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The Impact of Restructuring on Acute Care Hospitals in Newfoundland

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Key Implications for Decision Makers

- Regionalization by itself does not fully address cost drivers and may not be an effective means to control healthcare expenditures.
- Opportunities for further integration and rationalization of services and institutions exist throughout the province. Strategic planning and leadership is critical to meeting these objectives and controlling costs.
- Hospital closure, in the context of regionalization and programmatic management, may not lead to deterioration in healthcare provider attitudes, patient satisfaction, or quality of care.
- Options to sustain the number of healthcare workers in the face of rising human resource expenditures include infusion of new money; efforts to improve work attendance, overtime and productivity; efforts to reduce unnecessary demand; and reduction of need as a result of improved population health.
- Targeted interventions, rather than broad system changes, offer greater potential to improve use and efficiency, as well as patient satisfaction.
- Access to acute care beds is a problem, which will persist unless bed use improves.
- The climate of the workplace needs to be improved so that healthcare workers' organizational commitment and workplace emotional climate rise to the level of their general job satisfaction.

Executive Summary

Context

This report studies the impact of restructuring in the acute care sector in Newfoundland and Labrador. Regionalization occurred between 1995 and 1997. In 1996, the Health Care Corporation of St. John's, the largest of the province's acute care boards, implemented program-based management, partly to facilitate the closure of a hospital and the integration of clinical services. This study evaluated the impact during and shortly after restructuring in the following areas: costs, level of acuity, appropriateness of hospital stay and efficiency of acute care bed use, human resource indicators, healthcare provider perceptions, quality of care, and patient satisfaction. Analyses focused on time-related trends and comparisons between St. John's and the rest of the province where regionalization, but not the implementation of program-based management, occurred.

Major Findings

- Costs continued to rise, fuelled in part by higher human resource expenditures, largely outside the control of regional boards.
- The size of the workforce as a whole did not change, although there was consistent immediate reduction in management positions.
- In St. John's prior to restructuring an objective was declared, leadership was provided to achieve the objective, a strategic plan for rationalization was developed, communication, execution, and evaluation of the plan occurred.
- Integration of administrative and support functions did occur across the province, but clinical integration did not consistently follow.
- Opportunities for further integration of boards and rationalization of services and institutions exist; however, strategic planning is required.
- There was no measurable impact in the short term on quality of care, use, or efficiency attributable to regionalization.

- Considerable employee dislocation occurred during the restructuring in St. John's.
- Most employee groups supported the need for restructuring and had reasonable levels of general job satisfaction, but organizational commitment and the emotional climate of the workplace were rated poorly. These negative findings could not be directly attributed to the restructuring itself.
- Any observed improvements in use, care processes or patient satisfaction seemed more closely linked to targeted interventions than to system-wide restructuring.
- Accessibility of acute and long-term care beds remained a problem, as did the general level of appropriateness of acute care bed use.

Approach

The research team selected indicators broadly reflective of acute care sector performance. Information on the history of regionalization and restructuring in the province from the late 1980s to 2002 was collected and analysed. Data were also analysed to examine changes in: costs of acute care delivery; acuity and use; appropriateness and efficiency of acute care bed use; access to select healthcare services, human resource indicators; healthcare providers' perceptions of restructuring, the workplace, and quality of care; quality of care for stroke, community-acquired pneumonia, dialysis, acute myocardial infarction, schizophrenia, and coronary revascularization; medicine/surgery/women's healthcare indicators; and patient satisfaction. Indicator trends were followed from 1995 to 2002 comparing St. John's to the rest of the province. Historical events over the same time period were linked to data collected. No causal connections were drawn from the analysis, but trends over time were linked to system changes.

Persisting challenges for the future

There are major forces at work in the healthcare sector in the province of Newfoundland and Labrador, as elsewhere. There is a steady increase in real healthcare costs with an unabated demand for healthcare services, and there is poor access to some services.

Healthcare providers are dispirited. Finally, regional politics have created challenges and have impeded change processes in some regional health boards.

Policy Context

This report outlines the main findings of a program of research focused on the impact of restructuring on acute care hospitals in Newfoundland. The primary purpose is to inform policy makers and stakeholders, including consumers, about the impact of regionalization of responsibility for care delivery, programmatic management in the acute care setting, and closure of hospitals. These restructuring changes were driven by and occurred in the context of a steady increase in healthcare costs together with an unabated demand for services. Poor access to some services, dispirited healthcare providers and regional politics were other prevailing issues. The general objectives were to assess changes in the acute care system during and shortly after restructuring, while attempting to link specific restructuring or confounding events to observed patterns of change, and to identify areas requiring further attention and research. The evaluation is intended to inform debate about further restructuring of healthcare delivery, rather than advocate for any particular solution.

