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3**Title:** The effectiveness and safety of an emergency department short stay units: A rapid review

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27

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38[insert Box 1 here]

39

## 40INTRODUCTION

41Emergency department (ED) overcrowding has been defined as “a situation where the demand  
42for emergency services exceeds the ability to provide care in a reasonable amount of time”. [1]  
43ED overcrowding is a serious and ongoing issue across Canada; according to a 2006 survey of  
44Canadian ED directors, 62% of respondents reported overcrowding to be a major or severe  
45problem in 2004 and 2005. [1]

46

47Short stay units (SSUs) have emerged as a potentially useful strategy for managing  
48overcrowding in emergency departments. The theoretical benefit of SSUs is to ‘offload’ stable  
49patients from the acute ED and to reduce the amount of unnecessary hospital admissions.  
50 Typically, the focus of these units are on 1) expected short treatments such as blood  
51transfusions, 2) further diagnostic investigations to finalize a medical diagnosis, and 3) safe  
52discharge into the community such as social work involvement. To prevent such units from  
53being a ‘dumping grounds’, most SSUs have strict inclusion/admission criteria. Part of the  
54difficulty is evaluating the value of SSUs is terminology – many other terms have been used to  
55describe such units (e.g. Observation Units, Assessment Units, Clinical Decision Units).  
56Typically though, SSUs are some type of extension of the ED with an overarching objective for  
57improving “the quality of medical care through extended observation and treatment, while  
58reducing inappropriate admissions and healthcare costs”. [2]

59

60Using evidence to help inform the practice of healthcare has been a cornerstone of clinical  
61practice for many years. There are well-recognized benefits in utilizing high-quality systematic  
62reviews in implementing practice guidelines. However, the uptake of evidence-based decision  
63making has been slow in the field of healthcare administration. Policy makers and administrators  
64often work in a unique environment of strict and confining time restraints, making traditional  
65systematic reviews of the literature impractical. This paper presents an example of a streamlined  
66approach to synthesizing evidence: a *rapid review* scanning the published literature in a timely  
67manner and presenting the relevant information in a practical *evidence summary*.

68

69We completed this review in response to a request by members of The Ottawa Hospital (TOH)  
70senior management team. They were contemplating introducing a SSU to help alleviate ED  
71overcrowding; they wanted to know whether SSU's were effective and safe. They needed an  
72answer emergently and approached our rapid response service.

73

74To frame the literature, we used the definition of SSUs as operationalized by our Ottawa Hospital  
75stakeholder; specifically seeking and summarizing evidence that related to “an area of the  
76hospital reserved for patients admitted directly from the ED who require a period of observation  
77to resolve diagnostic uncertainty before being sent home or who are expected to recover within  
7848 hours or who require complex outpatient support arranged”. [3]

79

## 80**METHODS**

81Rapid reviews have emerged as a streamlined approach to synthesizing evidence in a timely  
82manner – typically for the purpose of informing emergent decisions faced by decision makers in  
83health care and health services settings. Despite the proliferation of rapid review products,  
84methods informing their production are disparate and underreported. [4] In the absence of a  
85standard protocol informing the conduct of rapid reviews, our rapid review service has evolved  
86its own 8-step approach to guide their execution (Box 2; manuscript in preparation); this  
87approach was used to guide this review.

88

89[insert Box 2 about here]

90

91Needs assessment between the OHRI and senior management of TOH identified SSUs as a high  
92need topic for review (Step 1). Question refinement between the Ottawa Hospital Research  
93Institute and nominated TOH stakeholder was used to narrow the scope of the SSU topic and  
94develop an answerable question to guide the review (Step 2). A review proposal capturing the  
95finalized review question, background information, proposed methods, deliverable, and timeline  
96(January 10<sup>th</sup> to February 11<sup>th</sup>, 2011) was drafted by the research coordinator and approval of the  
97proposal was sought and attained from the stakeholder (Step 3).

