Canada's Drug and
Health Technology Agency

CADTH Health Technology Review

Emergency Department Overcrowding: An Environmental Scan of Contributing Factors and a Summary of Systematic Review Evidence on Interventions

Supporting Information

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Note that these appendices haven't been copy-edited.

Appendix 1: Literature Search Methods

Literature Search Methods Statement: Environmental Scan

An information specialist conducted a literature search on key resources including MEDLINE, Embase, CINAHL, the Cochrane Database of Systematic Reviews, the International HTA Database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search approach was customized to retrieve a limited set of results, balancing comprehensiveness with relevancy. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. Search concepts were developed based on the elements of the research questions and selection criteria. The main search concepts were overcrowding, emergency medicine (emergency departments, emergency medical services, and emergency medicine personnel) and factors contributing to overcrowding. No search filters were used to limit retrieval by study type. The search was limited to English-language documents published since January 1, 2013. A supplemental literature search was conducted in Scopus, PsycINFO, as well as a focused internet search, for literature in the engineering, management, and operations fields. The search was conducted between June 20 and 23, 2023, and limited to English-language documents published since January 01, 2013.

Literature Search Methods Statement and Strategy: Summary of Systematic Review Evidence on Interventions

An information specialist developed and conducted a literature search for systematic reviews of clinical studies, using a peer-reviewed search strategy according to CADTH's *PRESS Peer Review of Electronic Search Strategies* checklist.[1]

Published literature was identified by searching the following bibliographic databases: MEDLINE via Ovid, Embase via Ovid, the Cumulative Index to Nursing and Allied Health Literature (CINAHL) via EBSCO, and the Cochrane Database of Systematic Reviews via CochraneLibrary.com. All Ovid searches were run simultaneously as a multi-file search. Ovid deduplication for multi-file searches, followed by manual deduplication in Endnote, was used to remove duplicate search results. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. Search concepts were developed based on the elements of the PICOS framework and research questions. The main search concepts were overcrowding and emergency medicine (emergency departments, emergency medical services, and emergency medicine personnel).

CADTH-developed search filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, overview of reviews, or indirect treatment comparisons. Retrieval

was limited to English- or French-language results that were published from January 01, 2013 onward. Search results excluded conference abstracts.

An information specialist performed the initial literature search on March 27, 2023. Regular alerts updated the database literature searches until August 27, 2023. Due to time constraints related to the project deadline, citations found through alerts were not screened or included in the analysis of the final report.

A supplemental literature search was conducted in Scopus, PsycINFO, as well as a focused internet search, for literature in the engineering, management, and operations fields. The search was conducted between June 20 and 23, 2023, and limited to English-language documents published since January 01, 2013.

Relevant sections of CADTH's Grey Matters: A Practical Tool For Searching Health-Related Grey Literature, which includes the websites of regulatory agencies, HTA agencies, clinical guideline repositories, systematic review repositories, patient-related groups, and professional associations, were searched to identify grey literature (literature that is not commercially published). Google was used to search for additional internet-based materials. These searches were supplemented by reviewing bibliographies of key papers and through contacts with experts and industry, as appropriate.

Interface: Ovid

Databases:

- MEDLINE All (1946-present)
- Embase (1974-present)
- Note: Subject headings and search fields have been customized for each database. Duplicates between databases were removed in Ovid.

Date of search: March 27, 2023

Alerts: Monthly search updates until August 27, 2023. Alerts were not screened or included in the analysis of the final report.

Search filters applied: Systematic reviews; meta-analyses; network meta-analyses; health technology assessments; or overview of reviews

Limits:

- Publication date limit: 2013-present
- Language limit: English- and French-language
- Conference abstracts: excluded

Table 1: Syntax Guide

Syntax	Description
/	At the end of a phrase, searches the phrase as a subject heading
MeSH	Medical Subject Heading
exp	Explode a subject heading
*	Before a word, indicates that the marked subject heading is a primary topic; or, after a word, a truncation symbol (wildcard) to retrieve plurals or varying endings
adj#	Requires terms to be adjacent to each other within # number of words (in any order)
.ti	Title
.ab	Abstract
.hw	Heading word; usually includes subject headings and controlled vocabulary
.kf	Keyword heading word
.dq	Candidate term word (Embase)
.pt	Publication type
.mp	Mapped term
.yr	Publication year
.ja	Journal abbreviation
.jn	Journal name
.jw	Journal title word (MEDLINE)
.jx	Journal title word (Embase)
medall	Ovid database code: MEDLINE All, 1946 to present, updated daily
oemezd	Ovid database code; Embase, 1974 to present, updated daily

Multi-Database Strategy

1. Crowding/ or "Length of Stay"/
2. Time Factors/ or Patient Admission/
3. (crowding or crowded or overcrowd* or gridlock* or boarded or boarding or overload* or over-load* or hallway* or code black* or handover* or hand-over* or offload* or off-load* or occupanc*).ti,ab,kf.
4. ((staff* or personnel* or nurs* or physician* or doctor* or resident* or paramedic* or bed* or resourc* or hospital*) adj4 (shortag* or capacit* or strain*)).ti,ab,kf.

