

DISCHARGING PATIENTS EARLIER FROM WINNIPEG HOSPITALS: DOES IT ADVERSELY AFFECT QUALITY OF CARE?

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Abstract • Résumé

Objective: To determine whether decreasing lengths of stay over time for selected diagnostic categories were associated with increased hospital readmission rates and mean number of physician visits after discharge.

Design: Retrospective descriptive study.

Setting: The seven large (125 beds or more) acute care hospitals in Winnipeg.

Patients: Manitoba residents admitted to any one of the seven hospitals because of acute myocardial infarction (AMI), bronchitis or asthma, transurethral prostatectomy (TURP) and uterine or adnexal procedures for nonmalignant disease during the fiscal years 1989–90 to 1992–93. Patients from out of province, those who died in hospital, those with excessively long stays (more than 60 days) and those who were transferred to or from another institution were excluded.

Outcome measures: Length of hospital stay, and rate of readmission within 30 days after discharge for all four categories and mean number of physician visits within 30 days after discharge for two categories (AMI and bronchitis or asthma).

Results: The length of stay decreased significantly over the 4 years for all of the four categories, the smallest change being observed for patients with AMI (11.1%) and the largest for those with bronchitis or asthma (22.0%). The readmission rates for AMI, bronchitis or asthma, and TURP showed no consistent change over the 4 years. The readmission rate for uterine or adnexal procedures increased significantly between the first and second year ($\chi^2 = 4.28$, $p = 0.04$) but then remained constant over the next 3 years. The mean number of physician visits increased slightly for AMI in the first year (1.92 to 2.01) and then remained virtually the same. It decreased slightly for bronchitis or asthma over the 4 years. There was no significant correlation between length of stay and readmission rates for individual hospitals in 1992–93 in any of the four categories. Also, no correlation was observed between length of stay and mean number of physician visits for individual hospitals in 1992–93 in the categories AMI and bronchitis or asthma.

Conclusions: Improving hospital efficiency by shortening length of stay does not appear to result in increased rates of readmission or numbers of physician visits within 30 days after discharge from hospital. Research is needed to identify optimal lengths of stay and expected readmission rates.

Objectif : Déterminer s'il y a un lien entre la réduction de la durée du séjour dans le cas de certaines catégories de diagnostics et l'augmentation des taux de réhospitalisation et du nombre moyen de consultations médicales après la libération.

Conception : Étude descriptive rétrospective.

Contexte : Les sept grands (125 lits ou plus) hôpitaux de soins actifs de Winnipeg.

Patients : Résidents du Manitoba admis dans un des sept hôpitaux pour infarctus aigu du myocarde (IAM), bronchite ou asthme, prostatectomie transurétrale (TURP) et intervention à l'utérus ou aux annexes à

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cause de maladies non malignes au cours des exercices 1989–1990 à 1992–1993. Les patients de l'extérieur de la province, ceux qui sont décédés à l'hôpital, ceux qui y ont fait un séjour excessivement long (plus de 60 jours) et ceux qui ont été transférés en direction ou en provenance d'un autre établissement ont été exclus.

Mesures des résultats : Durée de l'hospitalisation et taux de réhospitalisation dans les 30 jours suivant la libération dans les quatre catégories de diagnostics et nombre moyen de consultations médicales dans les 30 jours suivant la libération dans deux catégories (IAM et bronchite ou asthme).

