Can J Anesth/J Can Anesth (2018) 65:627–635
https://doi.org/10.1007/s12630-018-1087-1

REPORTS OF ORIGINAL INVESTIGATIONS

The impact of reducing intensive care unit length of stay on hospital costs: evidence from a tertiary care hospital in Canada

Impact de la baisse de la durée de séjour en unité de soins intensifs sur les coûts hospitaliers: données probantes d'un hôpital canadien de soins tertiaires

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Received: 27 June 2017 / Revised: 9 November 2017 / Accepted: 30 December 2017 / Published online: 23 February 2018

Abstract

Purpose *To use theoretical modelling exercises to determine the effect of reduced intensive care unit (ICU) length of stay (LOS) on total hospital costs at a Canadian centre.*

Methods *We conducted a retrospective cost analysis from the perspective of one tertiary teaching hospital in Canada. Cost, demographic, clinical, and LOS data were retrieved through case-costing, patient registry, and hospital abstract systems of The Ottawa Hospital Data Warehouse for all new in-patient ward (30,483) and ICU (2,239) encounters between April 2012 and March 2013. Aggregate mean daily variable direct (VD) costs for ICU vs ward encounters were summarized by admission day number, LOS, and cost centre.*

Results *The mean daily VD cost per ICU patient was $2,472 (CAD), accounting for 67.0% of total daily ICU costs per patient and $717 for patients admitted to the ward. Variable direct cost is greatest on the first day of ICU admission ($3,708), and then decreases by 39.8% to plateau by the fifth day of admission. Reducing LOS among patients with ICU stays ≥ four days could potentially result in an annual hospital cost saving of $852,146 which represents 0.3% of total in-patient hospital costs and 1.2% of ICU costs.*

Conclusion *Reducing ICU LOS has limited cost-saving potential given that ICU costs are greatest early in the course of admission, and this study does not support the notion of reducing ICU LOS as a sole cost-saving strategy.*

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Résumé

Objectif *Utiliser un modèle théorique pour estimer les effets d'une baisse de la durée de séjour (DS) en unité de soins intensifs (USI) sur l'ensemble des coûts hospitaliers d'un centre canadien.*

Méthodes *Nous avons mené une analyse rétrospective des coûts d'un hôpital universitaire au Canada. Les données économiques, démographiques, cliniques et de DS ont été collectées à partir des systèmes de coût par cas, du registre des patients et de la base de données des congés des patients provenant des bases de données de l'hôpital d'Ottawa pour tous les nouveaux patients hospitalisés (30,483) et pour les admissions en USI (2,239) entre avril 2012 et mars 2013. La moyenne quotidienne des coûts variables directs (VD) totaux à l'USI, comparée aux coûts en département, ont été calculées par la journée depuis l'admission, DS et par unité de soins ?.*

Résultats *Le coût moyen quotidien DV par patient en USI était de 2,472$ (CAD), représentant 67,0 % des coûts totaux quotidiens par patient en USI, contre 717$ pour les patients admis aux étages. Le coût direct variable est plus important le premier jour de l'hospitalisation en USI (3,708$), puis diminue de 39,8 % pour se stabiliser au cinquième jour du séjour. La baisse des DS de patients en USI $\geq$ 4 jours pourrait entraîner des économies annuelles de 852,146$ pour l'hôpital, ce qui représente 0,3 % du total des dépenses pour les patients hospitalisés et 1,2 % des coûts de l'USI.*

Conclusion *La réduction de la DS en USI ne permet qu'une économie limitée considérant que les dépenses en USI sont les plus élevées en début de séjour. Cette étude ne soutient pas l'idée que cette réduction puisse constituer une stratégie unique d'économie des dépenses.*

In Canada, hospital expenditures represent the largest component (37.7% in 2016) of total health spending.[1,2] In 2004-2005, total hospital spending was $39 billion,[3] with acute care inpatient costs being $17 billion.[2] This report found that over one quarter (27.3%) of total inpatient acute care costs were associated with the care of patients who had multiple comorbidities.[2] Acute care spending is anticipated to continue to increase because of an aging population and advances in medical care.