5. (delay* adj5 (service* or "being seen" or treat* or therap* or care or caring or exam* or clearance or consult*)).ti,ab,kf.
6. (volume* adj4 (patient* or case or "use" or usage or center* or centre*)).ti,ab,kf.
7. (staff* adj2 (patient* or bed*) adj2 ratio*).ti,ab,kf.
8. (bed* adj3 (spac* or availab* or utiliz* or utilis* or "use" or usage)).ti,ab,kf.
9. (care* adj3 interval*).ti,ab,kf.
10. (access block* or bed block* or exit block* or access gap*).ti,ab,kf.
11. (throughput* or through-put* or output* or out-put*).ti,ab,kf.
12. (re-enter or reenter or re-entr* or reentr* or readmit* or re-admit* or readmiss* or re-admiss*).ti,ab,kf.
13. without being seen*.ti,ab,kf.
14. ((leav* or left*) adj6 (medical advic* or treat*)).ti,ab,kf.
15. (wait* adj3 time*).ti,ab,kf.
16. ((length* or prolong*) adj5 (stay* or wait*)).ti,ab,kf.
17. (patient* adj2 flow*).ti,ab,kf.
18. exp Health Services Misuse/
19. (overutili* or over-utili* or overus* or over-us*).ti,ab,kf.
20. ((nonurgent or non-urgent or semiurgent or semi-urgent or nonacute or non-acute or unnecessary or preventable) adj5 (patient* or visit* or use* or care or problem* or attend* or clinic*)).ti,ab,kf.
21. ((level or low) adj3 (acuit* or complexit*)).ti,ab,kf.
22. or/1-21
23. exp Emergency Medicine/ or Evidence-Based Emergency Medicine/ or exp Emergency Medical Services/ or paramedicine/
24. (emergenc* adj5 (hospital* or department* or room* or service* or care or unit* or ward* or communication system* or dispatch* or call centre* or call center* or transportation* or psychiatr* or prehospital* or pre-hospital* or outpatient* or out-patient*)).ti,ab,kf.
25. (trauma* adj3 (unit* or care)).ti,ab,kf.
26. (emergicentre* or emergicenter* or emerg or paramed* or emergetolog*).ti,ab,kf.
27. (accident* adj4 department*).ti,ab,kf.

28. ambulance*.ti,ab,kf.
29. ("Canadian Triage & Acuity Scale" or "Canadian Triage and Acuity Scale" or emergency severity index).ti,ab,kf.
30. Emergency Nursing/ or exp emergency responders/
31. (emergenc* adj4 (personnel* or staff* or team* or nurs* or physician* or doctor* or resident* or responder* or medical technician* or patient* or specialist*)).ti,ab,kf.
32. (first adj3 responder*).ti,ab,kf.
33. ("A and E" or "A & E" or "A&E" or CTAS or ESI).ti,ab,kf.
34. Emerg*.ja,jn,jw.
35. or/23-34
36. 22 and 35
37. 36 use medall
38. "crowding (area)"/ or *"length of stay"/
39. Time Factor/ or hospital admission/ or hospital bed utilization/
40. (crowding or crowded or overcrowd* or gridlock* or boarded or boarding or overload* or over-load* or hallway* or code black* or handover* or hand-over* or offload* or off-load* or occupanc*).ti,ab,kf,dq.
41. ((staff* or personnel* or nurs* or physician* or doctor* or resident* or paramedic* or bed* or resourc* or hospital*) adj4 (shortag* or capacit* or strain*)).ti,ab,kf,dq.
42. (delay* adj5 (service* or "being seen" or treat* or therap* or care or caring or exam* or clearance or consult*)).ti,ab,kf,dq.
43. (volume* adj4 (patient* or case or "use" or usage or center* or centre*)).ti,ab,kf,dq.
44. (staff* adj2 (patient* or bed*) adj2 ratio*).ti,ab,kf,dq.
45. (bed* adj3 (spac* or availab* or utiliz* or utilis* or "use" or usage)).ti,ab,kf,dq.
46. (care* adj3 interval*).ti,ab,kf,dq.
47. (access block* or bed block* or exit block* or access gap*).ti,ab,kf,dq.
48. (throughput* or through-put* or output* or out-put*).ti,ab,kf,dq.
49. (re-enter or reenter or re-entr* or reentr* or readmit* or re-admit* or readmiss* or re-admiss*).ti,ab,kf,dq.

50. without being seen*.ti,ab,kf,dq.
51. ((leav* or left*) adj6 (medical advic* or treat*)).ti,ab,kf,dq.
52. (wait* adj3 time*).ti,ab,kf,dq.
53. ((length* or prolong*) adj5 (stay* or wait*)).ti,ab,kf,dq.
54. (patient* adj2 flow*).ti,ab,kf,dq.
55. (overutili* or over-utili* or overus* or over-us*).ti,ab,kf,dq.
56. ((nonurgent or non-urgent or semiurgent or semi-urgent or nonacute or non-acute or unnecessary or preventable) adj5 (patient* or visit* or use* or care or problem* or attend* or clinic*)).ti,ab,kf,dq.
57. ((level or low) adj3 (acuit* or complexit*)).ti,ab,kf,dq.
58. or/38-57
59. exp emergency/ or exp emergency medicine/ or exp emergency health service/ or emergency treatment/ or exp emergency care/ or emergency ward/ or emergency response time/ or emergency call system/ or exp ambulance/ or air medical transport/
60. (emergenc* adj5 (hospital* or department* or room* or service* or care or unit* or ward* or communication system* or dispatch* or call centre* or call center* or transportation* or psychiatr* or prehospital* or pre-hospital* or outpatient* or out-patient*)).ti,ab,kf,dq.
61. (trauma* adj3 (unit* or care)).ti,ab,kf,dq.
62. (emergicentre* or emergicenter* or emerg or paramed* or emergetolog*).ti,ab,kf,dq.
63. (accident* adj4 department*).ti,ab,kf,dq.
64. ambulance*.ti,ab,kf,dq.
65. ("Canadian Triage & Acuity Scale" or "Canadian Triage and Acuity Scale" or emergency severity index).ti,ab,kf,dq.
66. Emergency Nursing/ or emergency nurse practitioner/ or exp "first responder (person)"/ or emergency medical dispatcher/ or emergency physician/ or emergency patient/
67. (emergenc* adj4 (personnel* or staff* or team* or nurs* or physician* or doctor* or resident* or responder* or medical technician* or patient* or specialist*)).ti,ab,kf,dq.
68. (first adj3 responder*).ti,ab,kf,dq.
69. ("A and E" or "A & E" or "A&E" or CTAS or ESI).ti,ab,kf,dq.
70. emerg*.ja,jn,jx.