Implications

Despite the restructuring already carried out, opportunities for further integration and rationalization of services exist in all regions. Well-defined objectives, strong leadership, and a strategic plan for rationalization that is well-communicated, expeditiously executed and properly evaluated are essential. Intense efforts to involve healthcare providers, unions and associations, consumers, and external agencies that may be directly or indirectly affected are critical to success. The current evaluation may provide lessons for other regions grappling with the challenges of further healthcare system integration. Lessons from the St. John's experience include:

- Regionalization and planning facilitated rationalization of services in St. John's, but control of costs did not occur. If wage increases continue at the same rate and a cash infusion is not provided, reduction in employee numbers is the most viable solution to controlling costs.

- Hospital closure, in the context of regionalization and programmatic management, may not lead to deterioration in healthcare provider attitudes, patient satisfaction, or quality of care.
- Targeted quality improvement initiatives, rather than major system changes, may be more relevant to improving use efficiency, patient care and issues leading to client dissatisfaction.

Research Approach

The evaluation used the system-wide review approach taken by Ontario's hospitals, encompassing four dimensions (clinical use and outcomes, patient perceptions of hospitals, financial performance and condition, and system integration and change) and a select number of performance indicators (see Appendix A). We collected information on: 1) the history of regionalization and restructuring in the province from the late 1980s to 2002; 2) changes in costs of acute care delivery; 3) acuity and use; 4) efficiency of acute care bed use; 5) access to select healthcare services; 6) human resource indicators; 7) healthcare provider perceptions of restructuring, the workplace, and quality of care; 8) quality of care by audit for stroke, community-acquired pneumonia, dialysis care, acute myocardial infarction, schizophrenia, and coronary revascularization, 9) medicine/surgery/women's health indicators; and 10) patient satisfaction. Data sources were identified or developed for institutions in St. John's and elsewhere in the province. Indicator trends were followed from 1995 to 2002 comparing St. John's to the rest of the province. Historical events over the same time period were linked to data collected. No causal connections were drawn from the analysis, but trends over time were linked to system changes.

Results

History of Regionalization and Restructuring in Newfoundland

Transcripts of interviews with key senior managers in the Health Ministry and hospitals, together with documents (annual reports, ministry documents, newspaper articles, published articles, etc.), were reviewed to document changes in the province's healthcare

system, together with perceptions at the time about the rationale for and anticipated outcomes of restructuring.

A 1984 royal commission supported hospital closures and rationalization of services, particularly in the St. John's region. The St. John's Hospital Council, tasked with developing a restructuring plan for the region, suggested that amalgamation and restructuring would cost approximately \$300 million. The minister rejected this proposal, but later adopted what was known as the 10th option, which included closing a hospital and moving children's services to a new site.

In 1990, a Health Minister's Conference focused on the potential for regionalization to deal with escalating hospital costs. This discussion was fuelled by a national recession and decreased federal transfer payments to provinces for healthcare. At the provincial level, a former hospital CEO was commissioned in 1992 to advise on how regionalization should unfold. The report recommended a change from about 50 to 6 or 7 appointed boards. The implied objectives of this regionalization included improved service quality and effective and efficient use of scarce human and fiscal resources, while taking advantage of economies of scale and enhancing co-ordination of acute and long-term care and providing opportunity for publicly appointed trustees to provide meaningful input into regional boards.

The regionalization announced in 1993 named six government-appointed institutional boards, two integrated boards, four health and community boards, one nursing home board for St. John's and the provincial Cancer Treatment and Research Foundation. The boards assumed operational authority between April 1994 and January 1996. Restructuring varied in each region, but was most pervasive in St. John's.

In St. John's eight acute care facilities were consolidated in 1995 under the Health Care Corporation of St. John's (HCCSJ). Administration of institutional long-term care was separate, unlike regions outside St. John's. The corporation applied a well-developed strategic plan focused on organizational, clinical and site integration. Efforts were made

to communicate the plan objectives to staff, unions, and the public. Organizational administrative functions were integrated in the first year. In 1996, program management was introduced to facilitate integration of clinical service across sites, anticipating site closures. Consolidation resulted in a significant reduction in all levels of management. Finally, one adult acute care site closed in June 2000 and the children's hospital moved to its new site in 2001.

In other regions of the province, administrative consolidation of several acute and long-term care facilities and isolated clinics occurred (1994 — Central East Board; 1995 — Avalon, Central West and Western Boards; 1996 — Peninsulas Board). In each case this was associated with a major reduction in management staff. A variety of organizational structures and management styles was adopted, generally involving some centralization of management and integration across facilities. In some cases multidisciplinary teams were formed to deliver programs and services. Rationalization of clinical services did not always follow, partly as a result of geographic challenges. Intra-regional political differences with a historical basis have hampered regional planning and implementation efforts in the Western Board region. A review of this region, reported in October 2001, suggested that problems related to: conflicting messages and lack of funding on the part of the province; failure of the regional board to deal with inappropriate provincial and municipal interference; the lack of buy-in to a regional model by region physicians; and politicians fostering their own agendas using the healthcare system. In the Peninsulas Board region public resistance to the restructuring process occurred for the first three to four years, with political interference first in the Bonavista area in 1997 followed by Burin in 1999. Following a 1999 government-commissioned report, a vice-president of operations was appointed in Burin, resulting in a strengthened administrative link between regions.