Intensive care unit (ICU) costs comprise a large proportion of acute care hospital spending. In Ontario, between 1999/00 and 2003/04, ICU stays accounted for 15.9% of inpatient direct healthcare costs but represented only 8.1% of inpatient days.[3] During this period, ICU costs rose from $475 million to $662 million, and the average length of stay (LOS) increased slightly from 4.4 to 4.7 days.[3] In 2013-2014, 11% of hospital admissions in Canada included time spent in an ICU, representing a 12% increase in ICU admissions from 2007/08, while non-ICU hospitalizations increased by only 7%.[4]

In a recent study of high-cost inpatients within a Canadian acute-care hospital, over half of the patients defined as 'high cost' accumulated costs from a single event, with median total days spent in hospital being markedly higher for high-cost patients compared with non-high-cost patients.[5] Given that acute care and ICU spending represent a relatively large proportion of total hospital costs, one might anticipate that reducing LOS would reduce hospital cost. Nevertheless, Taheri *et al.* reported that reducing LOS by one day for all patients admited for at least four days reduced total cost of care by only 2.4% in 1999.[6] In another more recent US-based study, reducing ICU LOS by one day in patients with a LOS of four or more days resulted in cost savings of 0.2% of all hospital expenditures.[7] These studies and other critiques suggest that high fixed costs limit the extent to which reductions in LOS can yield significant cost savings.[6-8]

Currently no studies in Canada have explored the extent that a decrease in ICU LOS can lead to hospital cost savings. The objective of the current study was to use theoretical modelling to determine the effect of reduced ICU LOS on total hospital costs, with the aim of informing cost-saving strategies that currently strive to reduce hospital LOS.

Methods

Selection and description of participants

We conducted a retrospective cost analysis from the perspective of The Ottawa Hospital (TOH), a tertiary care teaching hospital consisting of 1,122 beds and approximately 50,800 annual admissions at two acute-care campuses. The Ottawa Hospital General Campus ICU is a 28-bed ICU with specialized care in respiratory, thoracic, and cancer care while TOH Civic Campus ICU is a 28-bed unit with specialization in neurologic, vascular, and trauma care.

We included all patients (all ages included) who were admitted to TOH with an ICU or ward stay between 1 April 2012 and 31 March 2013. In-patient encounters during this timeframe with an admission date outside of this period were excluded. Repeat patient admissions during the study period were included as separate encounters.

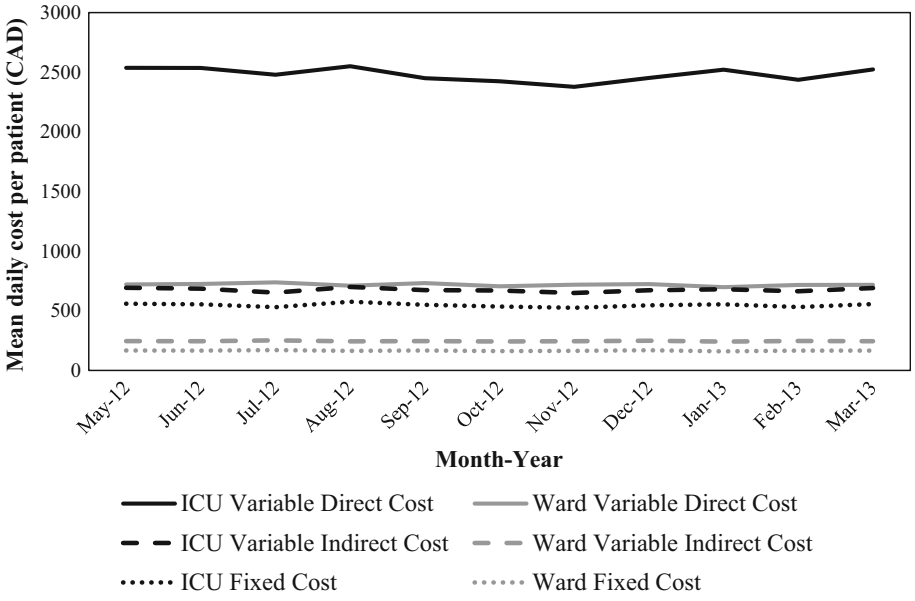

Fig. 1 Mean daily variable direct, variable indirect, and fixed costs per patient by month for ward and intensive care unit (ICU) encounters