Résultats : La durée du séjour a diminué considérablement pendant la période de 4 ans pour les quatre catégories de diagnostics, le changement le plus faible étant observé chez les patients victimes d'un IAM (11,8 %), et le plus important, chez les sujets bronchiques ou asthmatiques (22,0 %). Les taux de réhospitalisation dans les cas d'IAM, de bronchite ou d'asthme et de TURP n'ont pas changé pour la peine au cours de la période de 4 ans. Le taux de réadmission dans le cas des interventions à l'utérus ou aux annexes a augmenté considérablement entre la première et la deuxième année ($\chi^2 = 4,28, p = 0,04$), mais il est demeuré constant au cours des 3 années suivantes. Le nombre moyen de consultations médicales a augmenté légèrement dans les cas d'IAM au cours de la première année (1,92 à 2,01) et est ensuite demeuré à peu près stable. Il a diminué légèrement dans les cas de bronchite ou d'asthme au cours de la période de 4 ans. On n'a pas établi de lien significatif entre la durée du séjour et les taux de réhospitalisation pour des hôpitaux en particulier en 1992–1993, dans aucune des quatre catégories de diagnostics. On n'a pas observé de lien non plus entre la durée du séjour et le nombre moyen de consultations médicales dans le cas de chaque hôpital, en 1992–1993, dans les catégories de diagnostics IAM et bronchite ou asthme.

Conclusions : L'amélioration de l'efficacité des hôpitaux par le raccourcissement de la durée du séjour ne semble pas faire grimper les taux de réhospitalisation ou les nombres des consultations médicales dans les 30 jours suivant la libération de l'hôpital. Des recherches s'imposent si l'on veut définir les durées optimales du séjour et les taux attendus de réhospitalisation.

Hospital beds are being closed across Canada. In 1992 and 1993 British Columbia closed 832 beds, Saskatchewan 306 and Nova Scotia 262. Alberta, Saskatchewan and Manitoba projected absolute decreases in hospital funding in 1993–94 and 1994–95, as compared with earlier years (N.P. Roos: unpublished observations, 1994). The assumption has been that management of the hospital sector can be improved, more can be done with less, patients can be discharged sooner, and cuts can be made without adversely affecting access to hospital beds or quality of care.

Concern has been raised that, as hospitals strive to meet these demands for greater efficiency, quality of patient care will be negatively affected. Perhaps patients will be discharged "quicker but sicker"¹ and require readmission or more intensive levels of follow-up care. In Manitoba physicians and nurses have identified complications such as infection, bleeding and more visits to emergency departments as potential problems resulting from downsizing pressures and bed closures.² Despite the concern, studies have not consistently found shorter stays to be related to more adverse outcomes^{3,4} such as increased readmission rates^{5,6} or mortality rates.⁷ However, the research so far has been based on hospital data from the United States, and since the American and Canadian systems differ in several key ways, such findings may not hold true in the Canadian health care system.

Readmission rates have been targeted by several researchers as a potential indicator of hospital quality of care.^{8–13} Because direct measures of patient health status

are difficult to obtain on a large scale, rates of adverse events such as readmission have been used at the hospital level because it is assumed that hospitals with lower rates have better quality of care.¹⁴

To examine possible adverse effects of earlier discharge we asked the following questions: Are lengths of stay for specific diagnostic categories decreasing? If so, are readmission rates increasing over the same period? Where there are differences in length of stay between hospitals, do hospitals with shorter stays have higher readmission rates?

To answer these questions we examined hospital discharge practices in seven acute care hospitals in Winnipeg for four diagnostic categories. For each type of patient we assessed the change in hospital length of stay over time and the frequency with which patients were readmitted (to any Manitoba hospital) within 30 days after discharge. In addition, we examined the relation between length of stay and the number of physician visits within 30 days after discharge for two of the diagnostic categories.

METHODS

SAMPLE AND STUDY PERIOD

Hospital discharge, readmission and physician contact data for the fiscal years 1989–90 through 1992–93 were obtained from the Manitoba Health provincial administrative health care database. Previous work has

shown that this database is a valid source of hospital admissions and physician visits and of information for building patient histories over time.¹⁵⁻¹⁷ We selected patients discharged from the seven large (125 beds or more) acute care hospitals in Winnipeg. Patients were excluded if they were from out of province, died in hospital, had excessively long stays (greater than 60 days) or were transferred to or from another institution.

