

# Improved outcomes for elderly patients who received care on a transitional care unit

Margaret Manville MD FCFP Michael C. Klein MD FCFP FAAP FCPS Lesley Bainbridge MEd PhD

## Abstract

**Objective** To determine whether providing elderly alternate level of care (ALC) patients with interdisciplinary care on a transitional care unit (TCU) achieves better clinical outcomes and lowers costs compared with providing them with standard hospital care.

**Design** Before-and-after structured retrospective chart audit.

**Setting** St Joseph's Hospital in Comox, BC.

**Participants** One hundred thirty-five consecutively admitted patients aged 70 years and older with ALC designation during 5-month periods before ( $n = 49$ ) and after ( $n = 86$ ) the opening of an on-site TCU.

### EDITOR'S KEY POINTS

- This study describes an innovative model using FPs trained in care of the elderly to guide the care of alternative level of care (ALC) patients on a specialized transitional care unit (TCU).

- This study shows that it is possible to provide better, less expensive care to elderly patients with the ALC designation (ie, those frail deconditioned seniors who are stable after their acute issues that brought them to hospital but who need more time to recover and would benefit from focused therapies and optimization of their medications).

- Factors that contributed to the improvements in ALC patients' health and function included receiving focused care that involved the entire interdisciplinary team and having access to dedicated rehabilitation services. A key factor in the success of the TCU was having medical directors with care of the elderly training, as specialized knowledge about elder care was shared with various staff members.

**Main outcome measures** Length of stay, discharge disposition, complications of the acute and ALC portions of the patients' hospital stays, activities of daily living (mobility, transfers, and urinary continence), psychotropic medications and vitamin D prescriptions, and ALC patient care costs, as well as annual hospital savings, were examined.

**Results** Among the 86 ALC patients receiving care during the postintervention period, 57 (66%) were admitted to the TCU; 29 of the 86 (34%) patients in the postintervention group received standard care (SC). All 86 ALC patients in the postintervention group were compared with the 49 preintervention ALC patients who received SC. Length of stay reduction occurred among the postintervention group during the acute portion of the hospital stay (14.0 days postintervention group vs 22.5 days preintervention group;  $P < .01$ ). Discharge home or to an assisted-living facility increased among the postintervention group (30% postintervention group vs 12% preintervention group;  $P < .01$ ). Patients' ability to transfer improved among the postintervention group (55% postintervention group vs 14% preintervention group;  $P < .01$ ). At discharge, 48% of ALC patients in the postintervention group were able to transfer independently compared with 17% of ALC patients in the preintervention group. Hospital-acquired infections among the postintervention group decreased during the acute phase (14% postintervention group vs 33% preintervention group;  $P < .01$ ) and in the ALC phase of hospital stay (16% postintervention group vs 31% preintervention group;  $P = .011$ ). Antipsychotic prescriptions decreased among the postintervention group (45% postintervention group vs 66% preintervention group;  $P = .026$ ). Despite greater use of rehabilitation services, TCU costs per patient were lower (\$155/d postintervention period vs \$273/d preintervention period).

**Conclusion** Elderly ALC patients experienced improvements in health and function at reduced cost after the creation of an interdisciplinary TCU, to which most of the nonpalliative ALC patients were transferred. Although all the postintervention ALC patients (those admitted to the TCU and those who received SC) were analyzed together, it is very likely that the greatest gains were made in the ALC patients who received care in the TCU.

This article has been peer reviewed.  
*Can Fam Physician* 2014;60:e263-71

# Meilleures issues pour les patients âgés qui sont traités dans une unité de soins de transition

Margaret Manville MD FCFP Michael C. Klein MD FCFP FAAP FCPS Lesley Bainbridge MEd PhD

## Résumé

**Objectif** Déterminer si les patients âgés exigeant un niveau différent de soins (NDS) à qui l'on donne l'occasion de recevoir des soins interdisciplinaires dans une unité de soins de transition (UST) ont de meilleures issues et coûtent moins cher que ceux qui reçoivent des soins hospitaliers standards.

**Type d'étude** Révision rétrospective structurée de dossiers avant-et-après.

**Contexte** L'hôpital St Joseph à Comox, en Colombie-Britannique.

**Participants** Un total de 135 patients de 70 ans et plus exigeant un NDS admis consécutivement au cours des 5 mois précédant l'ouverture d'une UST locale (n=49), et après cette ouverture (n=86).

**Principaux paramètres à l'étude** Durée du séjour, dispositions de départ, complications durant les portions aiguë et NDS du séjour hospitalier, activités de la vie courante (mobilité, transferts et continence urinaire), prescription de médicaments psychotropes et de vitamine D, et coût des soins des patients NDS et économies annuelles pour l'hôpital.