Labour unrest overlapped the period of restructuring. A provincial nurse's strike occurred in 1999, with nurses legislated back to work. An eight-day illegal provincial strike by lab/x-ray workers occurred in 2000, and a two-week strike by hospital support workers occurred in 2001. Finally, a provincial physician strike occurred in 2002.

Labour unrest among healthcare providers was not unique to the province or to the country. Issues facing healthcare provider groups are applicable on a global level.

Although the healthcare system faced with many structural changes over this period, a new style of governance came into being with regionalization. Regionalization has been defined as “transfer of power and authority from one group (e.g., government) to a newly established, or pre-existing, organization with responsibilities.” It is based on two concepts — the establishment of regional units and the transfer of some degree of power to these units. Although this seems straightforward, regionalization means different things to different people. It can mean improved efficiency and economies of scale; improved resource allocation and rationalization of services; improved responsiveness to public needs resulting in perceived improved care quality; centralization of decision-making process from the regional board’s point of view and decentralization from the government’s point of view.

Common objectives of restructuring identified through interviews with system managers included: economies of scale in management and support areas, but not clinical areas; integration of services within regions; reduction of political influence on decision-making with a decrease in protectionism; and an increased regional perspective with decentralized governance. The interviews also suggested that communication of the objectives of regionalization was inadequate in some regions; rationalization of services was particularly successful in St. John’s; and the absence of a strategic plan for specific boards and poor communication facilitated political rejection of rationalization in some regions. Although some integration of services occurred, opportunities for further integration exist.

Changes in Costs of Acute-Care Delivery

This aspect of the research focuses on changes in specific human resource expenditures for the Health Care Corporation of St. John’s and five other sites from 1995/6 to 2000/1. The five other sites were in Carbonear, Burin, Clarenville, Gander, and Grand Falls-Windsor.

Expenditures on sick leave, workers' compensation and overtime as a percentage of regular personnel expenditures by bargaining group and program were analysed. Specific emphasis was placed on measuring changes in nursing and hospital support expenditures over time. Management costs as a percentage of total compensation were also assessed at the board level (including management of chronic care in some cases). Financial data for the St. John's corporation was abstracted from audited general ledger statements. The Department of Health and Community Services provided similar, condensed financial information for the five other sites.

Total expenditures for St. John's increased from \$281.4 million in 1995/6 to \$370.3 million in 2000/1, with most of the increase found in the latter two years. A similar pattern is seen for the other sites where combined expenditures were \$101.2 million in 1995/6 and \$131.4 million in 2000/1. About 75 percent of the money is spent on human resources, with 70 percent of that going to nurses and hospital support workers. These employee groups received a 15 percent salary increase over a three-year period from 2001.

Sick leave costs as a percentage of regular personnel expenditures varied significantly between bargaining groups in both urban and rural areas. For nurses this indicator increased from 7.8 percent to 8.8 percent in St. John's, and from 7.5 percent to 10.8 percent at the other sites over time. For hospital support workers, the corresponding figures were 9.6 percent to 8.0 percent in St. John's and 8.7 percent to 12.1 percent at the other sites. This sick leave indicator was significantly lower for the remaining bargaining groups in all regions. As well, the trend was relatively stable in all regions for most employee groups, except lab/x-ray staff who show a gradual upward trend outside St. John's.

From 1995/6 to 2000/1, overtime cost as a percentage of regular personnel expenditures increased from 2.9 percent to 10.8 percent for nurses in St. John's, while the weighted average for the five other sites went from 1.7 percent to 7.1 percent. For hospital support workers, the change was from 2.4 percent to 7.1 percent in St. John's and from 1.5

percent to 3.9 percent for the other sites. This indicator was significantly lower for other bargaining groups at all sites. Except for non-union, non-management employees, this indicator gradually increased at all sites over the study period.

Management costs as a percentage of total compensation for St. John's dropped from 12.8 percent in 1995/6 to 7.0 percent in 2000/1. The comparable weighted average for the five other boards (including acute and non-acute care expenditures) was 10.3 percent in 1995/6 and 8.1 percent in 2000/1.

Workers' compensation expenditures as a proportion of regular personnel expenditures in St. John's were relatively small (0-2.7 percent) for all bargaining groups. The trend was relatively stable over the study period.

Health Board Association officials advise that sick leave costs as a percentage of regular personnel expenditures may be disproportionately higher for the five sites outside St. John's. Management costs would have been underestimated at some of these sites in latter years due to use of regional accounts. Consequently board data were analysed. The recent rise in acute care expenditures across all institutions of about 10 percent per year exceeds the growth in gross domestic product. Since human resource expenditures account for approximately 75 percent of all acute care expenditures, changes in human resource efficiency greatly affect costs. Following restructuring, management costs fell at all sites, but no similar trend was noted for other employee groups.

Trends in Acute-Care Use, Complexity and Resource Intensity Weight.