PATIENT CHARACTERISTICS

We grouped patients into homogeneous diagnostic and surgical groups using Refined Diagnosis Related Group (RDRG) software,¹⁸ which categorizes patients according to the *International Classification of Diseases* codes (9th revision, clinical modification¹⁹) of the most responsible diagnosis entered on the hospital discharge record. (The most responsible diagnosis was the one that accounted for the longest portion of the hospital stay.) The RDRG classification system also subdivides each diagnostic or surgical group into three (medical) or four (surgical) levels of severity according to the presence (or absence) and severity of specific coexisting illnesses or complications expected to increase length of stay.

Patients were further classified according to whether they lived in the core area of Winnipeg (an area with poor housing and high rates of unemployment, factors known to be related to poor health status)²⁰ and whether they had Treaty Indian status.

ANALYSES

We selected four diagnostic categories for analyses rather than collapsing diagnosis-related groups (DRGs), since readmission rates are known to fluctuate depending on the diagnostic categories.¹¹⁻¹³ The categories were chosen from 14 used in a previous hospital-efficiency study.²¹ The 14 categories were originally selected because of their high frequency and relatively even distribution across the urban hospitals. To maximize the possibility of finding a relation between length of stay and readmission rates we selected categories that showed (a) a general pattern of decreasing length of stay over the study period, (b) significant variability in length of stay among the Winnipeg hospitals in each of the 4 years, after relevant patient characteristics such as age, severity of condition, place of residence and income level were controlled for, and (c) in the most recent year (1992-93), readmission rates high enough for comparisons across hospitals. The final categories selected were acute myocardial infarction (AMI), bronchitis or asthma, transurethral prostatectomy (TURP) and uterine or adnexal procedures for nonmalignant disease (primarily hysterectomy).

An index admission was defined as a patient's first

hospital stay for the selected diagnostic category in a fiscal year. A readmission was defined as an admission to any hospital in the province within 30 days after discharge following the index admission. If more than one readmission occurred in the 30-day period we counted only the first one. Subsequent admissions and readmissions within the fiscal year were not counted in the readmission analysis.

We did not distinguish between related and unrelated readmissions because criteria to do so are not well established and information needed to make such distinctions is not always available on administrative records. However, earlier work involving a physician review panel showed that over half of the readmissions in the first month after surgery were judged to be due to complications of the original procedure, ranging from 51% of the readmissions following cholecystectomy to 77% of those following hysterectomy.²²

The mean number of physician visits after discharge provided another potential indicator of adverse effects of early discharge. Outpatient, emergency-department and office contacts that occurred within 30 days after hospital discharge were counted from physician billing information. However, because the fee paid for surgical procedures includes outpatient physician contacts for follow-up, we could obtain reliable information on physician visits for only two of the categories: AMI and bronchitis or asthma.

We calculated the average length of stay for each fiscal year for each of the four diagnostic categories to determine any significant change over time. If a patient had multiple admissions in a fiscal year for the same diagnostic category a person-based average was used. We calculated the readmission rates and mean number of physician visits for each fiscal year; these analyses were person-based.

Finally, as a separate test of whether short hospital stays were associated with premature discharge we analysed the relation between length of stay and readmission rates across the hospitals in the most recent year (1992-93) using the Spearman rank correlation. We wanted to determine whether patients discharged from hospitals with the shortest stays were more likely to be readmitted than patients discharged from those with longer stays. We excluded patients who had major comorbidities or complications, those with Treaty Indian status and those who lived in the core area of Winnipeg. This made comparisons between hospitals more equitable because these groups of patients were not distributed equally across hospitals and they could be expected to have higher readmission rates than other groups.²³ As well, we explored the relation between length of stay and mean number of physician visits in 1992-93 for the two categories AMI and bronchitis or asthma.

Findings were statistically significant at a p value of 0.05 or less.

RESULTS

LENGTH OF STAY

Table 1 shows the average lengths of stay for each of the four diagnostic categories over the study period. We found a significant trend toward shorter lengths of stay over time for all four (AMI: $F = 18.99$, $p = 0.0001$; bronchitis or asthma: $F = 17.24$, $p = 0.0001$; TURP: $F = 61.81$, $p = 0.0001$; uterine or adnexal procedures: $F = 115.69$, $p = 0.0001$). Decreases ranged from 11.1% for AMI to 22.0% for bronchitis or asthma.