**Résultats** Sur les 86 patients exigeant un NDS qui ont été traités dans la période post-intervention, 57 (66 %) ont été admis à l'UST; 29 des 86 patients (34 %) ont reçu des soins standards (SS). Les 86 patients du groupe post-intervention exigeant un NDS ont été comparés à ceux qui ont reçu des SS. Une diminution de la durée du séjour a été observée dans le groupe post-intervention pendant la portion aiguë de l'hospitalisation (14,0 jours pour le groupe post-intervention c. 22,5 jours pour le groupe pré-intervention;  $P < ,01$ ). Au congé, les patients du groupe post-intervention revenaient plus souvent à la maison ou étaient dirigés vers un hébergement protégé (30 % pour le groupe post-intervention c. 12 % pour le groupe pré-intervention;  $P < ,01$ ). La capacité d'effectuer les transferts s'était améliorée dans le groupe post-intervention (55 % pour le groupe post-intervention c. 14 % pour le groupe post-intervention;  $P < ,01$ ). Au moment du congé, 48 % des patients exigeant un NDS pouvaient effectuer leur transfert sans aide contre 17 % de ces patients du groupe pré-intervention. Il y avait moins d'infections nosocomiales dans le groupe post-intervention au cours de la phase aiguë (14 % pour le groupe post-intervention c. 33 % pour le groupe pré-intervention;  $P < ,01$ ) de même que durant la phase de l'hospitalisation exigeant un NDS (16 % pour le groupe post-intervention c. 31 % pour le groupe pré-intervention ;  $P < ,011$ ). Il y avait moins d'antipsychotiques prescrits dans le groupe post-intervention (45 % pour le groupe post-intervention c. 66 % pour le groupe pré-intervention;  $P = ,026$ ). En dépit d'un plus grand recours aux services de réadaptation, les coûts par patient à l'UST étaient inférieurs (155 \$/d dans la période post-intervention c. 273 \$/d dans la période post-intervention).

**Conclusion** Des patients âgés exigeant un NDS ont connu une amélioration de leur santé et de leur état fonctionnel, et ce, à un coût moindre, à la suite de la création d'une UST interdisciplinaire à laquelle ont été transférés la plupart des patients exigeant un NDS non palliatifs. Même si tous les patients exigeant un NDS du groupe post-intervention (ceux admis à l'UST et ceux qui ont reçu des SS) ont été analysés conjointement, il est plus que probable que ceux qui ont obtenu les meilleurs gains sont ceux qui ont été traités à l'UST.

### POINTS DE REPÈRE DU RÉDACTEUR

- Cette étude présente un modèle innovateur dans lequel des MF formés pour traiter des personnes âgées sont responsables du traitement de patients exigeant un niveau différent de soins (NDS) dans une unité de soins de transition (UST) spécialisée.
- Les résultats montrent qu'il est possible de fournir de meilleurs soins à un coût moindre à des patients âgés exigeant un NDS (c.-à-d. les personnes âgées frêles et déconditionnées dont l'état est stable une fois réglés les problèmes aigus qui les ont amenées à l'hôpital, mais qui ont besoin de plus de temps pour récupérer et qui pourraient bénéficier traitements mieux adaptés et d'une optimisation de leur médication).
- Parmi les facteurs qui ont contribué à l'amélioration de la santé et de l'état fonctionnel des patients exigeant un NDS, mentionnons le fait de recevoir des soins mieux adaptés de la part de l'ensemble de l'équipe interdisciplinaire et d'avoir accès à des services de réadaptation pertinents. Un facteur clé du succès de l'UST était que les médecins responsables formés pour traiter des personnes âgées partageaient leurs connaissances spécialisées sur les personnes âgées avec les différents membres du personnel.

Cet article a fait l'objet d'une révision par des pairs.  
*Can Fam Physician* 2014;60:e263-71

Caring for frail elderly patients is a challenge in any setting. When elderly patients are hospitalized for acute illness, if recovery is delayed or if more supports are needed before discharge, these patients are categorized as requiring an alternate level of care (ALC).<sup>1</sup> An ALC designation can be a marker of systemic inefficiency, demonstrating that the most appropriate patient care in the most appropriate place is not occurring.<sup>2,3</sup> Alternate level of care patients are frequently cared for on acute care wards, where their needs for activation, rehabilitation, and maintenance of activities of daily living (ADLs) take “second place” to patients who are more acutely ill.<sup>4</sup> The terms *intermediate care*, *transitional care*, *postacute care*, *subacute care*, and *convalescent care* describe programs that are aimed at preventing prolonged hospital admission and avoiding premature residential care admission.<sup>5</sup> A UK discussion paper summarizing results from trials of intermediate care programs concluded that the evidence to support this “step-down” type of service is weak, and that there are no reliable data showing that acute hospital use is reduced,<sup>6-12</sup> illustrating a need for more study of this approach.