98

99Using exemplar papers and the proposal document, an experienced Information Specialist  
100developed and executed a detailed literature search (Step 4). The search strategy for published  
101literature is listed in Appendix A and was limited to the following databases: MEDLINE and  
102EMBASE on OVID; the Cochrane Library on Wiley (including CENTRAL, Cochrane Database  
103of Systematic Reviews, DARE, HTA, and NHS EED), and the Centre for Reviews and  
104Dissemination (CRD) databases. Additional references were also sought through searching the  
105bibliographies of relevant items. Grey (unpublished) literature was identified through searching  
106the Web sites of relevant specialty societies (e.g. American College of Emergency Physicians;  
107Canadian Association of Emergency Physicians; Society for Academic Emergency Medicine)  
108and organizations, HTA agencies, and through general Internet searching. The grey literature  
109search was guided by and documented through *Grey Matters*’, the Canadian Agency for Drugs  
110and Technologies in Health guide for grey literature (records available upon request).[5]  
111Retrieved records were imported into Reference Manager® (a bibliographic database software)  
112for removal of duplicates, and then uploaded into DistillerSR©, (an Internet-based systematic  
113review software program) to be screened by reviewers.

114

115Screening was conducted by two team members (one with methodological expertise, one with  
116ED clinical expertise) (Step 5) using questions developed by operationalized eligibility criteria.  
117A hybrid approach of a priori/iteratively defined eligibility criteria was used in order to  
118maximize the efficiency (i.e. limit number of records to be screened) and meaningfulness (i.e.  
119increase relevance or records) of the rapid review for our stakeholders. Thus, as per our previous  
120rapid reviews, included citations had to have been published in English and be electronically  
121available in full text (i.e. through University of Ottawa library subscription). Reports were  
122excluded if they were published before 2000 in order to prioritize evidence of contemporary ED  
123practice. Although primary studies are often included in rapid reviews, we chose to limit the  
124evidence to only systematic reviews; this was due to the heterogeneity of the primary studies  
125(determined during screening of title and abstracts) and limited time available for reconciling  
126and interpreting the complexity of this evidence base.

127

128Quality assessment, extraction and narrative synthesis of the included studies was done by one  
129member of the team (Step 6). The quality of included systematic reviews was assessed using

130AMSTAR, an 11-item measurement tool created to assess the methodological quality of  
131systematic reviews. A higher score indicates increased methodological quality.[6] For each  
132systematic review, the primary objective, methods, findings, and relevant limitations was  
133extracted and narratively described.

134

135The extracted information was formatted into a cogent, user-friendly final report (Step 7). To  
136help stakeholders get to the main points quicker, key messages of the report are presented on the  
137first page of the rapid review report and each subsection is summarized in a ‘Bottom line’  
138statement. The report was submitted to end-users for feedback and approval (Step 8). The  
139approved report was then circulated by our stakeholder to the clinical and management  
140knowledge users of TOH.

141

## 142**RESULTS**

143A PRISMA flow diagram of the evidence identified by this rapid review is shown in Figure 1.

144

### 145**a. Evidence on SSUs specifically**

146A 2003 systematic review by Daly and colleagues (AMSTAR 6/11) in Australia assessed the  
147evidence of short stay observation units with respect to efficiency of healthcare delivery and  
148quality of services provided [7] Specifically, data from included studies was extracted according  
149to the following domains: clinical outcomes, length of stay, re-presentation rates, ED efficiency  
150and costs of care. Notwithstanding the fact that the reviews’ search date was over 10 years old,  
151this was the best available synthesis of SSUs included in this rapid review. Twelve studies (1  
152Canadian) comparing observation units with routine care were included; between-study  
153heterogeneity prevented quantitative meta-analyses and findings could only be presented  
154narratively. Table 1 from this report, summarizing the study characteristics and main conclusions  
155is included below. Based on the evidence, the authors concluded that “[SSUs] have the potential  
156to increase patient satisfaction, reduce length of stay, improve the efficiency of EDs and improve  
157cost effectiveness. However, [SSUs] have commonly been implemented alongside new clinical  
158protocols, and it is not possible to distinguish the relative benefits of each. As demand increases,  
159providing effective and cost-efficient care will become increasingly important. [SSUs] may help

160organizations that are attempting to streamline patient care while maintaining their quality of  
161service delivery”.