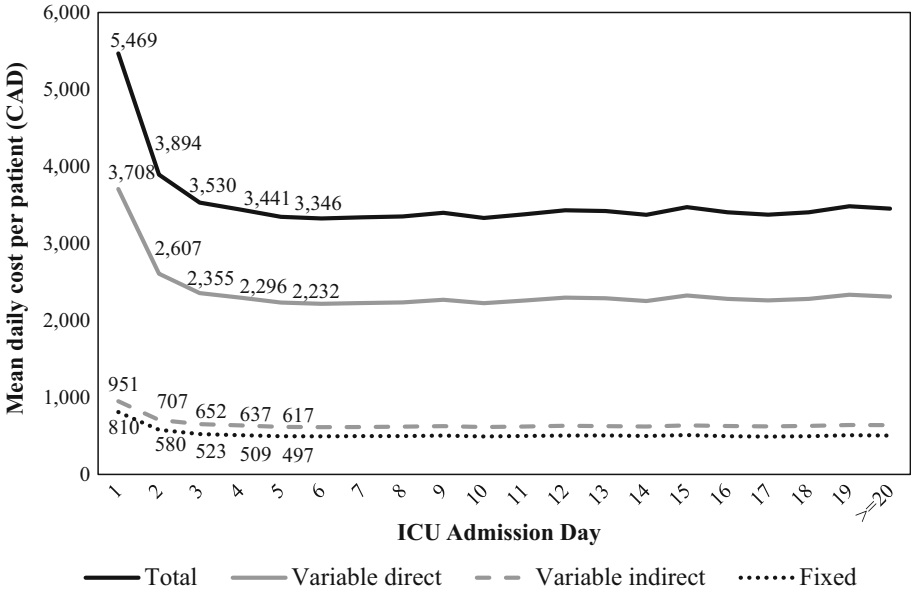

Fig. 2 Mean daily costs per patient by cost category and intensive care unit (ICU) admission day number. Fixed costs include direct and indirect costs. Mean daily cost per patient is reported for the first five admission days. CAD = Canadian dollars

Data description

Data were extracted from the Ottawa Hospital Data Warehouse, a relational database that has been widely used in previous research and contains information that links several hospital information systems, including patient registration, clinical data, case costing, and patient abstract systems.

We obtained the number of ICU and ward patient encounters and the total number of patient days and hospital costs from the Data Warehouse. We identified direct and indirect costs for each inpatient encounter within the case-costing system of the Data Warehouse. A detailed description of the cost centres included in each of the four cost categories (variable direct/indirect, fixed direct/indirect) is shown in the Appendix. Variable direct (VD) costs were the focus of our cost analysis as they are associated with specific service costs that can be immediately impacted by reducing LOS. Physician costs were excluded from the analysis as the hospital's perspective was the focus of our study.

Data analysis

Variable direct cost data for ICU and ward encounters were described by sex (female, male), age (< 45, 45-65, > 65-85,