Despite controversies about the effectiveness of step-down units, patient and staff satisfaction with postacute models of care is high. The literature shows that intermediate care or step-down models are responsive, patient-centred, flexible, and holistic.<sup>5</sup> Also, a Canadian study<sup>13</sup> that observed 4 acute care facilities in British Columbia found that dedicated ALC units could result in fewer staff injuries, thus reducing hospital costs.

The required conditions for successful care of elderly ALC patients need to be well described and replicated in order for research findings to be implemented. However, each region's unique acute care bed capacity and staffing levels, as well as access to specialty geriatric services, home-care services, and residential care, make it difficult to incorporate research findings into a unified practice model.<sup>14</sup>

To better address the needs of elderly ALC patients at St Joseph's Hospital in Comox, BC, a 22-bed transitional care unit (TCU) was opened in September 2010. We hypothesized that health outcomes for ALC patients should improve when they receive coordinated interdisciplinary care on a dedicated unit.

## METHODS

### Study population

Charts were selected for audit for all ALC patients 70 years of age and older who received care at St Joseph's Hospital between September 2009 and February 2010 (preintervention period, which was before the opening of the on-site TCU) and September 2011 and February 2012 (postintervention period, which was after the

opening of the on-site TCU). The ALC patients in the preintervention group received care on the acute medical, surgical, and psychiatric wards. The ALC patients in the postintervention group were either transferred to the TCU or remained on acute care units.

### Intervention

The TCU is a 22-bed inpatient unit designed to provide an elderly friendly, geriatric rehabilitation-style environment. Most TCU rooms (90%) have 2 to 4 beds with shared bathrooms. There are common areas for dining, activities, and exercise. Simple security measures are in place to prevent patients from wandering. Patients who require daily physician visits or intensive registered nurse (RN) support (eg, intravenous administration, frequent vital sign measurements) are not eligible for transfer. Patients who become acutely ill and cannot be safely cared for on the TCU are reclassified as acute and transferred. Patients are not excluded based on age or severity of dementia. Palliative patients are not typically transferred to the unit, but those who become palliative receive appropriate end-of-life care.

Staffing in the TCU resembles that in a residential care setting, with enhanced nursing and rehabilitation services. A 1.0 full-time equivalent (FTE) RN care coordinator leads the unit and selects ALC patients for transfer. Licensed practical nurses and care aides provide basic nursing care focused on preserving ADLs and functional abilities. Rehabilitation services are provided daily by a 0.5 FTE physiotherapist, a 0.5 FTE occupational therapist, and a 0.5 FTE rehabilitation aide. Activity aides lead group programs for activation and socialization. Family physicians provide most of the medical care. A small percentage of patients are cared for by FP hospitalists. There is no minimum number of physician visits per week, and visits vary based on clinical need.

There are weekly interdisciplinary care conferences, where medical care and discharge planning are reviewed; the home-care and residential care liaisons, RN care coordinator, medical directors, FPs, pharmacist, nutritionist, and social worker generally attend these conferences. Two FPs (including principal investigator M.M.), each with care of the elderly (COE) training, share medical director duties. They work a 2-month alternating rotation for 3.5 hours per week billed to the hospital. During weekly care conferences and informally on the TCU ward, the medical directors provide advice and education to staff and physicians regarding best geriatric practices (eg, medication reduction strategies, dementia care, and symptom management).

### Before-and-after design

**Chart audit.** The principal investigator (M.M.) developed a chart audit tool that was based on data recording formats used in the hospital charts. A list of eligible

patients fulfilling the inclusion criteria was generated by the hospital medical records department. Paper-based and computer-based patient hospital charts were reviewed. Charts were audited by the principal investigator (M.M.) and a trained RN research assistant. To ensure internal consistency and reliability, the auditors conducted 5 practice chart audits. Furthermore, the auditors examined charts in the same room at the same time. This allowed for checking if there was uncertainty about information documented in the patient chart.

**Analysis.** Chart audit data were analyzed using the R statistical program. To compare the 2 ALC cohorts, a Charlson comorbidity index<sup>15</sup> was calculated based on recorded medical histories. Two-sample proportional *t* tests compared means between groups. To compare categorical data,  $\chi^2$  tests were used;  $P < .05$  was considered statistically significant. The ADLs that were consistently recorded in the patients' charts were mobility, transfers, and urinary continence. Improvement and decline in ADLs were considered to have taken place if the patient's status changed by 1 or more descriptive categories.

### Ethics approval

Ethics approval for the study was obtained from the University of British Columbia's Research and Ethics Board and the St Joseph's Hospital Ethics Committee.

## RESULTS

A total of 135 subjects were eligible for chart audit (**Figure 1**). Forty-nine patients in the preintervention group and 86 patients in the postintervention group were analyzed. Of the 86 ALC patients in the postintervention group, 57 (66%) were transferred to the TCU. All 86 patients in the postintervention group (57 of whom were admitted to the TCU and 29 of whom received standard care [SC]) were compared with the 49 ALC patients in the preintervention group (all of whom received SC). Activities of daily living and medication prescriptions on the last hospital day were examined in 101 patients who survived to discharge (35 in the preintervention group and 66 in the postintervention group).