162

163**Bottom Line:** Evidence from one systematic review assessing evidence up to 2000 and  
164including 1 Canadian study suggested SSUs may offer an effective and safe ED patient  
165management option. Specifically, findings from the 12 studies reviewed suggested that SSUs  
166may potentially lead to potential improvements in patient satisfaction, length of stay, ED  
167efficiency, and cost effectiveness. Caution should be used in interpreting these findings however  
168due to the methodological limitations of the included studies and the need for an updated search  
169of the systematic review.

170

#### 171**b. Evidence on solutions for overcrowding (SSUs one of multiple solutions)**

172A 2006 systematic review by the Canadian Agency for Drugs and Technologies in Health  
173(CADTH) (AMSTAR 9/11) assessed the evidence on interventions to reduce overcrowding in the  
174ED.[1] SSUs were captured in two before-and-after studies and were associated with positive  
175outcomes; one study reported a decrease in ED length of stay for treat-and-release patients, while  
176the other reported a decrease of patients who left before being seen and the number of ED  
177diversions. Based on this evidence, the review authors categorize SSUs as one of the several  
178interventions for which “limited evidence suggests that these efforts to address overcrowding at  
179an institutional level should be encouraged and monitored; they have a high chance of success”  
180(see Table 2 for overview of interventions assessed).

181

182Of note, although the review attempted to assess the relative effectiveness of interventions aimed  
183at improving ED overcrowding, the lack of direct comparisons, and the general trend for positive  
184outcomes, restricted this aim. Consequently the reviewers could only conclude that “many  
185interventions of varying complexity, intensity, and duration have been applied in an attempt to  
186alleviate or control ED overcrowding. While most seemed to reduce overcrowding, it is difficult  
187to determine the relative value of these interventions, and the lack of comparison studies makes it  
188impossible to say which ones work best”.

189

190A 2008 systematic review by Hoot and Aronsky (AMSTAR 2/11) in the United States assessed  
191the evidence pertaining to the causes, effects, and solutions of ED overcrowding;[8] 4 studies  
192assessing observation units (grouped under ‘solutions’) were included’. Study findings were  
193summarized narratively and were generally positive with respect to process outcomes (e.g.,  
194decreased length of stay, rate of ambulance diversion, and number of patients leaving without  
195being seen). Of note, while systematic methods were employed, the literature search was not  
196comprehensive (i.e., only searched a single database, excluded non-English titles and grey  
197literature) and extracted quality assessments were not used to frame study results. Based on the  
198complexity of the included studies, the reviewers “refrain from making strong conclusions...  
199based primary on judgment rather than numeric inference” and consider the review to be of value  
200more as a “structured overview of the relevant literature” to “guide interested readers to the  
201original articles”.

202

203**Bottom line:** Evidence from two systematic reviews published in 2006 and 2008, respectively,  
204assessed interventions aimed at reducing ED overcrowding. Several studies assessing SSUs were  
205included and resulted in generally positive process outcomes. While the 2008 review by Hoot  
206and Aronsky abstained from making conclusions based on the complexity of included studies,  
207Bond and colleagues of the 2006 CADTH report conclude that there is sufficient (albeit limited)  
208evidence to warrant implementation and further investigation of SSUs across intuitions in  
209Canada.

210

#### 211c. Other evidence

212A 2006 systematic review by Boudreaux et al. (AMSTAR 5/11) in the United States assessed the  
213evidence on performance improvement methods for increasing ED patient satisfaction.  
214Observation units were captured as one of several interventions with “one supportive study (and  
215no negative studies) demonstrating improvement in at least one indicator of satisfaction”.[9] Of  
216note, only observation units for specific conditions (e.g. asthma and chest pain) were captured in  
217this review.

218

219**Bottom line:** There is limited evidence from one systematic review indicating that SSUs may  
220lead to improved patient satisfaction in specific clinical contexts.