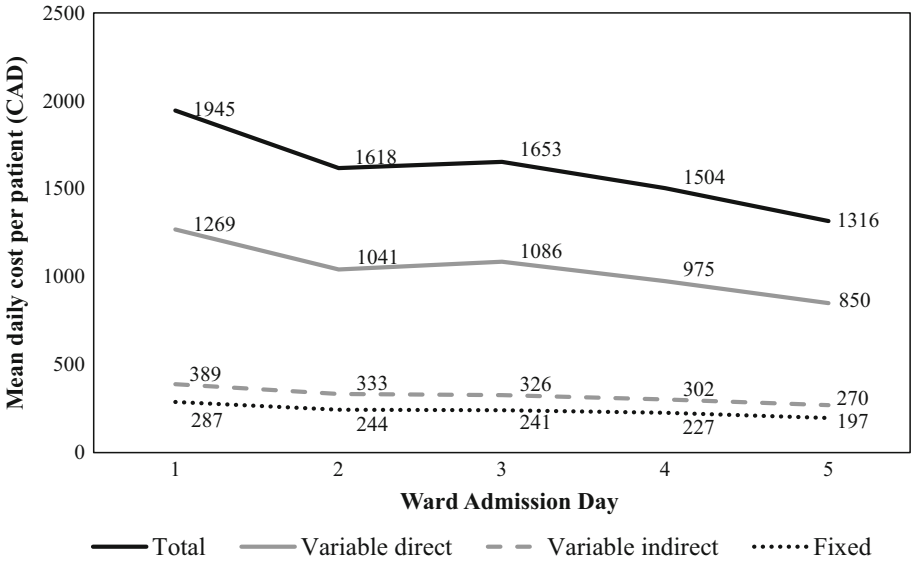

Fig. 3 Mean daily costs per patient by cost category and ward admission day number among patients discharged from the intensive care unit (ICU). Fixed costs include direct and indirect costs. CAD = Canadian dollars

> 85 yr), most responsible diagnosis (circulatory: I00-I99, respiratory: J00-J99, infectious and parasitic: A00-B99, neoplasms: C00-D48, and all other diagnoses), and cost centre (including nursing, post-anesthesia care unit, operating room, laboratory, medical imaging, respiratory therapy, pharmacy, allied health professionals, and food services costs). A descriptive analysis was performed given the aggregate nature of the demographic data obtained and lack of information on variance. Mean daily costs were reported by ICU encounter day numbers one to ≥ 20 (admissions lasting 20 days or more were combined) as well as ward encounter day numbers (one, two, three, four, ≥ five) among patients discharged from the ICU to the ward.

Mean daily VD cost savings associated with reducing LOS by one day were estimated for the subset of patients who were discharged from the ICU to a medical or surgical ward under three hypothetical scenarios: ICU encounters with LOS ≥ three, four, or five days. Cost saving estimates excluded patients who died in the ICU, were discharged directly home, or were transferred to another facility. Reducing LOS for shorter admissions was not estimated as it is unlikely that these patient encounters could be reduced. For ICU encounters with LOS ≥ five days, mean per-patient cost savings associated with reducing ICU LOS by one day were estimated by determining the difference in mean daily VD cost per patient encounter on the final ICU admission day *vs* the mean daily VD cost of the first post-ICU ward admission day. The product of the mean VD cost savings per patient encounter with the number of ICU encounters was then determined and summed for each admission day ≥ five days to determine total VD cost savings. Similar methodology was employed when calculating cost savings for the other two scenarios, but with the inclusion of mean daily VD per patient costs for LOS ≥ three and ≥ four days. An additional analysis was undertaken to estimate the cost savings associated with reducing LOS for ICU encounters ≥ four days with the inclusion of fixed direct costs in the assessment.

Variable direct costs associated with ICU readmissions during the study period were also analyzed. Conservative cost estimates were undertaken, assuming that repeat ICU encounters were admitted for an average of three days and would have otherwise been admitted to a ward setting had they not been admitted to the ICU. Summary aggregate data on the number of patients with one, two, and ≥ three ICU visits during the study period were ascertained. Costs were expressed in 2017 Canadian dollars (CAD).

Ethics approval

A research data request was submitted to the Data Warehouse and it was determined that ethics review board approval was not required. No patient- or physician-level data were released. The aggregate data did not include small cell sizes and were given a risk assignment of zero, indicating that there are no associated transfer/storage protocols or specific criteria for distribution external to TOH.