Patients' demographic and clinical characteristics were compared; there were no statistically significant differences between the 2 ALC groups (**Table 1**). Fifty percent of the patients had a past history of dementia recorded by the admitting physician. The most common reasons for hospital admission and ALC designation were delirium or dementia, fall or injury, and mobility issues (**Table 2**). No validated instruments (eg, frailty scales) were consistently recorded to support the diagnoses of frailty or dementia.

Length of stay (LOS) and discharge disposition were compared between the 2 ALC groups (**Table 3**). Total LOS is divided into acute LOS and ALC LOS. Among the postintervention group, total LOS had a non-significant reduction of 9.3 days ( $P = .137$ ). However, most of the LOS reduction was in the acute phase of hospitalization ( $-8.5$  days;  $P < .01$ ). Patients in the postintervention group were more likely to be discharged home or to assisted-living facilities (30% postintervention group vs 12% preintervention group;  $P < .01$ ). A non-statistically significant reduction in the number of deaths was noted in the postintervention group (23% postintervention group vs 29% preintervention group;  $P = .158$ ).

Complications of the acute and ALC portion of patients' hospital stays were examined. Hospital-acquired infections (gastrointestinal, genitourinary, respiratory, other) in the acute phase were reduced significantly among the postintervention group (14% postintervention group vs 33% preintervention group;  $P < .01$ ). Similar reductions in infections were demonstrated for the ALC phase of hospital stay (16% postintervention group vs 31% preintervention group;  $P = .011$ ). Among the postintervention group, falls were reduced for patients in the acute phase (7% postintervention group vs 20% preintervention group;  $P = .033$ ) but not in the ALC phase (17% postintervention group vs 12% preintervention group;  $P = .255$ ). Change in status from ALC to acute owing to medical illness was also reduced in the postintervention group (7% postintervention group vs 16% preintervention group;  $P = .044$ ).

Activities of daily living were examined in ALC patients who survived to discharge (**Table 4**). Patients in the postintervention group demonstrated improved mobility (21% postintervention group vs 14% preintervention group;  $P = .198$ ) and less dependency (eg, bed, specialty chair) (11% postintervention group vs 20% preintervention group). The ability to transfer was significantly improved among ALC patients in the postintervention group (55% postintervention group vs 14% preintervention group;  $P < .01$ ); and 48% of patients in the postintervention group could transfer independently compared with 17% of patients from the preintervention group. Among the postintervention group, urinary continence was maintained (71% postintervention group vs 57% preintervention group;  $P = .191$ ) and Foley catheter use declined (6% postintervention group vs 17% preintervention group).