Data were obtained from Canadian Institute of Health Information (CIHI) on all acute-care discharges and day-surgical procedures in the province for the years 1995/6 to 2000/01. These data included facility, age, sex, case mix group, length of stay, and status at discharge. In addition, CIHI provided data on complexity (Plx level), and resource intensity weight (RIW) for each acute-care case, and day procedure group weight (DPG Weight) for each day-surgical case. These latter parameters were recalculated by CIHI using their 2000 algorithms applied to raw data from all fiscal years. To permit a more

accurate reflection of current service volume, cases with more than 365 days of care (< 1 percent) were excluded. Analyses compare trends at the St. John's corporation to all other facilities in the province combined.

Total acute-care days show a gradual decline outside St. John's and a less consistent downward trend within the city. By 2002 the number of acute-care days had dropped further, by 19.8 percent in St. John's and 14.5 percent in the larger hospitals outside the city when compared to 1995/6. Acute-care bed numbers have also declined from 1,893 to 1,601 in the province. While this represents a fall from 3.3 to 3.1 beds/1,000 population, the real decline in bed availability is probably greater, as the decline in provincial population has been disproportionately among younger people. The percentage decline in beds (but not population) from 1995 to 2002 has been fairly evenly distributed between St. John's (-16.4 percent) and the rest of the province (-14.5 percent). Average length of stay remained constant over the period 1995/6 to 2000/1 in all regions.

In keeping with the decline in total days of care, total RIW shows a slight decline over time outside St. John's. The trend in this parameter in St. John's is affected in the last year by the apparent increase in average RIW within the city. It is possible that focused efforts to improve the completeness of coding co-morbidity in St. John's in recent years may have contributed to this finding. This is attested to by the rise in the proportion of cases assigned to Plx level 2 (indicating prior co-morbidity) within St. John's in 2000/1.

Efficiency of Acute-Care Bed Use

Studies were carried out in 1995/6, 1998/9, and 2001/2. In the first two periods three hospitals in St. John's and seven of the larger hospitals throughout the province were studied. The 2001/2 data were drawn from the then-two hospitals in St. John's and six of the original seven sites elsewhere. Data on length of stay were also obtained from CIHI to determine trends over the period 1995/6 to 2001/2. Appropriateness of stay in acute-care medical or surgical beds was assessed concurrently at each site by hospital staff using a modified version of the appropriateness evaluation protocol (AEP). Days not meeting appropriateness criteria were then classified into: 1) unnecessary days because of

inefficiencies within the hospital (e.g., awaiting surgery or diagnostic procedures); or 2) unnecessary days due to inadequate access to alternate facilities (e.g., long-term care).

Appropriateness of Stay

In St. John's the proportion of days appropriate for acute care increased from 75 percent in 1995/6 to 80 percent in 2001/2. This resulted from a reduction in unnecessary days due to inefficiency **within** the hospitals (17.6 percent vs. 11.2 percent), particularly due to delays in surgery (3.3 percent vs. 2.0 percent), diagnostics (3.8 percent vs. 2.2 percent), and inefficient medical management (4.6 percent vs. 1.8 percent). These changes may have resulted from targeted interventions to improve efficiency including: 1) care maps for specific diagnoses; 2) hiring a discharge planning manager; 3) formation of a committee for discharge planning; and 4) implementation of an early discharge planning study. Delayed discharge days themselves remained unchanged (3.1 percent vs. 3.8 percent), but half of these were due to the patient/family not agreeing with the discharge plan. The proportion of unnecessary days due to inadequate access to services/facilities **outside** the hospitals remained unchanged (8 percent vs. 9 percent) comparing 1995/6 to 2001/2.

Outside St. John's 25 percent of the total days studied were considered unnecessary for acute care in each study period. The proportion of days considered unnecessary due to inefficiency within the hospitals increased from 15 percent in 1995/6 to 17 percent in 2001/2. There were improvements in discharge delays (6.1 percent vs. 4.2 percent), but the proportion of days awaiting diagnostics increased from 2.1 percent to 5.2 percent in 2001/02, mainly because patients were awaiting diagnostic tests (particularly cardiac catheterization) in St. John's. Inadequate access to alternate services/facilities remained unchanged and was responsible for 8 percent of unnecessary days.

Length of Stay

In St. John's average length of hospital stay for matched cases decreased slightly (6.4 to 6.1 days) comparing 1995/6 to 1998/9. However, the average for the first six months of

2001/2 had returned to 6.4 days. Over the same period expected length of stay nationally decreased (5.4 days vs. 5.1 days). Outside St. John's, length of stay for matched cases showed little change over the three study periods (5.1 vs. 5.1 vs. 4.9 days, respectively), while nationally this decreased over time (4.7 vs. 4.3 vs. 4.1 days, respectively).

Access to Healthcare Services

In St. John's, the proportion of ICU care days attributed to delay in transfer to a ward bed increased from 1.5 percent in 1998, to a peak of 15.6 percent in 2000; then fell slightly to 11.1 percent in 2001. In St. John's, the proportion of patients satisfied or very satisfied with the time waiting for transfer from the emergency department to an inpatient bed increased from 67.5 percent to 73.4 percent between 2000 and 2002. In contrast, outside St. John's, this proportion decreased from 92.2 percent to 70.0 percent.