Results

There were 30,483 total ward encounters and 2,239 ICU encounters between 1 April 2012 and 31 March 2013 at The Ottawa Hospital. The population characteristics are presented in Table 1. Compared with patients who spent time in the ICU, patients admitted to the ward were on

Table 1 Study population characteristics

	Intensive care unit encounters (n = 2,239)		Ward encounters (n =30,483)	
	Proportion (%) of patients	Mean daily variable direct cost per patient	Proportion (%) of patients	Mean daily variable direct cost per patient
Gender				
Female	43.7	$2,454	62.7	$695
Male	56.3	$2,487	37.3	$746
Age category				
< 45 yr	15.8	$2,514	37.3	$683
45-65 yr	38.0	$2,476	25.8	$788
> 65-85 yr	40.0	$2,472	28.5	$715
> 85 yr	6.2	$2,294	8.4	$624
Primary diagnosis*				
Circulatory	20.0	$2,611	7.3	$663
Respiratory	13.7	$2,511	7.3	$703
Infections and parasites	12.7	$2,657	2.8	$827
Neoplasms	8.4	$2,354	12.4	$655
Other	45.3	$2,416	70.8	$706

Costs are reported in Canadian dollars

*Diseases were classified by International Classification of Disease (ICD)-10 codes: circulatory (I00-I99), respiratory (J00-J99), infectious and parasitic (A00-B99), neoplasms (C00-D48), and other (all other ICD codes excluding those previously outlined)

Table 2 Mean daily costs (CAD) per patient by cost category for intensive care unit and ward encounters

	ICU encounters (n = 2,239)	Ward encounters (n = 30,483)	Ward encounters post-ICU admission (n = 1,110)*
Cost category			
Variable direct	$2,472	$717	$906
Variable indirect	$674	$245	$285
Fixed direct	$293	$88	$113
Fixed indirect	$252	$77	$96
Total cost	$3,690	$1,128	$1,400

*Represents patients who were discharged from the ICU to medicine or surgical wards

CAD = Canadian dollars; ICU = intensive care unit

average younger, with a greater proportion of those admitted being under the age of 45 years (37.3% *vs* 15.8%). Ward encounters also had a greater proportion of female admissions than ICU encounters (62.7% *vs* 43.7%). Among ICU admissions, diseases of the circulatory system were the most common primary diagnosis (20.0%), followed by diseases of the respiratory system (13.7%) and infections (12.7%).

The mean daily costs per patient for ICU and ward encounters are shown by month in Figure 1 and by cost category in Table 2. The costs per patient were stable over the study period for all cost categories. The mean daily VD cost ($2,472 CAD) represented 67.0% of the total daily average cost for ICU admissions, 63.6% for total ward admissions, and 64.7% for ward admissions post-ICU discharge. Total mean daily ward costs were 24.1% greater among those who were discharged to the ward from the ICU.

Figure 2 contains the daily mean patient costs by ICU admission day number. Among ICU patient encounters, 63.0% of encounters were ≥ five days, 29.9% were ≥ ten days, and 11.0% of encounters were ≥ 20 days. Variable direct costs decreased substantially with increasing number of admission days; the costs were highest on the first ICU admission day ($3,708); however, the costs decreased by 29.7% on the second admission day to $2,607 and by 36.5% on the third admission day to $2,355. By the fifth ICU admission day, mean daily VD costs were 39.8%

Table 3 Mean daily intensive care unit and ward variable direct costs per patient by cost centre

	Mean daily variable direct costs (proportion, %)					
	ICU		Ward		Ward encounters post-ICU admission	
Special care unit (ICU)*	$1,738	(65.7)	$14	(2.0)	$238	(22.8)
Respiratory therapy	$233	(8.8)	$9	(1.2)	$55	(5.3)
Operating room	$182	(6.9)	$80	(11.2)	$67	(6.4)
Laboratory	$150	(5.7)	$36	(5.0)	$66	(6.3)
Pharmacy	$109	(4.1)	$63	(8.9)	$97	(9.3)
Medical imaging	$101	(3.8)	$17	(2.4)	$32	(3.1)
Food services	$52	(2.0)	$26	(3.7)	$29	(2.7)
Nursing other†	$31	(1.2)	$66	(9.3)	$31	(2.9)
Health professional ‡	$29	(1.1)	$50	(6.9)	$58	(5.5)
Inpatient nursing§	$18	(0.7)	$340	(47.4)	$360	(34.4)
Postanesthetic care unit‖	$6	(0.2)	$15	(2.1)	$12	(1.1)

