

System outcomes associated with a pediatric emergency department clinical decision unit

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CLINICIAN'S CAPSULE

What is known about the topic?

Clinical decision units (CDUs) may reduce short-stay hospitalizations (<48 hours), which are associated with longer lengths of stay, increased staffing needs and higher costs.

What did this study ask?

What are the disposition outcomes and emergency department (ED) return rates following CDU care? Has CDU implementation changed short-stay hospitalization rates?

What did this study find?

Most CDU patients were discharged, and short-stay hospitalization rate significantly decreased by 0.39% with CDU implementation.

Why does this study matter to clinicians?

The CDU may reduce short-stay hospitalizations, and is a safe care option for pediatric patients requiring prolonged ED care.

CDU) was 7.8 hours (5.4-12.0). Asthma represented 31% of cases. Short stay hospitalization rate decreased from 3.62% in 2013 to 3.23% in 2015 (difference = 0.39%; 95% CI = 0.15-0.63; $p=0.001$).

Conclusions: Most CDU patients were discharged, but 9% had a clinically-related ED revisit. CDU implementation was associated with a small but significant reduction in short stay hospitalization.

RÉSUMÉ

Objectifs: L'étude avait pour objectifs de faire état des décisions relatives aux suites à donner et des taux de nouvelle consultation au service des urgences (NCSU) après un séjour dans une unité de décision clinique (UDC) et de déterminer si le taux d'hospitalisation de courte durée (<48 heures) avait changé après cette mise sur pied.

Méthode: Il s'agit d'une étude rétrospective de cohortes d'enfants examinés au service des urgences pédiatriques (SUP) qui ont fait un séjour dans une UDC, et ce, du 1^{er} janvier au 31 décembre 2015. Des données ont été extraites des dossiers médicaux, puis copiées sur des formulaires électroniques uniformisés de manière à pouvoir déterminer les taux de suites à donner et de NCSU au bout de 7 jours. Deux chercheurs formés et tenus dans l'ignorance des faits ont examiné les NCSU pour déterminer si elles étaient en lien avec la consultation de référence à l'UDC. Il y a ensuite eu comparaison avec les taux d'hospitalisation de courte durée (séjour <48 heures) enregistrés en 2013 et en 2015, soit avant et après la mise sur pied de l'UDC.

Résultats: Sur 1696 consultations de référence à l'UDC, 1503 (89 %) ont abouti au congé du patient, et 139 (9,2 %) d'entre elles se sont soldées par ≥ 1 NCSU en lien clinique avec le motif principal de consultation. La durée de séjour (DS) médiane (écart interquartile) à l'UDC était de 4,4 heures (2,7-7,8) et la DS totale au SUP (y compris à l'UDC) était de 7,8 heures (5,4-12,0). L'asthme représentait 31 % des cas. Le taux d'hospitalisation de courte durée a diminué, et est passé de 3,62 % en 2013 à 3,23 % en 2015 (écart = 0,39 %; IC à 95 % = 0,15-0,63; $p=0,001$).

Conclusions: La plupart des patients ayant fait un séjour à l'UDC ont obtenu leur congé, mais 9 % d'entre eux ont demandé une

ABSTRACT

Objectives: Our objectives were to describe disposition decisions and emergency department return (EDR) rates following a clinical decision unit (CDU) stay; and to determine changes to short stay (<48 hour) hospitalization rates after CDU implementation.

Methods: We conducted a retrospective cohort study of pediatric emergency department (PED) visits with a CDU stay from January 1 to December 31, 2015. Health records data were extracted onto standardized online forms, then used to determine disposition and 7-day EDR rates. Two trained investigators blindly reviewed EDR visits to determine if they were related to the index CDU stay. We compared short stay inpatient admission rates (i.e., hospital length of stay <48 hours) in 2013 and 2015, before and after CDU implementation.

Results: Of 1696 index CDU stays, 1503 (89%) were discharged, and 139 discharged patients (9.2%) had ≥ 1 clinically-related EDR. Median (IQR) CDU length of stay (LOS) was 4.4 hours (2.7-7.8) and total PED LOS (including

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NCSU en lien clinique avec le motif principal de consultation. La mise sur pied de l'UDC a été associée à une réduction modeste mais significative des hospitalisations de courte durée.