71. or/59-70
72. 58 and 71
73. 72 use oemezd
74. 73 not (conference abstract or conference review).pt.
75. 37 or 74
76. (systematic review or meta-analysis).pt.
77. meta-analysis/ or systematic review/ or systematic reviews as topic/ or meta-analysis as topic/ or "meta analysis (topic)"/ or "systematic review (topic)"/ or exp technology assessment, biomedical/ or network meta-analysis/
78. ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*))).ti,ab,kf.
79. ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).ti,ab,kf.
80. ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).ti,ab,kf.
81. (data synthes* or data extraction* or data abstraction*).ti,ab,kf.
82. (handsearch* or hand search*).ti,ab,kf.
83. (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).ti,ab,kf.
84. (met analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).ti,ab,kf.
85. (meta regression* or metaregression*).ti,ab,kf.
86. (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).mp,hw.
87. (medline or cochrane or pubmed or medlars or embase or cinahl).ti,ab,hw.
88. (cochrane or (health adj2 technology assessment) or evidence report).jw.
89. (comparative adj3 (efficacy or effectiveness)).ti,ab,kf.
90. (outcomes research or relative effectiveness).ti,ab,kf.
91. ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).ti,ab,kf.
92. [(meta-analysis or systematic review).md.]

93. (multi* adj3 treatment adj3 comparison*).ti,ab,kf.
94. (mixed adj3 treatment adj3 (meta-analy* or metaanaly*)).ti,ab,kf.
95. umbrella review*.ti,ab,kf.
96. (multi* adj2 paramet* adj2 evidence adj2 synthesis).ti,ab,kf.
97. (multiparamet* adj2 evidence adj2 synthesis).ti,ab,kf.
98. (multi-paramet* adj2 evidence adj2 synthesis).ti,ab,kf.
99. (overview* adj3 review*).ti,ab,kf.
100. ("review of review" or "review of reviews").ti,ab,kf.
101. or/76-100
102. 75 and 101
103. limit 102 to yr=2013-current
104. limit 103 to (english or french)
105. remove duplicates from 104

Other Databases

Cochrane Database of Systematic Reviews

Same MeSH, keywords, and limits used as per MEDLINE search, excluding study types and human restrictions. Syntax adjusted for CochraneLibrary.com platform. The search strategy is available on request.

CINAHL

Same MeSH, keywords, and limits used as per MEDLINE search, excluding study types and human restrictions. Syntax adjusted for EBSCO platform, including the addition of CINAHL headings. The search strategy is available on request.

Grey Literature

Search dates: April 03 – 13, 2023

Keywords: [Crowding, overcrowding, access blocks, bed blocks, wait times, delays, length of stay, emergency, ambulances]

Limits: Publication years: 2013-present

Updated: As project finalised less than 6 months after initial search, an updated search for grey literature was not conducted.

Relevant websites from the following sections of the CADTH grey literature checklist *Grey Matters: A Practical Tool for Searching Health-Related Grey Literature* were searched:

- Health Technology Assessment Agencies
- Databases (free)
- Internet Search
- Open Access Journal

The complete search archive of sites consulted for this report is available on request.

Appendix 2: Inclusion Criteria

Table 2: Environmental Scan Inclusion Criteria for Informational Screening

Criteria	Description
Population	People of all ages that engage with ED (e.g., patients, ED staff, pre-ED health care providers, post-ED health care providers, and allied health professionals)
Phenomena of Interest	Input, throughput, and output factors contributing to ED overcrowding Contextual factors contributing to ED overcrowding
Setting	Emergency Departments in Canada and internationally (including all health system types) Health care services that do, and have the possibility to, interface with Emergency Departments (e.g., ambulance services, long-term care services)
Types of Information	Information on identified factors contributing to ED overcrowding Information on how and extent to which the identified factors contribute to ED overcrowding

ED = emergency department.