Costs are reported in Canadian dollars

*Includes predominately intensive care unit (ICU) nursing as well as equipment/supplies

†includes emergency department, obstetrical, endoscopy, hemodialysis, and medical day care units

‡includes nutrition, physiotherapy, speech/language therapy, audiology, social work, psychology, pastoral care, and recreation therapy

§includes medical, surgical, mental health, and rehabilitation unit nursing labour as well as clinical resources

‖represents patients who were discharged from the ICU to medicine or surgical wards

lower than on the first ICU admission day and remained stable across subsequent admission days. Figure 3 shows the daily mean ward patient costs among patients discharged from the ICU; similarly to ICU admissions, mean daily ward costs decline after the first admission day, such that costs on the fifth day of admission were 33.0% lower than on the first day.

Of all ICU admissions during the study period, 49.6% (n = 1,110) were discharged to a medical or surgical ward. Among patients with an ICU stay of $\geq$ five days who were discharged to a ward (n = 713), reducing LOS by one day yields a cost savings of $746,934 which represents 0.2% of total in-patient hospital costs (including ICU and ward admission costs) and 1.0% of total ICU costs. Among patients with an ICU stay of $\geq$ four days (n = 807) and $\geq$ three days (n = 899), reducing LOS by one day results in cost savings of $852,146 (0.3% of total in-patient hospital costs; 1.2% of ICU costs) and $962,013 (0.4% of total in-patient hospital costs; 1.3% of ICU costs), respectively. The cost savings per patient encounter of reducing LOS by one day is $1,015, $1,007, and $1,003 for ICU stays of $\geq$ five, $\geq$ four, and $\geq$ three days respectively. Including fixed direct costs into the analysis of cost savings associated with reducing LOS by one day among patient admitted for $\geq$ four days increased cost savings by $205,323 to $1.06 million (0.3% of total in-patient hospital costs; 1.5% of ICU costs).

Table 3 outlines mean daily VD costs by cost centre. In the ICU setting, the majority of VD costs (65.7%) are related to ICU nursing labour costs, followed by respiratory therapy, operating room, laboratory, medical imaging, and pharmacy costs. Similarly, the nursing labour costs represent the predominant cost (47.4%) in the ward setting; however, unlike the ICU, respiratory therapy was not a main source of cost, and investigative services (laboratory, medical imaging) represented a smaller proportion of VD costs. Among patients discharged to the ward from the ICU, nursing costs represented 57.2% of VD costs and were split between special care unit and ward nursing cost centres, owing to ICU nursing costs on the day of transfer. Unlike general ward encounters, post-ICU ward encounters had a higher proportion of respiratory therapy costs.

There were 119 ICU readmissions at TOH during the study period, representing a total VD cost of $578,683 (0.2% of total hospital costs; 0.8% of ICU costs). Our data show that the majority (95.1%) of patients admitted to the ICU were only admitted there once during the study period, while 4.3% were admitted twice and $<$ 1% had three or more admissions during the year.

Discussion

This study illustrated that reductions in ICU LOS are a proportionally small source of total in-patient hospital and ICU costs savings. The proportion of total in-patient hospital cost savings associated with reducing LOS by one

day for admissions lasting more than three days in this study were comparable to those reported in the 2008 US-based study by Kahn *et al.* (0.2% *vs* 0.3% in this study). These similarities are despite differences in cost centre structuring. In our study, VD costs were responsible for larger total ICU costs (67% *vs* 19%) and total hospital costs (64% *vs* 18%) than in the US-based study.[7] There is substantial diversity in the proportion of hospital costs represented by VD costs. One study conducted in a comparable US hospital setting reported a similar proportion of VD costs (16%)[9] as those reported by Kahn *et al.*,[7] while the study by Taheri *et al.*[6] reported that VD costs represented 42% of total costs. The differences between the studies in the proportion that VD costs represent are primarily due to the assignment of labour (predominantly nursing) to variable *vs* fixed cost centres, with the latter being associated with lower VD costs overall. Assigning nursing labour as a VD cost is appropriate when staffing can be quickly adjusted to match patient activity if nursing overtime is significant or nursing turnover considerable.[6] The high proportion of VD costs in this study can be attributable to the inclusion of nursing labour costs as part of this cost centre.