221

## 222**DISCUSSION**

223Emergency room crowding has been identified as a key concern for many hospitals across  
224Canada. Two landmark studies published in 2006 demonstrated an association between  
225emergency department (ED)/hospital crowding and patient mortality.[10,11] Numerous other  
226studies have demonstrated the significant adverse effect ED crowding has on various clinical  
227outcomes, including delayed time to thrombolysis in myocardial infarctions, delayed antibiotic  
228administration in pneumonias, and decreased quality of pain care.[12,13,14] It is now well  
229understood that the problem extends beyond the ED, and that ED crowding is a symptom of  
230much larger systemic problems within our hospital system. The American College of Emergency  
231Physicians recently published a report recommending a series of possible solutions to help  
232alleviate the problem, including the establishment of observation units/SSUs.[15]

233

234Our rapid review aimed to assess the evidence supporting the safety and effectiveness of SSUs in  
235the Canadian context. Although the evidence addressing SSUs and their effect on ED crowding is  
236limited, authors of the included systematic reviews are cautiously optimistic and suggests further  
237implementation and evaluation of SSUs in Canadian hospitals.

238

239The most notable limitation of SSU evidence is the lack of a sophisticated evaluative design,  
240common amongst evaluations of health services/administrative initiatives. In an attempt to move  
241this evidence forward, CADTH provide valuable recommendations for future studies including  
242the need for comparable and representative comparison groups, blinded or unbiased outcome  
243assessments, concurrent controls, comprehensive outcome assessment, and prospective design.  
244[1] Another significant limitation pertains to the unclear generalizability of the results due to the  
245heterogeneity in how SSUs are defined and delivered, with huge variability seen in their setup  
246and target patient population(s) from one institution to another. Also important is the fact that the  
247most recent systematic review identified by this rapid review is almost a decade old and thus its  
248findings may be outdated by contemporary evaluations and/or lack applicability to today's  
249healthcare environment. Finally, it is also worth noting that there is no quality evidence in the  
250literature looking at cost-effectiveness of SSUs; this is an area where more information is sorely  
251needed for proper evidence-based decisions.

252

253 There are some key benefits and limitations to using the rapid review process. One distinct  
254 advantage is their timeliness and thus the ability of rapid reviews to be helpful for management  
255 and policy users who are often faced with having to make emergent and emergency decisions.  
256 While timeliness is an important issue for rapid reviews, there does not appear to be any  
257 consensus as to what constitutes ‘rapid’. In their scan of this literature, Ganann and colleagues  
258 noted that rapid reviews took anywhere from one to nine months to complete.[4] We believe a  
259 timeframe closer to one month is more likely to be rapid. Rapidity, however, is also a potential  
260 limitation. To complete the process quickly requires short circuiting the traditional systematic  
261 review process to varying degrees which may result in an increase of error and/or bias. It is  
262 reassuring to know that Watt and colleagues compared the results and conclusions between four  
263 rapid reviews and systematic reviews addressing the same question and found few differences  
264 between the rapid reviews and systematic reviews in the results and conclusions. However, more  
265 research on this topic is clearly needed and cautious interpretation of the findings of our rapid  
266 review is warranted.

267

268 Another potential advantage of rapid reviews – at least the ones we are conducting – is their look  
269 and feel. Systematic reviews are often large documents that can be difficult to penetrate for key  
270 messages and the bottom line, both important for management and policy decision makers.  
271 Cognizant of this limitation, the format of our reports were initially based on that of the  
272 SUPPORT collaboration network [16] and has iteratively evolved through feedback with end-  
273 users. Key messages appear on the first page and the entire document is usually under 10 pages.  
274 As a companion to this manuscript, the original format of the SSU rapid review is provided in  
275 Appendix B.

276

## 277 **Acknowledgements**

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279 references and to Chantelle Garritty, Senior Research Project Manager, for conceptual feedback.  
280 Thanks also goes to Dr. Alan Forster and TOH senior management team for their ongoing  
281 support of the rapid response service.