Table 3: Eligibility Criteria for Summary of Systematic Review Evidence on Interventions

Inclusion	Exclusion
Population	

Any population in any setting
 	
Subgroups of interest:
• Age groups (pediatric, adults, older adults (65+ years)
• ED setting (urban, rural, geographically remote, virtual)
• Arrival type
  ○ Modality (ambulance, walk-in, private vehicle, etc.)
  ○ Where patients were referred from
• Admitted, not admitted or discharged status
• Acuity (e.g., Canadian Triage and Acuity Scale)
• Medical complexity (e.g., RWI scores)
• Whether patients have a primary care team
• Indigenous populations
 	
Equity deserving groups:
• Health condition (e.g., addictions and/or mental health presentation)
• Race	

Inclusion	Exclusion
• Ethnicity/Place of Origin • Language • Sex • Gender/Identity • Place of residence (e.g., fixed/non-fixed address/unhoused) • Socioeconomic status • Disability (including short term and long term) • Newcomer status • Sexual Orientation	
Interventions	
Any intervention to alleviate ED overcrowding in any setting including urban, rural, geographically remote, and virtual	
Comparators	
Any comparator; including no intervention, usual or standard care, another intervention	No comparator
Outcomes	
• ED length of stay • ED-related wait times (e.g., time before seeing provider, time from triage to care space, time to diagnosis, time from consultation to disposition, ambulance offload time, ED offload delay) • Boarding/access block outcomes (i.e., outcomes related to patients who have been admitted but are waiting for an inpatient bed) • ED occupancy (i.e., ratio of registered ED patients to available care spaces) • Number/proportion of patients in the ED waiting room • Mortality within the ED • Number/proportion of ED visits (including return visits to the ED, recurrent revisits, and return visits to the ED requiring admission) • Number/proportion of patients who left prematurely (left without being seen, against medical advice, etc.) • Patient safety (e.g., harms, adverse events) • Patient satisfaction • Health care provider capacity (e.g., provider burnout, workload, staffing insufficiencies)	

Inclusion	Exclusion
Study designs	
Published and unpublished English-language SRs[1] that include randomized controlled trials, non-randomized controlled trials, and/or comparative observational studies	• Overviews of reviews • Scoping reviews • Integrative reviews • SRs that only include case series, simulation studies, mathematical modelling approaches, theoretical studies • Clinical practice guidelines • Reviews that do not meet criteria for being SRs • Cost-effectiveness studies • Primary studies • Protocols and trial registers • Editorials, letters, and commentaries • Conference abstracts and presentations • Non-English language
Time frame	
2013 to present	Before 2013

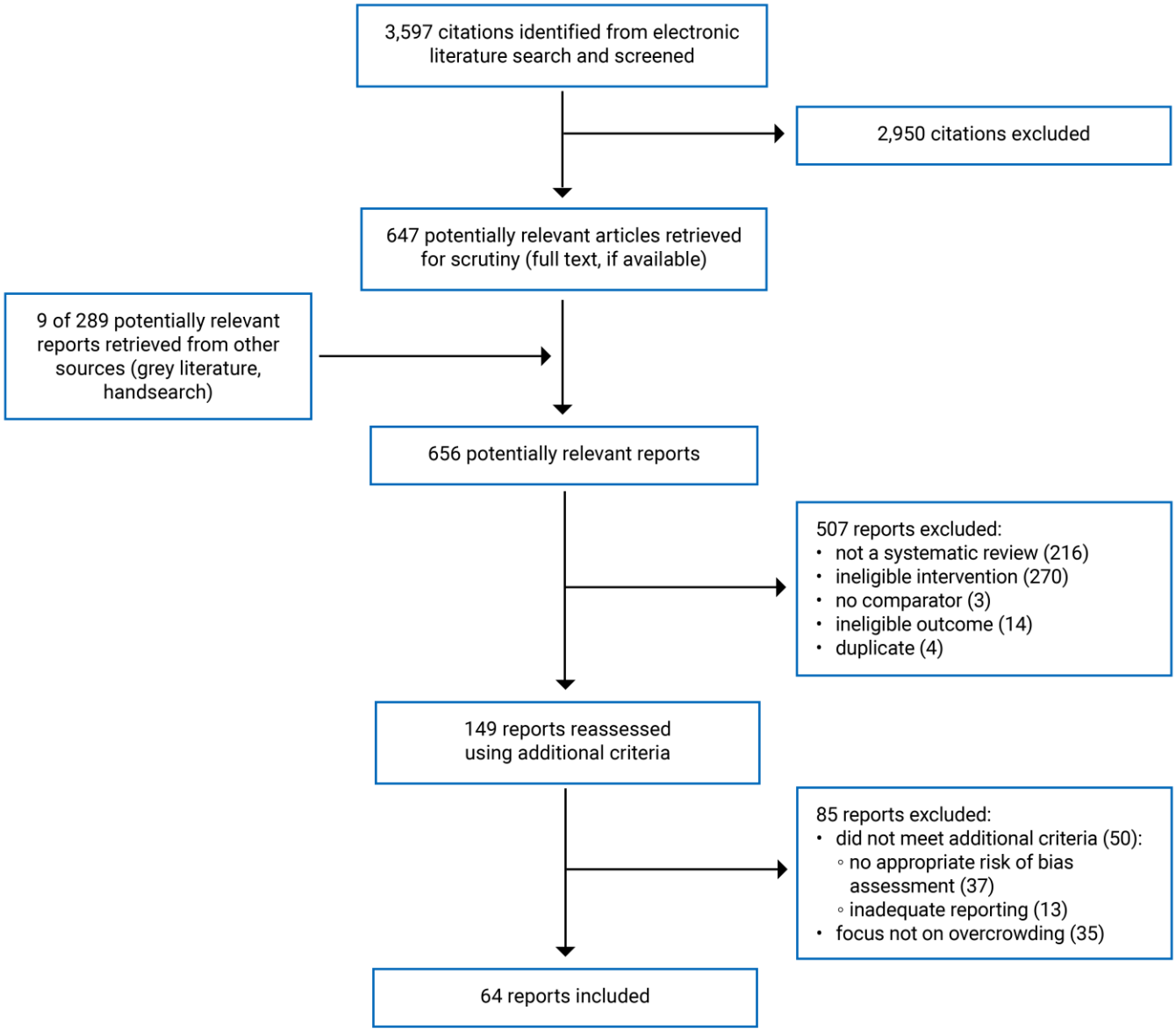
ED = emergency department; SR = systematic review