In 1994/5, 47 percent of patients received coronary artery bypass grafting (CABG) within the recommended period of time compared to 41 percent in 1998/9. Despite the growth in coronary revascularization, demand continues to exceed capacity, resulting in unacceptable wait times.

The median time from admission for stroke to neuroimaging improved over time in St. John's (two days in 1995/6 to less than 24 hours in both 1998/9 and 2000/1), but was unchanged outside of St. John's. Overall, however, the median time to receive an MRI increased steadily from five days in 1995/6 to 20 days in 2001. This was also the case for CT scan and ultrasound. Information on wait times outside St. John's was not available.

Human Resource Indicators

This report mainly provides human resource indicator trends for the Health Care Corporation of St. John's compared to the national health sector average over the period 1995-2001. Data were extracted from the Annual Benchmarking Surveys of the Human Resources Benchmarking Network. The number of participating organizations in the national survey increased from 28 in 1995/6 to 89 in 2000/1 with 81 percent of participants being in the healthcare sector. A "snapshot" view is also provided

comparing the key human resource indicators inside and outside the St. John's region using data collected by the Human Resources Planning Division of the Newfoundland and Labrador Health Boards Association. This report will focus on the key indicators chosen for this program of study that best demonstrate human resource functioning and employee well-being.

The degree of unionization is high and has increased both nationally (+2.6 percent) and in Newfoundland and Labrador by slightly more (+4.7 percent). Despite extensive restructuring and the closure of one hospital in the St. John's region, the number of employees at the St. John's corporation did not change over the period (6,353 in 1995/6 and 6,369 in 2000/1).

Human Resources Functioning

The external hire rate for St. John's has increased slowly, but it has consistently tracked below the health sector average by approximately five percent. The nursing and hospital support worker groups had the highest (i.e., 953 and 1,130), but varying, external hire rates over the period. The total hires ratio trends indicate major staff dislocation during the restructuring. This went from <10 percent in 1995/6 to peak at 35 percent in 1998/9. The dislocation is also reflected by the fact that 1,000 registered nurses internally changed jobs in 1999. The final step grievance rates within St. John's were much higher than the health sector average. Both the nurses and hospital support workers filed a large number of grievances after their respective strikes, while a very low percentage of grievances were resolved or dropped over this period.

Employee well-being

Although declining slightly over time, paid sick hours per eligible employee were consistently higher than the health sector average by approximately 20 per year. The workers' compensation lost time incident rate is again consistently higher than the health sector average, with a downward trend to 1999 and then a peak in 2000.

We partnered with the Health and Community Services Human Resource Sector Study to get a provincial snapshot of 2000/01 human resource indicators. Comparison of St. John's to other provincial regions shows many similarities in human resource indicators. However, the turnover rate was twice as high in St. John's, while sick hours per employee and workers' compensation lost time were higher outside St. John's.

Even though restructuring in St. John's was associated with substantial workforce dislocation, the total number of employees remained similar from 1995 to 2001, and measures of employee stress, such as sick hours and compensation lost time were actually less.

Healthcare Provider Perceptions During Restructuring

In 1999/2000 and 2001/2, main surveys were done to determine healthcare providers' perceptions of the impact of healthcare reform on the work environment and quality of patient care. The surveys also addressed the impact of system changes on work-related attitudes (i.e., organizational commitment, general job satisfaction, psychological contract violation) and behavioural intentions (i.e., intent to stay). Analyses are presented of time-related trends and inter-regional differences.

In 1999/2000 surveys were administered to stratified random provincial samples of registered nurses (RNs), licensed practical nurses (LPNs), and hospital support workers (HSWs) in acute care settings. A second stratified random sample was selected for the LPNs and HSWs in 2001/2, but the RN sample was restricted to those responding to the baseline survey. Baseline and two-year follow-up surveys were also administered to management personnel from three institutional boards (i.e., St. John's and two other boards) and the entire population of allied health professionals (AHPs) and physicians. Overall response rates ranged from 26 percent to 61 percent across groups in the first survey, and from 32 percent to 74 percent (RN repeats) on the second occasion.

At both baseline and follow-up, most healthcare providers were generally satisfied with their jobs, but most had low levels of commitment to their organizations, felt that

employers had failed to fulfill original commitments made to them upon hiring, and were unsure about staying with current employers. There were notable differences in the attitudes and behaviours of individual provider groups at both time periods.

A few significant regional differences were observed at both time periods. Satisfaction levels were higher outside of St. John's for management and physicians at baseline, but only for management at follow-up. At both time periods, physicians, AHPs, HSWs and management personnel outside of St. John's were more committed to their organizations. The current study's findings concur with other studies in showing moderate to strong interrelationships among attitudinal and behavioural intention variables for all provider groups.