READMISSIONS AND PHYSICIAN VISITS

Rates of readmission within 30 days after discharge

for each of the four diagnostic groups are summarized in Table 2. A χ^2 trend test confirmed that changes in the rates over the study period were statistically significant only for the category uterine or adnexal procedures ($\chi^2 = 4.28$, $p = 0.04$). The significant increase occurred between 1989–90 and 1990–91, after which the rate remained the same.

The mean number of physician visits within 30 days after discharge for the categories AMI and bronchitis or asthma are shown in Table 3. For the AMI patients a slight increase in the mean number of visits, from 1.92 to 2.01, was noted between 1989–90 and 1990–91, with virtually no change thereafter. The proportion of patients with at least one visit increased slightly, although the change was not significant. For the bronchitis and asthma patients the mean number of visits decreased slightly, from 1.80 to 1.67, over the study period. There was a significant decrease over time in the proportion of patients with at least one visit (χ^2 for trend = 4.98, $p = 0.03$).

Table 1: Mean length of stay for patients admitted to seven large acute care hospitals in Winnipeg from 1989–90 to 1992–93, by diagnostic category

Diagnostic category	Year				% change
	1989–90	1990–91	1991–92	1992–93	
Acute myocardial infarction					
No. of patients	806	681	785	786	
Mean length of stay, d (and 95% confidence interval [CI])	12.03 (11.54–12.52)	11.38 (10.91–11.84)	11.15 (10.75–11.55)	10.70 (10.25–11.15)	11.1
Bronchitis or asthma					
No. of cases	1014	857	1174	795	
Mean length of stay, d (and 95% CI)	4.20 (3.97–4.43)	3.67 (3.47–3.86)	4.13 (3.91–4.36)	3.29 (3.06–3.51)	21.7
Transurethral prostatectomy					
No. of cases	972	873	891	743	
Mean length of stay, d (and 95% CI)	8.00 (7.73–8.27)	7.55 (7.28–7.81)	7.06 (6.79–7.33)	6.52 (6.24–6.80)	18.5
Uterine or adnexal procedure for nonmalignant disease					
No. of cases	1710	1662	1745	1700	
Mean length of stay, d (and 95% CI)	6.85 (6.73–6.97)	6.65 (6.53–6.78)	6.51 (6.79–7.33)	5.91 (5.79–6.04)	13.7

Table 2: Rate of readmission to any hospital in Manitoba within 30 days after discharge from Winnipeg hospitals, by diagnostic category

Diagnostic category	Readmission rate, % (and 95% CI)			
	1989–90	1990–91	1991–92	1992–93
Acute myocardial infarction	11.2 (9.0–13.3)	10.6 (8.3–12.9)	11.6 (9.4–13.8)	11.3 (9.1–13.5)
Bronchitis or asthma	7.9 (6.2–9.6)	6.9 (5.2–8.6)	7.4 (5.9–8.9)	6.5 (4.8–8.3)
Transurethral prostatectomy	7.3 (5.7–8.9)	6.4 (4.8–8.0)	7.2 (5.5–8.9)	7.3 (5.4–9.1)
Uterine or adnexal procedure for nonmalignant disease	2.2 (1.5–2.9)	3.1 (2.2–3.9)	3.1 (2.3–3.9)	3.4 (2.5–4.3)

RELATION BETWEEN READMISSION RATES AND LENGTH OF STAY

The comparison between the mean lengths of stay at the seven study hospitals and the readmission rates is shown in Figs. 1 through 4. Correlations of hospital rankings by length of stay (shortest to longest) and re-

Table 3: Mean number of physician visits within 30 days after discharge from Winnipeg hospitals for patients with acute myocardial infarction and those with bronchitis or asthma*