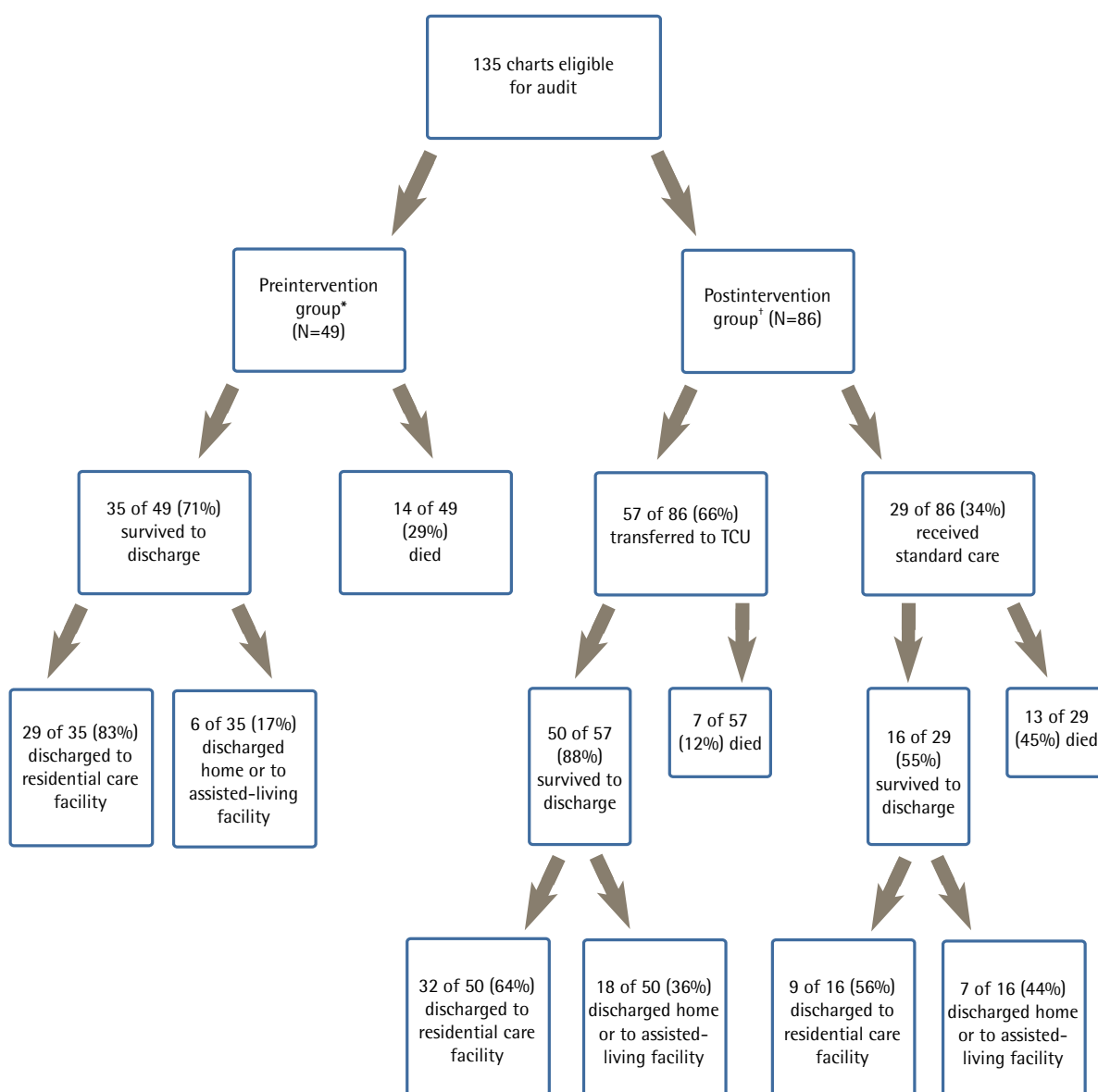
Psychotropic medications and vitamin D prescriptions in patients surviving to discharge were examined (**Table 5**). There were fewer prescriptions for antipsychotics (45% postintervention group vs 66% preintervention group;  $P = .026$ ) and sedatives (38% postintervention group vs 46% preintervention group;  $P = .223$ ) in the postintervention group than in the preintervention group; however, the decreased number

of prescriptions was achieved primarily in the patients admitted to the TCU. Postintervention patients cared for on acute units were prescribed more antipsychotics (43% of the postintervention patients who received SC vs 35% of the postintervention patients admitted to TCU) and more sedatives (50% postintervention patients who received SC vs 35% postintervention patients admitted to TCU) than patients admitted to the TCU

were. Vitamin D prescriptions increased among the postintervention group (58% postintervention group vs 14% preintervention group;  $P < .01$ ).

**Table 6** shows the ALC patient care costs and calculated savings for the TCU compared with SC, as supplied by the St Joseph's Hospital Department of Finance. Costs for acute care patients are listed for comparison. The ALC patient cost per day on an acute care unit was \$273.

**Figure 1. Elderly ALC patients eligible for chart audit:** All patients 70 years of age and older who were admitted to hospital and designated as ALC.



ALC—alternate level of care, TCU—transitional care unit.

\*Preintervention is the 5-month period (September 2009–February 2010) before the opening of the on-site TCU; preintervention ALC patients received care in acute care units.

†Postintervention is the 5-month period (September 2011–February 2012) after the opening of the on-site TCU; postintervention ALC patients were either transferred to the TCU or remained in acute care units.

On the TCU, the ALC patient cost per day was \$155. The annual hospital savings, including the added cost of TCU medical advisors, was \$953 645 (Table 7).

## DISCUSSION

This study describes how a community hospital changed its approach to caring for its growing elderly ALC patient population. As the number of ALC patients in the postintervention group exceeded the capacity of the unit, those most likely to benefit from the TCU were chosen for transfer. Twenty-nine ALC patients in the postintervention cohort remained on acute care units, many of whom were palliative (Figure 1). Thirteen (45%) of these patients died before discharge and had shorter average total LOS (39 days) than both the preintervention and the other postintervention (those admitted to the TCU) cohort did. Therefore, in order to more effectively compare outcomes between the preintervention and postintervention groups, all the ALC patients in the postintervention group (those admitted to the TCU and those who received SC) were

analyzed together. As a result, the effect of the TCU on ALC patient outcomes can only be strongly inferred but not conclusively proven in this study.