1. To be considered SRs, reports had to include a research question, sources searched with a reproducible search strategy, eligibility criteria, selection methods, reporting of methodological quality and/or risk of bias of the included studies, and information about data analysis and synthesis that would allow the results to be reproduced. In addition, SRs also had to use risk of bias methods that assessed allocation concealment and blinding for randomized controlled trials, and confounding and selection bias for non-randomized studies, be focused on ED overcrowding, and provide numerical results for most of their primary studies.

Appendix 3: Selection of Included Systematic Reviews

Figure 1: Selection of Included Systematic Reviews – Summary of Systematic Review Evidence on Interventions

3,597 citations were identified, 2,950 were excluded, while 647 electronic literature potentially relevant full text reports were retrieved for scrutiny. In total 64 reports are included in the review.



Appendix 4: Detailed Findings Tables

Table 4: Summary of Findings for Input Interventions

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Dick et al. (2023)[2] Narrative synthesis 2000 to Oct 2021	Community-based (out of hospital) interventions to reduce urgent ED visits or hospital admissions for children	Belgium, New Zealand, US Suburban and inner city (1 study)	2 NRS Telemedicine vs. Usual care	Pediatrics Higher and lower SES (1 study)	ED attendance	"telemedicine (which has gained even more importance after the COVID-19 pandemic) seemed to have the greatest impact on reducing ED attendances"	Very uncertain[a,b,c]	Low	Favourable, inconclusive
			1 RCT Pathway of urgent care for asthma implemented by general practices (2-hour group education session on assessment and management) vs. Usual care	Pediatrics Asthma	ED attendance	NC	Some uncertainty[b]	Low	Neutral
			1 NRS GP cooperative vs. Usual care	Pediatrics	ED attendance		Very uncertain[b]	Low	Favourable, inconclusive
O'Cathain et al. (2022)[3] Narrative synthesis Up to Jan 2021	"Health literacy" (defined by authors as ability to find information,	Australia, Taiwan, UK, US Urban (5 studies) Remote (1 study)	3 RCT 3 NRS Navigation tools directing people to the	Adults (3 studies) Pediatrics (3 studies) "Non-emergency problems" (as	ED attendance	NC	Very uncertain[a,b,c]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
	understand information, know how to act on information and know which services to use) interventions for reducing the use of primary and emergency services for minor health problems		range of services available (patient navigation program, educational posters in primary care, mailed information, videotapes, informational booklets, patient education on alternative venues of care, or telephone call to discuss services vs. No intervention	referred to by authors) Culturally and linguistically diverse (1 study) Mainly Black and Hispanic (1 study)					
			1 NRS Navigation tools vs. No intervention	Pediatrics Influenza-like illness	Patient satisfaction		Very uncertain[a,b,c]	Low	Favourable, inconclusive
			2 RCT 5 NRS Written educational materials about managing minor health problems vs. No intervention	Adults (1 study) Pediatrics (4 studies) Mainly African American (1 study) Mainly Latin parents (1 study) "Ethnically diverse" (as referred to by authors) (1 study) Lower SES (2 studies) "Non-emergency problems" (as	ED attendance	"We found that there was evidence that leaflets/booklets could help to reduce the use of emergency and primary care for minor health problems, but the evidence base was too mixed and not of high enough quality to draw firm conclusions about this. The best we could say was that they have the potential to work."	Very uncertain[a,b]	Low	Mixed, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
				referred to by authors)					
			1 RCT Written educational materials vs. No intervention	"Non-emergency problems" (as referred to by authors)	ED re-attendance	NC	Very uncertain[b]	Low	Neutral, inconclusive
			3 RCT 2 NRS Written educational materials vs. No intervention	Adults (1 study) Pediatrics (3 studies) "Non-emergency problems" (as referred to by authors)	Patient satisfaction		Very uncertain[a,b]	Low	Favourable, inconclusive
			1 RCT 2 NRS Person-delivered education about managing minor health problems vs. No intervention	Pediatrics (2 studies) Adults (1 study) Latin (1 study) Preferred language: Spanish (1 study) "Large ethnic minority" (as referred to by authors) (1 study) Lower income (1 study) "Non-emergency problems" (as referred to by authors)	ED attendance		Very uncertain[a,b,c,d]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 RCT Person-delivered education in the ED vs. No intervention	Pediatrics Latin "Non-emergency problems" (as referred to by authors)	Patient satisfaction		Very uncertain[a,b,c]	Low	Favourable, inconclusive
			1 NRS Rapid triage website vs. No intervention	Adolescents Mainly African American "Non-emergency problems" (as referred to by authors)	Patient satisfaction		Very uncertain[b]	Low	Favourable, inconclusive
Berkman et al. (2021)[4] Narrative synthesis Jan 2000 to Mar 2021	Any intervention for adults who have high health care needs	US Urban (1 study)	2 RCTs 1 NRS Home-based care vs. Usual care	2+ chronic conditions (1 study) 2+ ADLs that require assistance (1 study) Depression 31% (1 study) Non-white 40% (1 study)	ED visits, all ED visits, ACSC	"The evidence is insufficient to judge all other outcomes."	EPC: Low[e]	Low	Neutral, inconclusive