Diagnostic category; year	Mean no. of visits (and 95% CI)	% of patients with at least one visit (and 95% CI)
Acute myocardial infarction		
1989-90	1.92 (1.82-2.01)	89.2 (87.1-91.4)
1990-91	2.01 (1.91-2.11)	90.6 (88.4-92.8)
1991-92	2.04 (1.93-2.15)	90.5 (88.4-92.5)
1992-93	2.04 (1.94-2.13)	91.9 (90.0-93.8)
Bronchitis or asthma		
1989-90	1.80 (1.71-1.89)	86.4 (84.3-88.5)
1990-91	1.80 (1.71-1.90)	85.3 (82.9-87.7)
1991-92	1.74 (1.66-1.82)	85.4 (83.3-87.4)
1992-93	1.67 (1.57-1.77)	83.1 (80.5-85.8)

*Information on the number of visits for the other two categories could not be obtained from billing information because outpatient follow-up visits are included in the fee for surgical procedures.

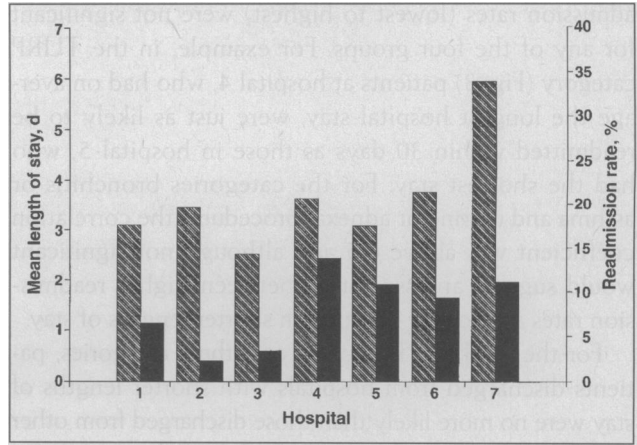


Fig. 2: Mean lengths of stay (striped bars) and rates of readmission (black bars) for patients admitted because of bronchitis or asthma in 1992-93. Number of index admissions ranged from 27 to 352 across hospitals.

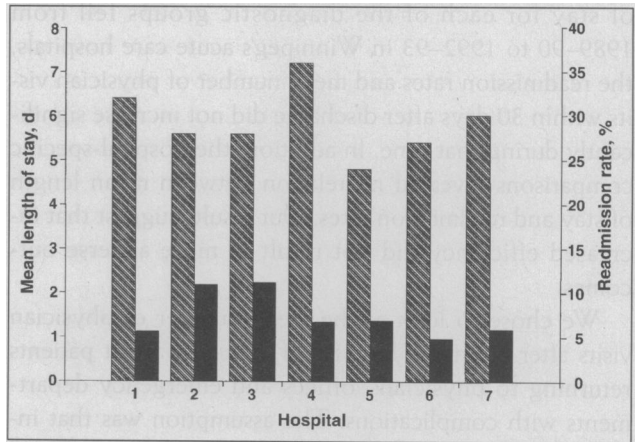


Fig. 3: Mean lengths of stay (striped bars) and rates of readmission (black bars) for patients who underwent transurethral prostatectomy in 1992-93. Number of index admissions ranged from 44 to 189 across hospitals.

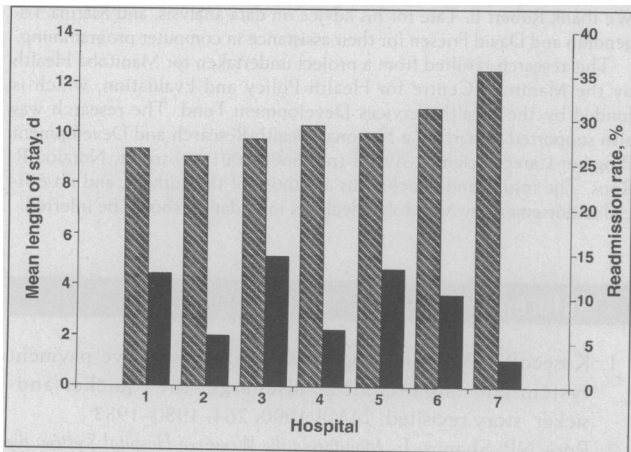


Fig. 1: Mean lengths of stay (striped bars) and rates of readmission within 30 days after discharge (black bars) for patients admitted because of acute myocardial infarction to seven acute care hospitals in Winnipeg in 1992-93. Number of index admissions ranged from 64 to 150 across hospitals.