Keywords: clinical decision unit, observation unit, system outcomes, pediatric emergency department, hospitalization, revisit

INTRODUCTION

Approximately one-third of inpatient admissions from the pediatric emergency department (PED) result in a short hospitalization (<48 hours in duration).¹ Inpatient admission is associated with a longer length of stay (LOS) and increased staffing needs and costs compared to PED observation.¹ Alternative care settings may reduce the number of short-stay inpatient admissions,¹ and one such setting is a clinical decision unit (CDU).² CDUs are special care areas within the PED that provide protocol-driven treatment and observation for up to 24 hours for patients who may not require hospital admission but are not ready for discharge.³ We established a CDU at the BC Children's Hospital (BCCH) PED in October 2014 as a quality improvement initiative. Given the paucity of Canadian pediatric CDU data, we conducted a descriptive analysis to describe disposition decisions and ED return (EDR) rates following CDU care and changes in short-stay (<48 hour) hospitalization rates after CDU implementation.

METHODS

Study design, setting, and population

This retrospective cohort study of all PED visits with a CDU stay was performed at the BCCH PED, the only quaternary care pediatric referral centre in British Columbia. Our four-bed CDU is open 24 hours daily and functions as a separate unit within our PED. It is staffed by one nurse and one nurse practitioner (when available) or a pediatric emergency physician who oversees disposition decisions. CDU admissions are limited to patients who require prolonged ED LOS and are expected to be safe for discharge within 24 hours, the maximum allowed LOS. CDU admission is accompanied by a pre-printed order sheet completed by the admitting ED provider. A CDU option is integrated into certain care paths such as our PED asthma pathway that have standardized reassessment periods. Our CDU does not accept PED overflow or boarded patients awaiting admission. We reviewed all PED visits from

January 1, 2015, to December 31, 2015. The study protocol was approved by the University of British Columbia, Children's and Women's Health Centre Research Ethics Board.

Study protocol

We collated the administrative data that summarized the patient demographics, triage acuity, chief complaint, discharge diagnosis, disposition, total PED LOS, and CDU LOS for all CDU admissions and then identified patients who had EDR within seven days. Trained research assistants performed the chart review and entered the visit characteristics, physician findings, management, and personalized discharge instructions into an online research electronic data capture (REDCap) database.⁴

Two trained investigators reviewed the clinical information to determine if the return visits were clinically related to their index CDU visit by assessing whether the revisit presentation fell within the spectrum of illness that was diagnosed on the index visit or if new health care needs arose partly or wholly because of care received during the index visit. All cases were reviewed in duplicate, and disagreements were settled by a third investigator.

Measures

Primary outcome measures were patient disposition following CDU stay and EDR rate. Secondary outcomes included PED utilization (total PED and CDU LOS), CDU diagnostic case mix, and rates of short-stay hospitalization (LOS <48 hours) before and after CDU implementation (2013 v. 2015). Total PED LOS was defined as the time from triage to PED disposition (discharge, admit, or other). CDU LOS was defined as the time from CDU admission to PED disposition and was included within total PED LOS.

RESULTS

Of the 46,706 PED visits in 2015, 1,696 (3.6%) received CDU care. The median CDU occupancy was 25%, and 1,503 (89%) patients were discharged, with 190 (11%)