At both time periods, most healthcare providers were fairly positive about the importance of reforms. In contrast, most providers had concerns about the negative impact of reforms on the emotional climate of the workplace (e.g., stress due to increased job demands, lack of respect and recognition, less support from co-workers, etc.) and practice-related issues (i.e., less staff-management communication, decision latitude and continuing education opportunities). Most of the groups surveyed were generally dissatisfied with managerial support and interdisciplinary relations, but all groups rated interdisciplinary relations more positively than managerial support.

There were a few regional differences observed at baseline and follow-up. LPNs working within St. John's viewed the importance of reforms more positively than their counterparts outside at follow-up only. Doctors working outside of St. John's had more positive perceptions of the emotional climate of the workplace at both time periods, but of practice-related issues only at baseline. Finally, doctors and AHPs working outside of St. John's had significantly more positive perceptions of managerial support and interdisciplinary relations than their counterparts at follow-up only.

Again the findings concur with other research on the relationship between work environment factors and work attitudes and behaviours. More positive perceptions of the

emotional climate, practice-related issues, managerial support and interdisciplinary relations were associated with greater job satisfaction, organizational commitment and intent to stay, and with lower levels of implied contract violation. As well, more positive views about the importance of reforms were linked with greater job satisfaction, organizational commitment, and lower levels of implied contract violations.

All of the health provider groups had concerns about quality of care, safety measures, and standards of care in the workplace at both time periods. Only RNs had significantly more positive perceptions of quality of care, safety measures, and standards of care at follow-up.

There were regional differences observed for both time periods. At baseline, quality of care was perceived as higher by LPNs in St. John's, but by doctors outside the city. At both time points, doctors outside of St. John's had more positive perceptions of safety measures. Finally at follow-up only, management working in St. John's had more positive perceptions of safety and standards than their counterparts outside.

Apart from the restructuring, a number of historical events that occurred during the study may have influenced the results and limited ability to attribute change to restructuring itself. These included provincial labour unrest and strikes for the registered nurses, hospital support workers, and lab-x-ray personnel.

Quality of Care – Audits

Community-acquired pneumonia

Chart audits were completed for the years 1995/6, 1998/99 and 2000/01 of 1,166 patients with a discharge diagnosis of community-acquired pneumonia. Three adult acute-care hospitals in St. John's and two acute care hospitals from two regions outside St. John's (Carbonear General Hospital and Central West Regional Health Centre) were audited.

The key findings suggested that although a high proportion of Class 1 and Class 11 (i.e., low-risk patients that could possibly have been treated on an outpatient basis) patients

were admitted to hospital, an improvement over time occurred in St. John's. While the appropriateness rate for initial antibiotic did not change over time, inappropriateness was related to more aggressive antibiotic use in the lower-risk patients. Finally, mortality did not differ by study year or by region (i.e., St. John's versus outside St. John's).

Stroke

A chart review of 1,000 patients with a discharge diagnosis of stroke was also completed for the same study years and regions.

In the St. John's region there were improvements in time to CT scan/MRI access, to dietitian, speech language pathology, physiotherapy, and occupational therapy, partly attributable to a stroke team at the Health Sciences Centre. A drop in the proportion of patients seen by a social worker in the St. John's region was noted. Although there was an improvement in the time before a patient was discharged home, a similar pattern for time to transfer to a nursing, home/personal care home did not occur. In the two hospitals outside of the St. John's region there were improvements in time to CT scan, to speech language pathology and physiotherapy, but there was a longer length of stay compared to the St. John's region. Finally, mortality did not differ by study year or by region.

Renal dialysis care

On closure of the Grace Hospital in 2000, all nephrology services in St. John's were combined and delivered via an acute and an ambulatory site. Provincial peritoneal dialysis services were co-ordinated in St. John's. A hemodialysis unit has been operating independently at Western Memorial Hospital in Corner Brook throughout the study period. A semi-independent hemodialysis unit was opened in Grand Falls-Windsor in January 1998, with regular site visits from St. John's nephrologists. For this study, benchmarks were taken from clinical practice guidelines published by the Canadian Society of Nephrology. Indicator data, collected prospectively for quality assurance, were abstracted for 1995/6, 1998/9 and 2000/1.

The guidelines state that more than 60 percent of prevalent hemodialysis patients should have a native arteriovenous (AV) fistula as access. The proportion with fistulae increased over time and now meets this standard in St. John's and Corner Brook. There remains room for improvement in Grand Falls, where more than half of the patients had catheter access in 2000. The guidelines suggest a ≥ 65 percent reduction of urea concentration with each hemodialysis as a minimum dosing target. The proportion meeting this standard increased over time at all sites to 82 percent in St. John's and 70 percent elsewhere by 2000/1. The guidelines indicate a threshold hemoglobin level of < 100 g/L for initiating erythropoietic therapy. The percentage of patients with hemoglobin < 100 g/L both in St. John's and outside decreased over time (to 19 percent and 22 percent respectively) to less than corresponding Canadian rates.

As in Canada as a whole, the number of patients on peritoneal dialysis declined over time. The peritonitis rate fell from 6.9 to 3.5 per 100 patient months between 1995/6 and 2000/1, largely due to a continuous quality improvement program targeting this problem beginning in late 1997. The percentage of patients on peritoneal dialysis with Hb < 100 rose to 28 percent, but remains below Canadian rates.