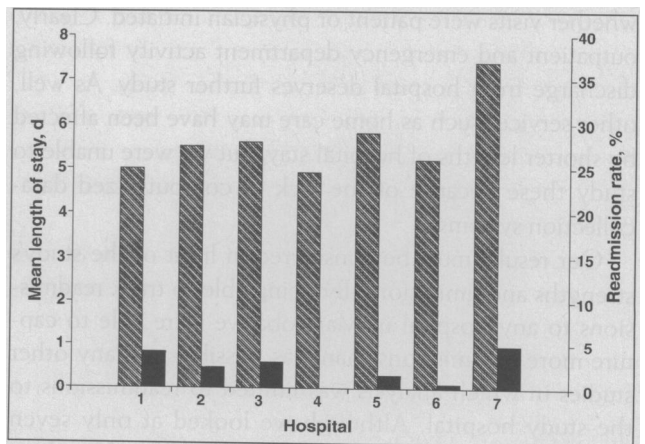


Fig. 4: Mean lengths of stay (striped bars) and rates of readmission (black bars) for patients who underwent uterine or adnexal procedures for nonmalignant disease in 1992-93. Number of index admissions ranged from 84 to 401 across hospitals.

admission rates (lowest to highest) were not significant for any of the four groups. For example, in the TURP category (Fig. 3) patients at hospital 4, who had on average the longest hospital stay, were just as likely to be readmitted within 30 days as those in hospital 5, who had the shortest stay. For the categories bronchitis or asthma and uterine or adnexal procedures the correlation coefficient was above 0.5 and although not significant would suggest an association between higher readmission rates and longer rather than shorter lengths of stay.

For the AMI and bronchitis or asthma categories, patients discharged from hospitals with shorter lengths of stay were no more likely than those discharged from other hospitals to have a higher mean number of physician visits.

DISCUSSION

Our findings suggest that although the mean length of stay for each of the diagnostic groups fell from 1989-90 to 1992-93 in Winnipeg's acute care hospitals, the readmission rates and mean number of physician visits within 30 days after discharge did not increase significantly during that time. In addition, the hospital-specific comparisons revealed no relation between mean length of stay and readmission rates. Our results suggest that increased efficiency did not result in more adverse outcomes.

We chose to look at the mean number of physician visits after discharge because of concerns about patients returning to physicians' offices and emergency departments with complications. The assumption was that increased activity could reflect premature discharge. However, an increase in the number of visits may reflect a planned part of early discharge. That is, patients may be sent home earlier with more intensive outpatient follow-up. This is very likely more cost-effective than extra days in hospital. It was not possible to determine whether visits were patient or physician initiated. Clearly, outpatient and emergency department activity following discharge from hospital deserves further study. As well, other services such as home care may have been affected by shorter lengths of hospital stay, but we were unable to study these because of the lack of computerized data-collection systems.

Our results must be considered in light of the study's strengths and limitations. By being able to track readmissions to any hospital in Manitoba we were able to capture more readmissions than was possible in many other studies in which analysis was limited to readmissions to the study hospital. Although we looked at only seven hospitals, they included teaching and nonteaching hospitals ranging in size from 136 to 1113 beds. We used two different types of analyses: one over time and the other hospital specific. In addition, our results are con-

sistent with those from studies in the United States, where mean lengths of hospital stay are generally shorter than those in Canadian institutions.³⁻⁷ Our analysis was limited to four diagnostic groups; however, these were selected specifically to maximize the probability of detecting adverse effects if they existed.

