Margaret Hospital, Toronto, stopped accepting new patients referred for radiation therapy until it could reduce waiting times to a medically acceptable period. We believe this is the best example to date of implicit rationing as a consequence of underfunding. The causes and effects of this decision deserve a close, objective examination.

Another high-profile area with long waiting lists has been coronary artery bypass surgery (CABS). In Metropolitan Toronto the total number of open-heart procedures actually fell between 1985 and 1988. The number of people waiting for CABS rose from 444 in February 1985 to 723 in February 1988; as of January 1989, 848 people were waiting. In 1984 the average waiting times were 2 to 3 weeks, but during much of 1989 they ranged from 3 to 9 months.[11] In Ontario the CABS rates per 100 000 people have reached a plateau (Table 7). However, although the current Ontario rate is less than half that in the United States (100 per 100 000), it is almost double the rate in Britain (21 per 100 000) and includes a growing proportion of elderly patients.[12]

Surgical rates aside, CABS waiting lists serve as an example of the political process through which additional funds enter the health care system. In spring 1988 Toronto cardiovascular surgeons took their concerns about waiting lists to the media. The

Table 6: Annual procedure rates per 100 000 people in Ontario and the United States, 1985–86*

Procedure	United States	Ontario
Cesarean section	370	280
Hysterectomy	280	220
Cholecystectomy	200	220
Cardiac catheterization	290	130
Pacemaker-related procedure	90	40
Tonsillectomy and adenoidectomy	70	270
Oophorectomy or salpingo-oophorectomy	220	60
Appendectomy	110	110
Prostatectomy	130	160

*Data compiled by Darrel Weinkauf, Department of Economics, Ontario Medical Association (OMA), from the American College of Surgeons *Socioeconomic Factbook for Surgery, 1987*, and from a 6-month service data set from the Ontario Health Insurance Plan (drawn from billings received between Jan. 1 and Sept. 30, 1986).

Table 7: Rates of coronary artery bypass surgery per 100 000 population in Ontario, 1979–88*

Year	Rate
1979	28.6
1981	34.3
1983	41.5
1985	41.0
1988	42.4

*Rates for 1979 to 1985 were from Anderson et al,[12] adjusted for entire population rather than for people aged 20 years or older; rate for 1988 was obtained from Hospital Medical Records Institute discharge data (Darrel Weinkauf, Department of Economics, OMA: personal communication, 1989).

resulting publicity led the Ontario Ministry of Health to make an immediate commitment of $20 million to expand the cardiac surgical programs existing at the time and to initiate a fourth program in Toronto, implemented late in 1989. Thus, although the ministry contains hospital expenditures with its global budgetary constraints, it also injects funds into the system on an ad hoc basis in response to adverse publicity. We are again led to emphasize the importance of better information and clearer decision-making criteria. Has the quality of the health care system fallen to an unacceptable level only when adverse comment appears on the front pages of newspapers?

The system continues to evolve as we enter a new decade. Hospitals in deficit positions are closing beds and cutting back on services to meet budgetary goals. There is much talk about alternative methods of health care delivery such as "community health centres" and "health services organizations", as well as rhetoric about health promotion and disease prevention as means to reduce costs. However, although these strategies may offer the public more choices in delivery systems or improved health, there is no evidence to suggest that they will be effective in reducing costs. In Toronto the hospital merger phenomenon may be a response from hospital administrators searching for a way to provide high-quality care through the reallocation of existing resources. Meanwhile, the government has attempted to deal with public and interest group pressure by creating two independent advisory bodies — the Premier's Council on Health and the Ontario Task Force on the Use and Provision of Medical Services. These groups have the task of finding solutions to the problem of increasing demand for more expensive services in a political environment of limited health care resources.

Whatever the solutions applied, it seems clear that current resources must be allocated more efficiently. In the search for better methods to allocate resources, one hopes that such rational processes as the demonstration of effectiveness, efficiency and equity will win out as analytic tools for decision-making. The application of these methods may require hard choices and result in unpopular political consequences. Unfortunately, politicians may be unwilling to make these choices if they feel it will affect their potential for election; this arguably represents a key management drawback to government-funded health insurance.

Compared with our findings for the first 13 years of global budgeting in Ontario, those for the last 6 have shown an increase in the acuity and severity of the problems in Ontario's hospital sector. However, 19 years of well-controlled hospital costs without numerous examples of crises due to underfunding is not a bad record. We believe our neighbours to the south would be more than satisfied to control hospital costs for half that time.

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