Myocardial infarction

Cases were identified from discharge codes for hospitals in St. John's, Carbonear, and Grand-Falls for the years 1995/6, 1998/9 and 2000/1, except for the 1995/6 sample in St. John's who were identified from the Fastrak I database used to study care process at that time. Demographics, therapy, complications, and in-hospital mortality were abstracted retrospectively.

The frequency of myocardial infarction and the percentage receiving thrombolytic therapy remained stable over time. The proportion receiving thrombolysis within 30 minutes of presentation improved at all sites over time. The proportion not receiving thrombolytics when indicated improved in St. John's and remained stable elsewhere. There was no consistent trend in cardiac care unit use in St. John's, whereas the proportion so admitted and length of stay declined elsewhere. There was a non-

significant trend to decreasing mortality over time only in St. John's. Recurrent ischemia or infarction rates and hospital length of stay were unchanging at all sites. The proportion discharged on ASA was unchanged over time, while beta-blocker use declined in St. John's only and ACE inhibitor/ARB and lipid lowering medication prescription at discharge increased at all sites.

Coronary Revascularization

An incident cohort of patients having coronary angiography in 1998/9 was identified, and the group referred for coronary artery bypass grafting and percutaneous transluminal coronary angioplasty were followed and compared to a similar cohort from 1994/5. We studied trends in appropriateness, necessity, efficiency, and clinical outcomes as indicators of care quality.

Appropriateness and necessity ratings were assigned using a validated scoring system developed by the RAND Corporation and adapted for the Canadian population. In addition, a consensus priority score (very urgent — treat in < 24 hours — to delayed elective — treat within 6 months) was assigned based on the pattern or severity of angina, coronary anatomy, and results of non-invasive tests of ischemic risk. By comparing this with the length of time patients actually waited for grafting or angioplasty, an indirect assessment of the efficiency with which each procedure was carried out was made.

The number of coronary angiograms increased by 37 percent between 1994/5 and 1998/9, as did the proportion of patients with critical coronary artery disease (68 percent to 74 percent). In addition, the number of patients referred for grafting increased by 48 percent (391 vs. 578). Necessity ratings for grafting remained high (94 percent and 95 percent, respectively). In 1994/5, 47 percent of patients received grafts within the recommended period of time compared to 41 percent in 1998/9. The proportion of patients with unstable angina referred for grafting decreased from 77 percent in 1994/5 to 45 percent in 1998/9. These changes were attributable to an increase in the number of patients referred for surgery with less severe symptoms who required necessary grafting. Mortality rates

following grafting remained essentially unchanged (3.3 percent and 3.5 percent respectively).

The number of patients who received angioplasty increased from 313 in 1994/5 to 645 in 1998/9. In 1994/5, 95 percent of angioplasties carried out were considered appropriate, compared to 86.5 percent in 1998/9. The change in appropriateness ratings was mainly attributable to patients presenting for angioplasty in an earlier phase of their disease and changing indications for angioplasty. In 1994/5, 85 percent of patients received angioplasty within the recommended period of time, compared to 97 percent in 1998/9. During the latter study period, 60 percent of all angioplasties were carried out immediately following diagnostic cardiac catheterization. The proportion of adverse events (myocardial infarction, emergency grafting, and death within 24 hours) following angioplasty decreased over time (5.1 percent vs. 2.5 percent, 1.3 percent vs. 0.5 percent, and 1.3 percent vs. 0.6 percent respectively).

Procedure volumes increased over the study period, but appropriateness remained high. Clinical outcomes were stable or improved. Angioplasty was completed in the recommended time frame, but many grafts were not and this did not improve over time.

Medicine/Surgery/Women's Health

For the medicine and surgery programs at St. John's there was no change in quality of care measured by length of stay, mortality rates and the use of blood products. However, in the surgery program there was a decrease in the number of surgeries performed and an increase in surgery cancellations. This was attributable in part to restructuring, i.e., the closure of a hospital and re-orientation of staff.

In other regions, there was no change in length of stay or mortality rates. Information related to blood use and operating room cancellation rates was not available outside St. John's

In the Women's Health Program in St. John's, there was an overall improvement in length of stay. Healthcare indicators such as cesarean section rate and cesarean section wound infection rates remained stable.

Schizophrenia

A provincial retrospective chart review was used to identify changes in a number of outcome measures often thought to reflect quality of care between 1995/96 and 1998. Comparisons were made between St. John's and the regional health boards outside St. John's.

In 1995/6, 82 percent of the 316 schizophrenia patients were admitted in St. John's, while this was true for 76 percent of 291 patients admitted in 1998. On average each patient had two separations per period. For St. John's the average length of stay rose from 27 days to 33 days comparing years. Patients admitted in 1998 had an average of 12 more inpatient days per year than did patients in 1995/6. Outside St. John's, the mean number of admissions per patient, average length of stay per episode, and average inpatient days per patient per year was the same in both years.