			2 RCTs Telephonic models of care vs. Usual care	Chronic kidney disease (all patients) Diabetes (subgroup) Ischemic vascular disease (subgroup)	ED visits, all ED visits, ACSC	"For telephonic/mail models, we also found low strength of evidence that ED visits, inpatient admissions, and mortality did not	EPC: Low[e]	Low	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
				End-stage renal disease (subgroup, 1 study)		differ between the groups."			
			5 RCTs 3 NRS Primary care models (care is embedded in 1 or more primary care practices) vs. Usual care	Adults Older adults (1 study) Depression (1 study) Chronic conditions (1 study) Complex medical and behavioral concerns (1 study) 6+ ED visits in past year (1 study) 8+ clinic visits in past year (1 study)	ED visits	"The evidence is insufficient to judge other utilization, cost, and clinical and functional outcomes."	EPC: Insufficient[e]	Low	Mixed, inconclusive
			2 RCTs Primary care models vs. Usual care	NR	ED visits, ACSC		EPC: Insufficient[e]	Low	Neutral, inconclusive
			2 RCTs 4 NRS Community-based models (care management or care coordination assistance inside and outside of the healthcare system,	Adults Houseless (1 study) Mental health and/or substance use challenges (1 study) 2+ inpatient admissions in past 6 months to 1 year	ED visits	"The evidence is insufficient to judge all other healthcare outcomes, including inpatient admissions, inpatient days, readmissions, and healthcare cost."	EPC: Insufficient[e]	Low	Mixed, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			wherever the patients are) vs. Usual care	(3 studies) 1+ ED visit in past year (2 studies)					
			1 RCT Community based model vs. Usual care	Adults Houseless Psychiatric inpatients stays and/or jail in past 2 years	ED psychiatric visits		EPC: Insufficient[e]	Low	Favourable, inconclusive
			1 RCT 1 NRS Ambulatory intensive care unit (separate clinic or a team within a clinic that provides care to patients with complex care needs) vs. Usual care	Adults Veterans	ED visits	"Evidence was insufficient to judge all other outcomes."	EPC: Insufficient[e]	Low	Neutral, inconclusive
Leduc et al. (2021)[5] Narrative synthesis Up to Feb 2019	Paramedic and allied health professionals providing on-site care to LTC patients	Canada, US Rural (1 study)	2 RCTs 11 NRS LTC on-site interventions (advance nursing, INTERACT, end-of-life care, condition specific care, or extended care paramedics) vs. No intervention	Older adults Patients living in LTC facilities	ED visits	"Although many interventions found in our study trended toward successfully reducing ED visits or hospitalizations, most studies were observational."	Very uncertain[a,b]	Moderate	Favourable, inconclusive[f]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Pulcini et al. (2021)[6] Narrative synthesis Up to Jul 2019	Any intervention to reduce ED visits by children with medical complexities	Australia, Canada, US NR	2 NRS Ambulatory-based care coordination (Pediatric Medical Home Project and Pediatric Alliance for Coordinated Care program) vs. Usual care	Pediatrics Medical complexity 1+ medical specialists	ED visits	"Our review suggests that specific elements of high-quality, comprehensive outpatient care for CMC – particularly real-time access to providers who know the child – are promising strategies to reduce ED visits. For clinical programs, 24/7 access and expedited ambulatory appointments with knowledgeable providers to address the emergency health needs of CMC were found to be promising strategies."	Very uncertain[b,c,d]	Moderate	Favourable, inconclusive
			1 RCT 7 NRS Hospital (partnered with primary care physician) care co-ordination vs. Usual care		ED visits		Very uncertain[a,b,c]	Moderate	Favourable, inconclusive[f]
			1 RCT 1 NRS Primary care-based care coordination vs. Usual care	Pediatrics Medical complexity 3+ ED visits in past year (1 study)	ED visits		Very uncertain[b,c,d]	Moderate	Favourable, inconclusive
			1 NRS Hospital pharmacist led intervention vs. Usual care	Pediatrics Multiple complex disease states Multiple chronic medications	ED visits	NC	Very uncertain[a,b,c]	Moderate	Neutral, inconclusive
Grant et al. (2020)[7] Narrative synthesis	Any throughput intervention to reduce ED crowding	US NR	2 NRS Telemedicine triage vs. Usual care	NR	ED LOS	NC	Very uncertain[a,b,c]	Low	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Up to Apr 2020									
Pritchard et al. (2020)[8] Narrative synthesis Up to Jul 2019	Any intervention to reduce ED visits by older adults	Australia, China, Italy, Spain, New Zealand, Singapore, US NR	1 RCT Telemedicine vs. Usual care	Older adults Asthma Lower income 1+ ED or urgent care visits in past year	ED visits	"Telemedicine had inconclusive effects on overall ED use but was more likely to show decreases in hospitalization and hospital readmission rates"	Some uncertainty[b,c]	Low	Favourable
			1 NRS High-intensity telemedicine vs. Usual care	Older adults living in senior living communities	ED visits, ACSC		Very uncertain[b,c]	Low	Favourable, inconclusive
			1 RCT 2 NRS Primary care-based case management vs. No intervention	Older adults 2+ ED or hospital admissions in past year (1 study)	ED visits	"community-based strategies that included regular contact with a nurse, general practitioner, or geriatrician led to better outcomes for patients"	Very uncertain[a,b,c]	Low	Neutral, inconclusive
			1 NRS Primary care-based intervention case management vs. Usual care	Older adults	Repeat ED visits	NC	Very uncertain[b,c]	Low	Neutral, inconclusive
			1 RCT Primary care-based GRACE model vs. Usual care	Older adults Low income	ED visits		Certain[c]	Low	Favourable