The focus on VD costs during this analysis assumes that reducing LOS would influence predominately short-term savings. However, if a strategy were aimed to reduce LOS in the long term, it is more appropriate to consider both fixed and VD costs. In this study, we observed a $1.06 million savings associated with reducing LOS by one day for those with admissions of greater than three days when fixed direct cost was taken into account, representing a negligible (< 0.1%) additional increase in total hospital cost savings compared with estimates that excluded potential fixed direct cost savings.

As has been reported at other Canadian centres,[4] we found that average daily ICU costs are also approximately three times greater compared with general wards costs. Moreover, post-ICU ward admission costs are approxiately 20% greater than mean ward admission costs for all admission types, with the first ward admission day post-ICU discharge being 42% greater than mean ward admission costs. A greater proportion of males was admitted to the ICU during the study, while a greater proportion of females was admitted to the ward setting, presumably for obstetrical-related admissions. This is in keeping with Canadian data, which show that males represent a greater proportion of specialized care unit patient days.[3] This gender disparity may be attributable to increased rates of cardiovascular disease among males, as it has been shown that total acute care costs were greater for males secondary to a greater burden of diseases of the circulatory system, representing the largest proportion of acute care costs (19%).[2]

The number of ICU admissions as well as ICU costs per day have been increasing over time.[4] One of the most recent Canadian studies assessing daily ICU costs estimated an average daily ICU cost of approximately $2,300 (2016 CAD) per patient.[10] After accounting for inflation, the daily ICU costs reported in this study show a significant increase over time, with the average total daily ICU cost per patient in 1992[10] being approximately 40% less than estimates reported in this study.

Although the Canadian Institute for Health Information's (CIHI) national Standards for Management Information Systems provides a set of national standards for gathering and processing operational data of health services organizations, variability in cost accounting across hospitals likely still exists in Canada; thus, this study is limited in that the results represent a single centre. It is reassuring, however, that the mean daily ICU costs reported in this study are comparable to national values reported by CIHI in 2013/14. The mean daily ICU cost per patient for all provinces across all hospital types (teaching and various sizes of community hospitals) in 2013/14 was $3,592, while the mean daily ward cost was $1,135, which is comparable to our study's report of a mean daily ICU cost of $3,690 and mean daily ward cost of $1,128.[11] Another consideration is that some of the costs that are labelled "VD" as per CIHI standards may in fact be fixed at certain times, pending other variables. For example, when a patient is discharged at the beginning of a nursing shift, nursing costs may be more variable if a nurse can be sent home. However, if the discharge were to occur later in the nursing shift, the discharge would not yield the same cost savings as the majority of the nursing shift costs would have been paid.

The findings reported need to be interpreted with caution, particularly regarding the risk of overestimating cost savings associated with reducing LOS. This study was a theoretical modelling exercise, and the real-world effect of reducing ICU LOS could not be addressed. For instance, there is the possibility that increasing the overall rate of ICU discharges would result in increased admissions, as ongoing new ICU demands could be met with increased capacity. Furthermore, reducing ICU LOS may also be associated with increased total hospital LOS. Finally, the feasibility of being able to discharge all ICU patients who are destined to be transferred to the ward one day earlier is unlikely as many patients would be unfit to leave the ICU and readmission rates may increase in the case of inappropriate early discharge. Nevertheless, it has been reported that ICU strain (census, new admissions, increased acuity) has a small effect on the odds of ICU readmission (1% per 6.3 hr reduction in LOS), while having no impact on short-term patient outcomes.[12] If this increase in odds is applied to the readmission rate reported in the current study

(5.5%; 119 repeat encounters), we would only expect an additional 5 (0.2%) readmissions in a one-year period.