Comprehensive geriatric assessment and management on a geriatric specialty unit or by a specialty team has been shown to improve health outcomes and discharge disposition for patients older than 65 years of age.<sup>16</sup> However, in rural and small community hospitals, on-site specialized geriatric services are usually unavailable. During the preintervention period, there was little geriatric nursing expertise, disorganized care planning, and no dedicated rehabilitation resources for ALC patients despite their substantial population in hospital. Focused care planning, based on comprehensive geriatric assessment and involving the entire interdisciplinary team, was key

**Table 1. Patient characteristics: *N* = 135.**

CHARACTERISTICS	PREINTERVENTION GROUP* <i>N</i> = 49	POSTINTERVENTION GROUP† <i>N</i> = 86	<i>P</i> VALUE
Age, y	86.4	85.6	.425
Sex, <i>n</i> (%)			.398
• Female	31 (63)	48 (56)	
• Male	18 (37)	38 (44)	
Residence before admission, <i>n</i> (%)			.684
• Private residence	38 (78)	64 (74)	
• Assisted living	10 (20)	21 (24)	
• Residential care	1 (1)	1 (1)	
Lives alone, <i>n</i> (%)	27 (55)	53 (60)	.543
Known dementia, <i>n</i> (%)	25 (51)	44 (52)	.885
Charlson comorbidity index (index range 1–35)	3.16	2.97	.983

ALC—alternate level of care, TCU—transitional care unit.

\*Preintervention is the 5-month period (September 2009–February 2010) before the opening of the on-site TCU; preintervention ALC patients received care in acute care units.

†Postintervention is the 5-month period (September 2011–February 2012) after the opening of the on-site TCU; postintervention ALC patients were either transferred to the TCU or remained in acute care units.

**Table 2. Reasons for hospital admission and ALC designation of patients: *N* = 135.**

REASONS	PREINTERVENTION GROUP ( <i>N</i> = 49), <i>N</i> (%)	POSTINTERVENTION GROUP ( <i>N</i> = 86), <i>N</i> (%)	<i>P</i> VALUE
Reasons for hospital admission			.567
• Dementia, delirium, or confusion	21 (43)	38 (44)	
• Fall, fracture, or injury	22 (45)	35 (41)	
• Frailty or failure to thrive	12 (25)	27 (31)	
• Infection	7 (14)	11 (13)	
• Cardiac condition	9 (18)	7 (8)	
• Psychiatric or neurologic condition	10 (20)	11 (12)	
Reasons for ALC designation			.762
• Dementia	32 (65)	49 (57)	
• Immobility, falls, fracture, or postoperative rehabilitation	20 (41)	41 (47)	
• Frailty	17 (35)	30 (35)	
• Caregiver burden or unable to care for self	14 (29)	27 (31)	
• Cancer	7 (14)	9 (10)	

ALC—alternate level of care.

**Table 3. Comparisons between the ALC groups: A) Mean LOS. B) Discharge disposition.**

<b>A)</b>				
LOS	PREINTERVENTION GROUP (N = 49), D	POSTINTERVENTION GROUP (N = 86), D	DIFFERENCE, D	P VALUE
Total LOS	74.8	65.5	-9.3	.137
Acute LOS	22.5	14.0	-8.5	<.01
ALC LOS	52.6	51.5	-1.1	.446
<b>B)</b>				
DISCHARGE DISPOSITION	PREINTERVENTION GROUP (N = 49), N (%)	POSTINTERVENTION GROUP (N = 86), N (%)	DIFFERENCE, %	P VALUE
Home or assisted-living facility	6 (12)	26 (30)	+18	<.01
Residential care facility	29 (59)	40 (47)	-12	.078
Death	14 (29)	20 (23)	-6	.158

ALC—alternate level of care, LOS—length of stay.

to the improvements noted in the postintervention group. Dedicated rehabilitation services and ADL support provided by residential care aides were important factors in patients' improved function and better discharge disposition. The TCU's quiet but busy environment, where there are opportunities for group exercises and social activities, is another factor in the patients' improvements.

The involvement of COE physicians<sup>2</sup> as medical directors had a substantial role in the success of the TCU. In Canada, COE training is a 6- to 12-month accredited postgraduate program. Family physicians are educated in specialized elder care with core rotations in geriatric medicine and geriatric psychiatry, and are trained in diverse settings, including hospitals, patients' homes, and residential care facilities. The medical directors provided leadership by helping plan the structure and function of the unit and implement the COE-specific policies and care pathways. They act as liaisons with hospital administrators and community agencies as required. Both medical directors provide informal and formal educational sessions for hospital staff regarding best geriatric practices. During care conferences, they routinely give advice regarding medication reductions, dementia care, pain and symptom management, and continence and bowel care, as well as assist with complex discharge planning. Although the medical advisors consult on specific challenging patients when requested, the FPs maintain responsibility for their patients. This approach to caring for ALC patients could be replicated in community hospitals where FPs are highly involved and specifically trained in COE.

The reduction in hospital-acquired infections among ADL patients could be associated with having less exposure to acutely ill patients and being in better physical condition, as demonstrated by improved ADLs in the ALC patients in the postintervention group.