**283Box 1. Purpose and key messages of SSU rapid review**

**Primary question:**

What is the evidence of the effectiveness and safety of emergency department short stay units?

**Purpose or report:**

This report summarizes evidence of the effectiveness and safety of short stay units (SSU) in the emergency department (ED). Its intention is to support knowledge needs of stakeholders considering the implementation of SSUs in The Ottawa Hospital.

**Key Messages:**

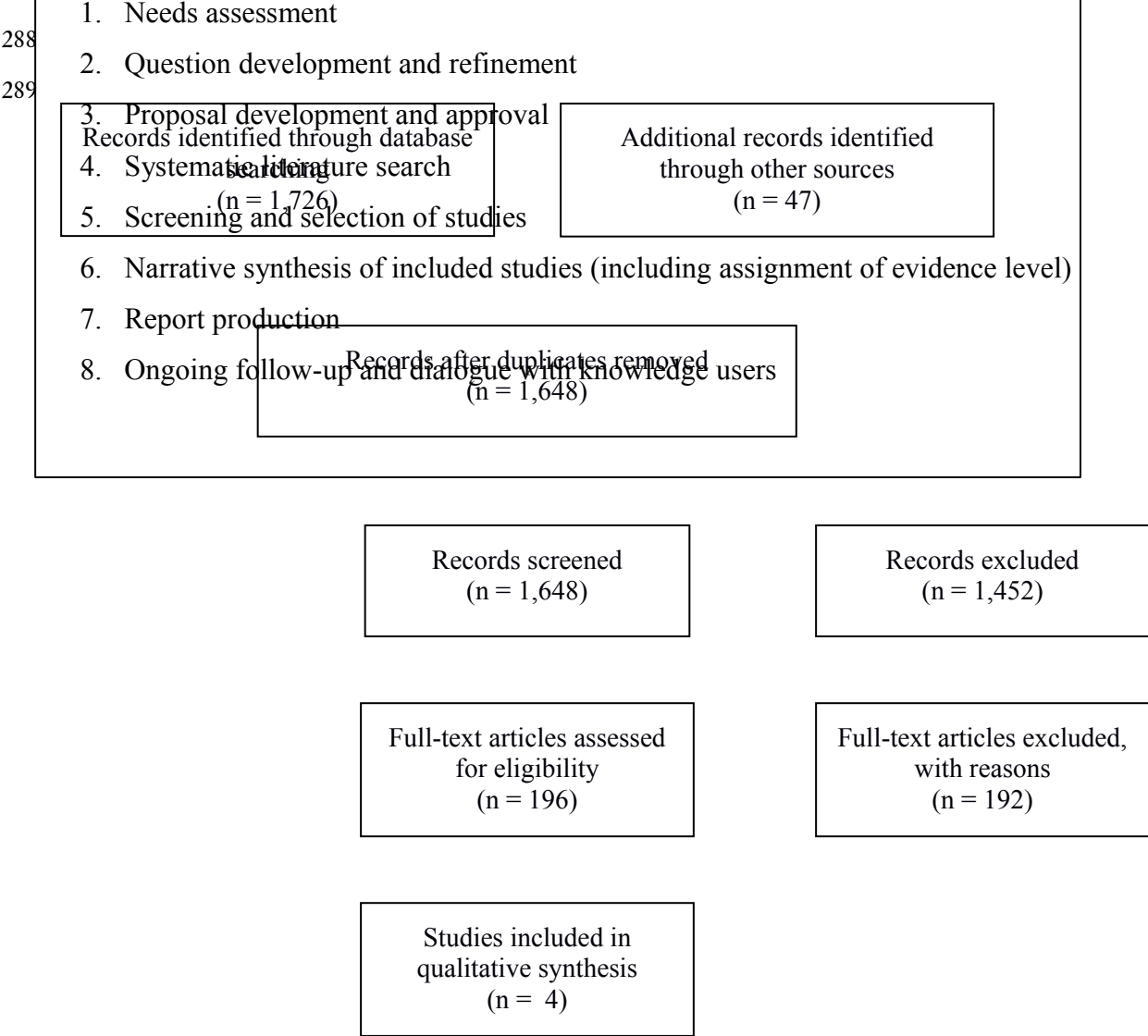
- Evidence from a moderately robust systematic review indicates SSUs may lead to improved clinical outcomes and efficiency in healthcare delivery. Yet, this systematic review is nearly a decade old. A rigorous and updated systematic review on this issue is strongly recommended.
- Most comparative evaluations of SSUs to date have involved before-and-after designs; consequently caution must be used in interpreting positive findings which may have also resulted from non-SSU improvement over time (e.g. changes in practice behaviors, increased hospital beds).
- There is a dearth of quality RCTs in both the literature assessing SSUs specifically, and ED overcrowding more globally. Evidence from the few RCTs reviewed are limited in generalizability due to the disease specific focus of the observation units evaluated (e.g. cardiac, asthma).