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 RCT Medical Alert protection system vs. Usual care	Older adults Falls	ED visits		Very uncertain[a,g]	Low	Neutral, inconclusive
			6 RCTs 5 NRS Home-based case management vs. Usual care	Older adults 2+ ED admissions in past year (2 studies) Chronic illness (2 studies) 2+ ADLs (1 study)	ED visits	NC	Very uncertain[b,d]	Low	Neutral, inconclusive
			2 RCTs 2 NRS Home-based care with educational component vs. Usual care	Older adults Heart failure (2 studies) Major functional disability (1 study)	ED visits		Very uncertain[b,f]	Low	Favourable, inconclusive
			2 RCTs Home care visits vs. Usual care	Older adults	ED use	"home visits … appeared to reduce ED use."	Some uncertainty[b,c]	Low	Favourable
			1 NRS Hospital in the nursing home program vs. Usual care in the hospital	Older adults	ED LOS	NC	Very uncertain[a,b]	Low	Favourable, inconclusive
					ED presentations				Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 NRS LTC intervention (collaboration with primary care, GPs, ambulance, and ED) vs. Usual care	Older adults	ED LOS		Very uncertain[a]	Low	Favourable, inconclusive
			2 RCT 3 NRS LTC on-site interventions vs. Usual care	Older adults	ED visits		Very uncertain[b,d]	Low	Favourable, inconclusive
			1 RCT Direct mailing intervention (to promote influenza vaccinations and to promote telephonic nurse advice service) vs. No intervention	Older adults	Condition-related ED visits		Some uncertainty[b,c]	Low	Neutral
Godard-Sebillotte et al. (2019)[9] MA Narrative synthesis Jan 1995 to Aug 2017	Any health service intervention to avoid hospital use for community-dwelling people with dementia	China, Denmark, Germany, The Netherlands, UK, US NR	10 RCTs Health services interventions[h] vs. Usual care	Older adults Females 41% to 74% Neurocognitive disorders (dementia and Alzheimer's disease)	ED visits	"None of the considered outcome comparisons provided conclusive evidence supporting the hypothesis that health service interventions lead to a decrease in service use as measured by	Some uncertainty[a,c]	Low	Neutral

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
						ED visits."			
Kirkland et al. (2019)[10] MA Narrative synthesis 1990 to Jan 2016	Any diversion strategy for low-acuity patients to bypass the ED or redirect them away from the ED	England, US, Wales NR	4 RCTs Paramedic decision making (pre-hospital diversion) vs. Transport to ED or usual ambulance response	Adults (1 study) Older adults (2 studies) Falls (2 studies) "Non-serious concerns" (as referred to by authors) (1 study) Minor injuries (1 study)	Initial ED attendance	"At this time, there is insufficient evidence to recommend the implementation of ED diversion strategies to address ED overcrowding."	Very uncertain[a,d]	Low	Neutral, inconclusive
			1 RCT 2 NRS Paramedic decision making (pre-hospital diversion) vs. Transport to ED	Older adults Falls (2 studies) "Alcohol intoxication" (as referred to by authors) (1 study) Minor injury or illness (1 study) "Non-serious" injuries or illness (as referred to by authors) (1 study)	Return ED visits	"Among the studies that could be pooled, no differences in subsequent ED utilisation were found."	Some uncertainty[a]	Low	Neutral
Poku et al. (2019)[11] Narrative synthesis Up to Nov 2018	Any intervention to reduce non-urgent ED visits by children	US NR	2 RCTs 1 NRS Written materials in the ED (home management of minor illness, primary care services or	Pediatrics Minor illness	Repeat non-urgent ED visits	"This review has demonstrated that there is inconclusive evidence to support any specific strategy aimed at reducing subsequent	Very uncertain[a,c,]	Moderate	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			appropriate use of ED services) vs. Usual care			attendance to PED after attendance with non-urgent."			
			1 RCT 1 NRS Education session in ED (availability of primary care, barriers to primary care, after-hours services, and appropriate PED visits) vs. Usual care		Repeat non-urgent visits		Very uncertain[a,c,d]	Moderate	Neutral, inconclusive
			1 RCT Telephone counselling (appropriate PED use and availability of after-hours services at primary care sites) by primary care		Repeat non-urgent visits		Some uncertainty[a,c]	Moderate	Favourable, inconclusive
Rushton et al. (2019)[12] Narrative synthesis Up to Jul 2018	Virtual or distanced triage for adults	England NR	4 RCTs 3 NRS Remote triage (triage from a distance, including telephone, video, web or SMS) vs. Usual care	Adults (1 study) Female 52% to 63% (3 studies) White 56% (1 study) Black <1% (1 study) Asian 1% (1 study) Respiratory 38% (2 studies)	ED utilization	"We found moderate COE to support that remote triage has no effect on ED utilization among the studies comparing in-person and phone modalities and call professional type."	GRADE: Moderate[e]	Moderate	Neutral