In St. John's, 73-78 percent of the patients admitted were readmitted to hospital, with 60-62 percent being readmitted within one year of discharge in the two study years. Outside St. John's, 85 percent of the 1995/6 population was readmitted compared with 68 percent in 1998.

There was virtually no difference in the proportion of patients requiring seclusion in 1995/6 (15.1 percent) compared to 1998 (17.2 percent) in St. John's.

During this three-year time period, novel antipsychotic medications for the treatment of schizophrenia were introduced. Despite the fact that three times as many patients in St. John's received a novel antipsychotic agent in 1998, our data did not demonstrate any reduction in hospitalization or length of stay as were anticipated by the manufacturers of

these agents. The provincial reimbursement cost for antipsychotic agents jumped from \$706,000 in 1995/6 to \$1.8 million in 1998/9.

In summary, the total number of days in hospital and rates of readmission did not change significantly over the two study years. The use of seclusion was also not affected by the changes happening in the system within St. John's. However, the introduction of atypical antipsychotic medications for the treatment of schizophrenia is a potential confounding factor.

Patient Satisfaction

Using a modified questionnaire developed by the Quality Initiatives Department of the St. John's corporation, surveys were carried out on adult patients admitted to an acute-care hospital (excluding ICU/CCU and psychiatry) in two regions in the province during 2000 and 2002. The questionnaire had 36 items, each scored on a five-point scale, to assess patients' perceptions of the care received during the admission. The questionnaire was administered by telephone two to three weeks after discharge.

The 2000 and 2002 samples had 1,467 and 635 patients respectively. Response rates were high in both years (81.5 percent and 90.2 percent). In each year women made up 61 percent of respondents, and the majority of each sample was admitted in St. John's (73.1 percent and 68.8 percent). A significant percentage was admitted via the emergency room (46.1 percent and 48.1 percent). In general, people indicated a high level of satisfaction with the inpatient care and discharge planning processes at each site and in both years. There was a decline in the level of satisfaction with the time spent by physicians outside St. John's from 2000 to 2002. The major sources of dissatisfaction related to the admission process, where the time spent in pre-admission was sometimes seen as too long in St. John's in 2002. Targeted interventions in St. John's led to improvement in areas of concern identified in 2000. Patients admitted electively had higher levels of satisfaction than in 2000. Approximately 10 percent of patients expressed dissatisfaction with the amount of time spent waiting to be admitted to the floor at both time periods. Patients admitted through the emergency department expressed consistently high levels

of dissatisfaction with the time waiting to be admitted to the floor in St. John's. Outside St. John's, patients experienced high levels of satisfaction with the time waiting to be admitted in 2000, but this worsened in 2002.

Further Research

This study focused on the short- and mid-term impact of restructuring in the acute-care sector in the province of Newfoundland and Labrador. It is possible that some of the current restructuring efforts may in time facilitate the targeted interventions necessary to improve aspects of system function. Specific interventions will be required targeting costs, use patterns, and the climate of the workplace. Further research will be needed to judge the impact of these interventions. Further work is also needed on how best to plan and implement system changes, taking account of the various factors that impact these decisions, including research-derived evidence and political influences.

Additional Resources

A number of baseline reports summarizing the findings of various arms of this comprehensive program of research are available on our web site at www.med.mun.ca/med/. Other reports will be posted on the web site over the next few months. The findings of this research will be submitted for publication. Any of the reports may be obtained by contacting the principal investigator.

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Appendix A

Figure 1. A Framework for Monitoring Organizational Change in Hospitals in Newfoundland

Dimensions	Performance Indicators
Measures of Clinical Use and Outcomes	
<i>(1) Efficiency</i>	Average length of stay (ALOS) Percent change in service volumes Patients who may not require hospitalization Appropriateness of acute care bed use Waiting times for coronary artery bypass surgery
<i>(2) Quality of care: Adverse Occurrences</i>	Rates of readmission/complication Rates of nosocomial infections Number of procedure cancellations Number of patients awaiting transfer
<i>Processes and outcomes: Adherence to Published Guidelines for Sentinel Diagnoses</i>	Management of schizophrenia Management of community-acquired pneumonia Management of stroke Management of hemodialysis patients Management of myocardial infarction/unstable angina Management of coronary revascularization
Patient Perceptions of Newfoundland Hospitals	
<i>Patients' and Families' Perspectives</i>	Patient/Family satisfaction questionnaires
Measures of Financial Performance and Condition	
<i>Costs</i>	Labour costs by employee group
System Integration and Change	
<i>(1) Employee Attitudes</i>	Staff and Physicians' Perspectives Survey to evaluate program-based management
<i>(2) Human Resource Indicators</i>	Hiring practices Sick leave, workers' compensation leave, etc.
<i>(3) CEOs'/Boards' Perspectives</i>	Survey – CEOs' and boards' perspectives
<i>(4) Patients'/Families' Perspectives</i>	Patients' perceptions of discharge information Patients' perceptions on information provided on community services
<i>(5) Clinical Use</i>	Alternate level of care days (ALC)