There is limited evidence from one systematic review indicating that SSUs may lead to

**Box 2. Outline of 8 steps informing KTA's evidence summary approach**

286

287 **Figure 1. PRISMA flow diagram**



290**Table 1. Comparative studies of SSUs**

291 Study	Location	No. of patients and design	Evidence level	Authors' conclusions
292 Farkouh et al, 1998 <sup>4</sup>	Minnesota, US	424	I	An emergency department chest pain OU can be a safe, effective, and cost-saving alternative for patients at intermediate risk of cardiovascular events.
293 Rydman et al, 1998 <sup>5</sup>	Illinois, US	113	I	The emergency department OU was a lower cost and equally effective treatment alternative for refractory asthma.
294 Gouin et al, 1997 <sup>6</sup>	Canada	4227; before v after opening OU	II-1	An emergency department OU was associated with a significant reduction in admission of children with asthma; however, there was also a significant increase in the number of patients returning to the emergency department within 72 hours.
295 McDermott et al, 1997 <sup>7</sup>	US	222	I	Treatment of selected patients with asthma in an emergency diagnosis and treatment unit results in the safe discharge of most such patients. Improved quality and cost-effectiveness can be achieved by the use of such units.
297 Gomez et al, 1996 <sup>8</sup>	Utah, US	100	I	The protocol ruled out myocardial infarction and unstable angina more quickly and cost-effectively than routine hospital care.
298 Bazarian et al, 1996 <sup>9</sup>	New York, US	1424; before v after opening OU	II-1	Reducing the number of admitted patients waiting in the emergency department for inpatient beds, in this case by establishing a short-stay unit, is associated with a decrease in the time that patients who are treated and released spend in the emergency department.
300 Hadden et al, 1996 <sup>10</sup>	Belfast, UK	214; before v after OU closure	II-1	The accident and emergency observation ward was more efficient than the general acute wards at dealing with short-stay patients.
301 Gaspoz et al, 1994 <sup>11</sup>	Massachusetts, US	Treatment, 529; control, 924	II-1	The coronary OU may be a safe and cost-saving alternative to current management for low-risk patients who require investigation to exclude acute myocardial infarction admitted from the emergency department. Replication in other hospitals is required.
303 Brillman and Tandberg 1994 <sup>12</sup>	New Mexico, US	1224; before v after opening OU	II-1	Use of OU for patients with asthma reduces initial discharge rate without appreciably reducing eventual hospital admissions.
304 MacLaren et al, 1993 <sup>13</sup>	London, UK	405; OU open v OU closed	II-1	Fewer patients with head injuries were discharged from the accident and emergency department when the short-stay ward was available.
306 Saunders and Gentile 1988 <sup>14</sup>	Denver, US	54; OU v matched controls	II-2	Length of stay did not differ between patients with alcoholic pancreatitis in the OU and those admitted directly to hospital
307 Willert et al, 1985 <sup>15</sup>	Chicago, US	103	I	Children with asthma treated in the OU had lower costs, shorter length of stay and no increase in morbidity or returns to the hospital.