**Table 4. Activities of daily living that were examined in ALC patients who survived to discharge: N = 101.**

ADLS OF ALC PATIENTS AT DISCHARGE	PREINTERVENTION GROUP (N = 35), N (%)	POSTINTERVENTION GROUP (N = 66), N (%)	P VALUE
Mobility			.198
• Improved	5 (14)	14 (21)	
• Maintained	26 (74)	47 (71)	
• Declined	4 (11)	5 (8)	
Transfers			<.01
• Improved	5 (14)	36 (55)	
• Maintained	21 (60)	20 (30)	
• Declined	9 (26)	10 (15)	
Urinary continence			.191
• Improved	8 (23)	16 (24)	
• Maintained	20 (57)	47 (71)	
• Declined	7 (20)	3 (5)	

ADLS—activities of daily living, ALC—alternate level of care.

**Table 5. Medications on last hospital day in ALC patients who survived to discharge: N = 101.**

TYPES OF PRESCRIPTIONS	PREINTERVENTION GROUP (N = 35), N (%)	POSTINTERVENTION GROUP (N = 66), N (%)	P VALUE
Antipsychotics (used regularly or as needed)	23 (66)	30 (45)	.026
Sedatives (used regularly or as needed)	16 (46)	25 (38)	.223
Antidepressants	11 (31)	27 (41)	.261
Vitamin D	5 (14)	38 (58)	<.01

ALC—alternate level of care.

**Table 6. Total direct nursing hours and costs from hospital database**

PATIENT COST VARIABLE	PREINTERVENTION (PER ALC PATIENT PER DAY ON MIXED ALC AND ACUTE MEDICAL UNIT)	POSTINTERVENTION (PER ALC PATIENT PER DAY) ON TCU	TOTAL SAVINGS PER ALC PATIENT PER DAY	EXTRAPOLATED ACUTE PATIENT CARE COSTS (PER PATIENT PER DAY ON ACUTE MEDICAL UNIT)
Direct patient care nursing hours per occupied bed day, h	4.7	3.4	2.8	6.2
Wages and benefits, \$	230	146	84	330
Drug costs, \$	11	5	6	19
Other (equipment, supplies), \$	32	4	28	66
Total, \$	273	155	118	415

ALC—alternate level of care, TCU—transitional care unit.

**Table 7. Total annual hospital savings from 22-bed TCU**

COST VARIABLE	ANNUAL COSTS OR SAVINGS, \$
Direct patient care nursing hours per occupied bed day	-22 752
Wages and benefits	-675 858
Drug costs	-48 595
Other (equipment, supplies)	-228 440
TCU medical directors annual cost	+22 000
Total	-953 645

TCU—transitional care unit.

Decreased use of antipsychotic medications might be attributed to the TCU's quieter environment and having staff members who are more experienced with dementia patients. Medication reviews in care conferences by the medical directors, FPs, and pharmacist likely contributed to the reduction in antipsychotic and sedative use, as well the increase in vitamin D prescriptions.

The reductions in days in hospital and residential care admissions achieved in the postintervention group have important clinical significance and cost savings, which are not accounted for in the hospital cost data. Despite conflicting studies on postacute units, the reorganization described appears to have successfully delivered equal or improved care at lower cost.

## Limitations

The study's relatively small size and retrospective nature limits its strength. Uncontrolled variables resulting from the before-and-after study design could have affected the results. Validated tools were not always used for assessment or documentation. The principal investigator (M.M.) participated as one of the chart auditors, which theoretically could lead to bias. The principal investigator was also a TCU medical advisor but had no authority over choosing patients for admission. Patient, family, and staff satisfaction was not assessed during the study; however, a survey

is planned and will provide more information about the success of the TCU from the patient and staff point of view.

There was a large increase in the total number of ALC patients in the postintervention time frame. During the preintervention phase, relatively stable patients might have waited longer before staff designated ALC status. However, the demographic characteristics and the comorbidity indices show that both ALC groups were well balanced. Despite its limitations, this study is representative of real-world problems experienced by small community hospitals in the conduct of research and program evaluations.

## Conclusion

This study demonstrates that caring for elderly post-acute hospital patients on an interdisciplinary TCU managed by FPs, with COE-trained physicians in leadership roles, can improve health outcomes, decrease LOS, and improve discharge disposition. A hospital-based unit as described in this study appears to provide better care at less cost.

**Dr Manville** is a care of the elderly physician and Medical Co-director in the Transitional Care Unit at St Joseph's Hospital in Comox, BC, and a Clinical Scholar in the Department of Family Practice at the University of British Columbia (UBC) in Vancouver. **Dr Klein** is Emeritus Professor of family practice and pediatrics and Director of the Clinician Scholar Program in the Department of Family Practice at UBC. **Dr Bainbridge** is Director of Interprofessional Education in the Faculty of Medicine at UBC.