Table 1. CDU index visit characteristics by disposition outcomes

| | Discharged home | Admitted | Total |
|---|------------------------|----------------------|------------------------|
| Number of index CDU visits (%) | 1,503 (89%) | 190 (11%) | 1,696* (100%) |
| Mean age (SD) | 5.3 (4.7) | 5.3 (4.5) | 5.3 (4.6) |
| Percent male | 61% | 52% | 60% |
| High acuity cases, i.e., CTAS 1–3, <i>n</i> , (%) | 1,414 (94%) | 176 (93%) | 1,593 (94%) |
| Diagnosis, <i>n</i> (%) | | | |
| Asthma | 468 (31.1%) | 62 (32.6%) | 531 (31.3%) |
| Allergy/anaphylaxis | 172 (11.4%) | 1 (0.5%) | 173 (10.2%) |
| Non-surgical gastrointestinal disease | 149 (9.9%) | 14 (7.4%) | 163 (9.6%) |
| Concussion/traumatic brain injury | 101 (6.7%) | 2 (1.1%) | 103 (6.1%) |
| Undifferentiated fever/viral illness | 99 (6.6%) | 9 (4.7%) | 108 (6.4%) |
| Croup | 93 (6.2%) | 3 (1.6%) | 97 (5.7%) |
| Headache | 64 (4.3%) | 4 (2.1%) | 68 (4.0%) |
| Bronchiolitis | 33 (2.2%) | 9 (4.7%) | 42 (2.5%) |
| Pneumonia | 32 (2.1%) | 13 (6.8%) | 45 (2.7%) |
| Surgical gastrointestinal disease | 8 (0.5%) | 27 (14.2%) | 35 (2.1%) |
| Other | 284 (18.9%) | 46 (24.2%) | 331 (19.5%) |
| Median CDU LOS (IQR), hours | 4.1 (2.6–6.9) | 9.2 (6.0–13.6) | 4.4 (2.7–7.8) |
| Median total PED LOS (IQR) including CDU LOS, in hours | 7.2 (5.2–11.0) | 13.8 (11.1–18.1) | 7.8 (5.4–12.0) |
| Number of EDR (rate in %, 95% CI) | 139 (9.2%, 7.9–10.1%) | 7 (3.7%, 1.8–7.4%) | 146 (8.6%, 7.4–10.0%) |
| Number admitted on first EDR (rate in %, 95% CI) | 29 (20.9%, 14.9–28.4%) | 2 (28.6%, 8.2–64.1%) | 31 (21.2%, 15.4–28.6%) |

CDU = clinical decision unit; CDU LOS = CDU admission time to the pediatric emergency department disposition time; CTAS = Canadian Triage and Acuity Scale; EDR = a clinically related return visit to the pediatric emergency department within seven days of the index visit; IQR = interquartile range; SD = standard deviation; PED LOS (CDU LOS-inclusive) = pediatric emergency department triage time to pediatric emergency department disposition time.

*Three patients left against medical advice from the CDU (1,503 discharged + 190 admitted + 3 left AMA = 1,696 disposition outcomes).

admitted and 3 (0.2%) who left against medical advice. Of the 1,503 discharged patients, 157 had return ED visits within seven days, and 139 of the 157 revisits were clinically related to their index CDU visit (inter-rater agreement 97%, kappa 0.85), yielding an EDR rate of 9.2%. The CDU patient and visit characteristics are shown in Table 1.

The median (IQR) CDU LOS was 4.4 hours (2.7–7.8), and the total PED LOS including CDU was 7.8 hours (5.4–12.0) (Table 1). Asthma was the most common condition in our CDU, representing 31.3% of all diagnoses (Table 1). The short-stay (<48 hour) hospitalization rate fell from 3.62% in 2013 to 3.23% in 2015, a difference of 0.39% (95% CI 0.15–0.63, $p = 0.001$).

DISCUSSION

We found that 89% of our CDU population was discharged, with an EDR rate of 9.2%, which is consistent with EDR rates reported elsewhere^{5–8} but higher than the 7.3% EDR rate for our PED overall. Nearly one-half of our CDU population had asthma, allergy/anaphylaxis, or concussion/traumatic brain injury. Each

of these conditions has protocol-driven observation periods from two to six hours^{9–11} that may explain our median CDU LOS of 4.4 hours, which is shorter than previous reports.¹² Short-stay inpatient admissions fell significantly after CDU implementation; however, the difference was small, and other factors may have contributed.

CONCLUSION

CDU is a safe care option for PED patients requiring prolonged ED care; however, the cost-effectiveness and impact on other hospital operations are unclear based on this retrospective study of one site.

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