We looked at all readmissions within 30 days after discharge, including planned or elective readmissions, which are less likely to relate to quality of care.¹³ We did find, however, that for the 1992-93 fiscal year 75% to 90% of the readmissions included in our analysis were unplanned (designated on admission as nonelective). Although some investigators have attempted to differentiate between related and unrelated readmissions we did not do so in this study. We also did not account for the appropriateness of admissions. For conditions such as bronchitis and asthma, for which admission may be more discretionary than for AMI or surgical conditions, short lengths of stay may not necessarily be related to readmission if the patients did not really have to be admitted.

Finally, although we have evidence that Winnipeg hospitals have not yet reached optimal levels of length of stay,²¹ clearly there is a limit to lowering lengths of stay beyond which there could be adverse outcomes. Research efforts directed at identifying optimal lengths of stay and expected readmission rates will be important.

Despite these limitations our findings are consistent with those from other studies in which shorter hospital stays were not found to be related to more adverse outcomes.¹⁻⁴ Pressures on Canadian hospitals to improve the efficiency with which they discharge patients are not likely misdirected; there is no evidence based on the indicators examined in this study that shorter stays have compromised quality of care.

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Sept. 28-29, 1995: 8th International Symposium on Long-Term Clinical Trials (sponsored by McMaster University, Hamilton, and the Maryland Medical Research Institute, Baltimore)

Toronto

Dr. Salim Yusuf or Professor Michael Gent, McMaster Clinic, Hamilton General Hospital, 237 Barton St. E, Rm. 614, Hamilton ON L8L 2X2; tel 905 527-7327, fax 905 521-1551

Sept. 28-30, 1995: Ontario Medical Association Section on Anaesthesia and Canadian Anaesthetists' Society Annual Meeting

Kingston, Ont.

Dr. E.L. Ashbury, Department of Anaesthesia, Queen's University, Kingston ON K7L 2V7; tel 613 548-7827, fax 613 548-1375

Sept. 28-30, 1995: Women, Children and Youth HIV/AIDS Conference (in cooperation with British Columbia's Children's Hospital, British Columbia's Women's Hospital and

Health Centre and Sunny Hill Health Centre for Children)

Vancouver

1995 Women, Children and Youth HIV/AIDS Conference, Continuing Education in the Health Sciences, Rm. 105, 2194 Health Sciences Mall, University of British Columbia, Vancouver BC V6T 1Z3; tel (in BC) 800 663-0348, (Vancouver and outside BC) 604 822-2626 or 822-4965; fax 604 822-4835

Sept. 29, 1995: Applied Ergonomics seminar

Toronto

Instructor: Suzanne Rodgers, PhD

Maureen Dwight, Professional Training Seminars, 803-131 Bloor St. W, Toronto ON M5S 1S3; tel 416 616-8774, fax 416 925-6823

Sept. 29, 1995: Qualitative Methods in Mental Health Research (cosponsored by the Qualitative Research Group, Clarke Institute of Psychiatry and the Ontario Mental Health Foundation)

Toronto

Speaker: Dr. Sue Estroff

Isabel Granic, Clarke Institute of Psychiatry, 250 College St., Toronto ON M5T 1R8; tel 416 979-4747, ext. 2643

Oct. 5-6, 1995: College of Family Physicians of Canada, Quebec Chapter, 13th Annual Scientific Assembly — the Family Physician: a Central Role

Montreal

Mrs. Micheline Guilbault, 101-310 Victoria Ave., Westmount QC H3Z 2M9; tel 514 481-5962, fax 514 481-6948

Les 5 et 6 oct. 1995 : 13^e Assemblée scientifique annuelle du Collège des médecins de famille du Canada, Section Québec — Le médecin de famille : au coeur de l'action

Montréal

M^{me} Micheline Guilbault, 101-310, ave. Victoria, Westmount QC H3Z 2M9; tél 514 481-5962, fax 514 481-6948

Oct. 5-6, 1995: Health Information Journey: the Next Millennium

Victoria

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