## Acknowledgment

This report was funded by the Clinician Scholar Program in the Department of Family Practice (DFP) at the University of British Columbia (UBC) (accredited by the College of Family Physicians of Canada), which provided a research stipend and mentorship for practice-based researchers. The British Columbia College of Family Physicians awarded an additional grant to support this project. We thank **Jane Morris** for assistance with data collection and data entry, as well as **Kim Forman**, Clinical Coordinator of the Transitional Care Unit at St Joseph's Hospital (SJH), for her support. **Dr Barrie Turnham** at North Island College in Courtenay, BC, kindly provided statistical analysis. We thank **Dr Margaret McGregor** (Clinical Associate Professor and Director of Community Geriatrics in the DFP at UBC) and **Dr Scott Garrison** (Clinical Assistant Professor in the DFP at UBC) for their thoughtful suggestions regarding the study design and for reviewing the final report. We also thank **Dr Jason Wale** (SJH) and **Dr Mandy Ruthnum** (SJH) for their suggestions and encouragement. Finally, we acknowledge the administration team and the Records Department at SJH for all their diligent work in support of this research.

**Contributors**

**Dr Manville** was responsible for developing and conducting the study, as well as all aspects of the design and evaluation. **Drs Klein** and **Bainbridge** were advisors and mentors; they contributed to the study design and analysis, and reviewed all aspects of the project and the write-up of the findings.

**Competing interests**

**Dr Klein** is Director of the Clinician Scholar Program at the University of British Columbia.

**Correspondence**

**Dr Margaret Manville**, Senior's Health, St Joseph's Hospital, 2137 Comox Ave, Comox, BC, V9M 1P2; telephone 250 339-1440; fax 250 339-1529; e-mail [manwale@shaw.ca](mailto:manwale@shaw.ca)

**References**

1. Canadian Institute for Health Information. *Waiting in hospital. Alternate level of care in Canada*. Ottawa, ON: Canadian Institute for Health Information; 2009.
2. Penney C, Henry E. Improving performance management for delivering appropriate care for patients no longer needing acute hospital care. *J Health Serv Res Policy* 2008;13(Suppl 1):30-4.
3. Lavis JN, Anderson GM. Appropriateness in health care delivery: definitions, measurement and policy implications. *CMAJ* 1996;154(3):321-8.
4. Fisher RH, Zorzitto ML. Placement problem: diagnosis, disease or term of denigration? *Can Med Assoc J* 1983;129(4):331-4.
5. Regen E, Martin G, Glasby J, Hewitt G, Nancarrow S, Parker H. Challenges, benefits and weaknesses of intermediate care: results from five UK case study sites. *Health Soc Care Community* 2008;16(6):629-37. Epub 2008 May 13.
6. Woodford HJ, George J. Intermediate care for older people in the U.K. *Clin Med* 2010;10(2):119-23.
7. Young J, Green J, Forster A, Small N, Lowson K, Bogle S, et al. Postacute care for older people in community hospitals: a multicenter randomized, controlled trial. *J Am Geriatr Soc* 2007;55(12):1995-2002. Epub 2007 Nov 2.
8. O'Reilly J, Lowson K, Green J, Young JB, Forster A. Post-acute care for older people in a community hospitals—a cost-effectiveness analysis within a multi-centre randomised controlled trial. *Age Ageing* 2008;37(5):513-20. Epub 2008 May 30.
9. Garasen H, Windspoll R, Johnsen R. Intermediate care at a community hospital as an alternative to prolonged general hospital for elderly patients: a randomised controlled trial. *BMC Public Health* 2007;7:68.
10. Crotty M, Whitehead CH, Wundke R, Giles LC, Ben-Tovin D, Phillips PA. Transitional care facility for elderly people in hospital awaiting a long term care bed: a randomised controlled trial. *BMJ* 2005;331(7525):1110. Epub 2005 Nov 2.
11. Griffiths PD, Edwards MH, Forbes A, Harris RL, Ritchie G. Effectiveness of intermediate care in nursing-led in-patient units. *Cochrane Database Syst Rev* 2007;(2):CD002214.
12. Fleming SA, Blake H, Gladman JR, Hart E, Lymbery M, Dewey ME, et al. A randomised controlled trial of a care home rehabilitation service to reduce long-term institutionalisation for elderly people. *Age Ageing* 2004;33(4):384-90. Epub 2004 May 19.
13. Ostry AS, Tomlin KM, Cvitkovich Y, Ratner PA, Park IH, Tate RB, et al. Choosing a model of care for patients in alternate level care: caregiver perspectives with respect to staff injury. *Can J Nurs Res* 2004;36(1):142-57.
14. Gladman JR. Transitional care for elderly people: intermediate care can be safe and reduce hospital use, but is it and does it? *BMJ* 2005;331(7527):1271.
15. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis* 1987;40(5):373-83.
16. Ellis G, Whitehead MA, Robinson D, O'Neill D, Langhorne P. Comprehensive geriatric assessment for older adults admitted to hospital: meta-analysis of randomised controlled trials. *BMJ* 2011;343:d6553.

— \* \* \* —