309(from Daly et al. 2003; highlighting added with permission)

Table 2. Evidence-based interventions for ED overcrowding and clinical practice

Intervention	Systematic Review	ED Survey	Evidence
Fast track	✓	✓	++
Triage	✓	✓	inconclusive
Diversion strategies	✓	✓	+
Short stay units	✓	✓	+
Staffing changes	✓	✓	+
Physician order entry	✓	x	inconclusive
Specific processes: electronic tracking board, re-engineering of ED radiology services, admission system based on telephone consultation between ED physicians and in-house hospital staff, point-of-care testing, dedicated stat laboratory, implementing a satellite laboratory and research nurse in the ED for point-of-care testing, alternative care destination program, bedside registration	✓	x	+
Multi-faceted interventions: increased emergency physician coverage; designation of physician coordinators; new hospital policies regarding laboratory, consultation, and admission procedures	✓	✓	+
Interventions used by ED directors for which there is no evidence: float nurse pool, senior ED MD flow shift, home care and community care workers assigned on site to ED, over-census on wards ("hallway" patients), establishment of orphan clinics, "coloured" codes to decongest ED, emergency in-patient (EIP) units	x	✓	N/A

✓=reported in scientific literature; x=not reported in scientific literature; ++=scientific evidence from RCTs supporting intervention; +=scientific evidence from non-randomized studies supporting intervention; N/A=not available.

(from Bond et al. 2006, with permission)



325**APPENDIX A. Search strategy for short stay units rapid review (Search date: Jan 20 2011)**

326

327**Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid**

328**MEDLINE(R) <1948 to Present>, EMBASE <1980 to 2011 Week 02> Search Strategy:**

3291 ((short stay\* or observation\* or clinical decision\* or assessment\* or extended care) adj2  
330(unit or units or ward or wards)).ti,ab. (3566)

3312 exp Hospital Administration/ (537672)

3323 (hospital\* adj3 (organiz\* or organis\* or manag\* or administ\*)).ti,ab. (32706)

3334 exp Hospital Units/ (263624)

3345 ((hospital\* or emergency or trauma) adj2 (unit\$1 or ward\$1 or centre\$1 or center\$1 or  
335department\$1 or dept\$1 or service\$1 or ED or facility or facilities)).ti,ab. (159969)

3366 exp Hospitalization/ (264058)

3377 (hospitaliz\* or hospitalis\* or (stay\$1 adj2 (length\$1 or duration or period\$1)) or ((patient\$1  
338or inpatient\$1 or in-patient\$1 or hospital\$1 or in-hospital\$1) adj2 (admission\* or readmission\*  
339or re-admission\* or admit\* or readmit\* or re-admit\* or discharg\*))).ti,ab. (460217)

3408 or/2-7 (1227688)

3419 1 and 8 (2181)

34210 9 use prmz (981)

34311 exp observation unit/ (88)

34412 ((short stay\* or observation\* or clinical decision\* or assessment\* or extended care) adj2  
345(unit or units or ward or wards)).ti,ab. (3566)

34613 11 or 12 (3581)

34714 exp hospital management/ (350686)

34815 (hospital\* adj3 (organiz\* or organis\* or manag\* or administ\*)).ti,ab. (32706)

34916 exp "hospital subdivisions and components"/ (200964)

35017 ((hospital\* or emergency or trauma) adj2 (unit\$1 or ward\$1 or centre\$1 or center\$1 or  
351department\$1 or dept\$1 or service\$1 or ED or facility or facilities)).ti,ab. (159969)

35218 (hospitaliz\* or hospitalis\* or (stay\$1 adj2 (length\$1 or duration or period\$1)) or ((patient\$1  
353or inpatient\$1 or in-patient\$1 or hospital\$1 or in-hospital\$1) adj2 (admission\* or readmission\*  
354or re-admission\* or admit\* or readmit\* or re-admit\* or discharg\*))).ti,ab. (460217)

35519 or/14-18 (972575)

35620 13 and 19 (1902)

35721 20 use emez (1215)

35822 10 or 21 (2196)

35923 remove duplicates from 22 (1360)

36024 23 use prmz (973)

36125 23 use emez (387)

362

363

364