Due to differences between the Canadian and US healthcare systems, the cost savings observed in our study may not be directly comparable to prior studies. In particular, there is greater availability of ICU care in the US: in 1986, ICU utilization in the US was 2.5 times that of Canada and represented a greater proportion of total inpatient costs in the US *vs* Canada (20% *vs* 8.3%).[13] Although more recent data are not available, this gap is likely narrowing as Canada's bed per 100,000 population is increasing and was reported to be 12.9 adult ICU beds per 100,000 (*vs* approximately 20 per 100,000 in the US).[4]

End-of-life care is important to consider when discussing ICU cost reduction strategies. Although substantial uncertainty exists regarding the extent to which reducing ICU LOS is efficacious and yields cost savings, it has been suggested that efforts aimed at redirecting end-of-life care to non-ICU settings, when appropriate, may be an area to explore in terms of cost reduction.[14] Nevertheless, while Canadians are more likely than those from other countries to have advance care plans,[15] some research has shown that efforts aimed at promoting advanced care directives are not necessarily associated with reduced hospital resource utilization or ICU interventions.[16,17] Moreover, sustaining cost savings with the promotion of prompt palliation and non-ICU care at the end of life is a challenge due to difficulties in predicting outcomes for acutely terminally ill patients.[14] Despite this, factors that increase communication among healthcare personnel, patients, and patient families, such as involving palliative care teams, have more recently been reported to be associated with reduced ICU LOS and hospital costs and should be pursued for the benefit of improved patient quality of care.[18,19] Finally, beyond reducing ICU LOS, efforts to improve resource consumption in the early stages of ICU admission, when costs are greatest, should be explored, as should efforts to avoid preventable ICU admissions, such as rapid response teams and ICU step-down units.

Conclusions

It is anticipated that the aging population, along with growing illness severity amongst hospitalized patients, will result in ongoing increases in ICU admission rates, with substantial impact on healthcare costs in Canada. The estimated absolute cost savings associated with reducing ICU LOS that were reported in this study confirm that reducing ICU LOS has limited potential to save total hospital costs in settings where VD costs are the main cost driver. Given that ICU costs are greatest early in the course of admission, this study does not support the notion of reducing ICU LOS as a sole cost-saving strategy.

Conflicts of interest The authors declare that there is no conflict of interest regarding the publication of this article.

Editorial responsibility This submission was handled by Dr. Sangeeta Mehta, Associate Editor, *Canadian Journal of Anesthesia.*

Author contributions *Jessica Evans* and *Kwadwo Kyeremanteng* contributed to study conception and design, acquisition of data, and drafting of the article. *Daniel Kobewka*, *Kednapa Thavorn*, *Gianni D'Egidio*, and *Erin Rosenberg* contributed to critical revision of the article. *Jessica Evans*, *Daniel Kobewka*, *Kednapa Thavorn*, *Gianni D'Egidio*, *Erin Rosenberg*, and *Kwadwo Kyeremanteng* contributed to analysis and interpretation of data and final approval of the version to be published.

Funding No sources of financial or other support.

Appendix: Description of cost centres as defined by The Ottawa Hospital Data Warehouse

Variable direct costs

1. Labour: non-contracted employees including account payable clerk, nurse, purchases services nurse, laboratory technician, pharmacist, registration clerk, support worker, case manager, social worker, therapist, and counselor
2. General supplies: non-patient specific medical/surgical supplies, food, and utilities
3. Patient-specific supplies: non-ward stock drugs, prostheses, and angiography coils
4. Other: contracted laundry and laboratory services

Fixed direct costs

1. Labour: management/operational support such as directors/managers, clerical staff in direct patient care areas, and salaried or contracted physicians who administer programs
2. Other (sundry): insurance, consulting/course registration fees, travel expenses, postage
3. Building/equipment/grounds: equipment maintenance contracts, amortization of major equipment/software, replacement of major equipment parts, renovations, waste disposal contracts

Variable indirect costs

1. Variable operative expenses from overhead functional centres: clerical staff in HR, finance, health records, registration, housekeeping, and plant operations

Fixed indirect costs

1. Fixed operating expenses from overhead functional centres: management/operational support staff in overhead centres

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