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			4 RCTs Remote triage vs. Usual care	Adults (1 study) Female 60% (1 study) White 56% (1 study) Black <1% (1 study) Asian 1% (1 study)	Patient satisfaction	"There is low or very low COE that remote triage has no effect on improving patient satisfaction."	GRADE: Very low[e]	Moderate	Neutral, inconclusive
Santosaputri et al. (2019)[13] Narrative synthesis 2010 to Nov 2017	Interventions led by geriatrics-trained staff for nursing home residents	Australia, Canada, Spain, US NR	1 NRS ED-based hospital avoidance intervention (ED-based nurses manage patients in nursing home and provide education and support to staff) vs. No intervention	Older adults	ED presentations	NC	Very uncertain[b]	Moderate	Favourable, inconclusive
			1 NRS Interventions applied in nursing homes to prevent hospitalization of residents vs. Usual care	Older adults	ED LOS	NC	Very uncertain[b]	Moderate	Favourable, inconclusive
			6 NRS Interventions applied in nursing homes to prevent hospitalization of residents vs. Usual care	Older adults "Delirium" (as referred to by authors) (1 study)	ED presentations		Very uncertain[a,b,d]	Moderate	Favourable, inconclusive[f]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Morley et al. (2018)[14] Narrative synthesis Jan 2000 to Jun 2018	Any solutions to ED overcrowding for adults	Australia, Canada, Finland, Korea, Singapore, the Netherlands, UK, US NR	3 NRS Extended GP opening hours vs. Usual care	Adults Pediatrics (1 study)	ED visits	NC	Very uncertain[b]	Moderate	Favourable, inconclusive
			2 NRS GP-led walk-in centres vs. No intervention	Adults	ED visits		Very uncertain[a,b,c]	Low	Mixed, inconclusive
Crawford et al. (2017)[15] Narrative synthesis 2000 to 2014	Walk-in centres and GP co-operatives for adults	Australia, Ireland, The Netherlands, Switzerland, UK NR	3 NRS Walk-in centre vs. No intervention	Adults	ED presentations	The evidence for use of WIC as an alternative non-urgent pathway varied considerably."	Very uncertain[a,b,c]	Low	Mixed, inconclusive
			1 NRS Walk-in centres vs. No intervention	Adults	HCP workload in the ED	"Walk-in-centres have the potential to impact on ED workloads but there is little recent research and more work is required to substantiate this pathway".	Very uncertain[b]	Low	Neutral, inconclusive
			5 NRS GP co-operative vs. No intervention	Adults Musculoskeletal and skin concerns (1 study)	ED presentations	"GP cooperatives with nurse-led triage of medical emergency care (as in The Netherlands) do receive and reduce a proportion of ED presentations in less	Very uncertain[b]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
						urgent patient categories."			
Huntley et al. (2017)[16] Narrative synthesis Jan 2005 to Dec 2016	Interventions to avoid hospital admissions in older adults	Australia, Sweden, UK, US NR	1 RCT Paramedic practitioner service vs. Inactive paramedic service	Older adults Female 72% Falls, hemorrhage, acute medical condition	ED attendance	NC	Some uncertainty[b]	Moderate	Favourable
					Call time to ED discharge				
					Patient satisfaction				
			2 NRS Hospital-at-home (or in the nursing home) vs. Usual care in the hospital	Older adults Female 34% to 76% White 90% (1 study) Lower income 11% (1 study) Acutely ill	ED LOS		Very uncertain[a]	Moderate	Unfavourable, inconclusive
			1 NRS Hospital-at-home model vs. Usual care	Older adults Female 34% White 90% Lower income 11% Acutely ill	ED visits		Very uncertain[a,b,c]	Moderate	Neutral, inconclusive
			1 RCT EMS pre-hospital decision making	Older adults Female 56%	Subsequent ED transfers		Some uncertainty[b]	Moderate	Favourable

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			(following triage at home) vs. Direct transport to ED						
Peterson et al. (2013)[17] Narrative synthesis Up to Sept 2012	Intensive primary care programs	Canada, US Urban	1 RCT Home-based primary care model vs. Usual care	Older adults 78% White ≥ 2 ADL impairments Heart disease 16% Respiratory diseases 13% Cerebrovascular disease 9%	ED use	NC	Very uncertain[a,c,g]	Low	Neutral, inconclusive
			1 RCT Free standing primary care clinic vs. Usual care	Older adults Females 71% Frailty Chronic diseases Cognitive concerns 31% Depressive symptoms 13%	ED visits	NC	ECP: Moderate[e]	Low	Neutral[f]
			1 RCT Primary care-based GRACE model vs. Usual care	Older adults Female 76% White 41% Black 59%	ED visits	"The best evidence of the effectiveness of practice-based models comes from the GRACE program, which found a statistically significant	EPC: Moderate[e]	Low	Favourable

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
				Income < 200% of federal poverty level Living alone 47% (1 study) Depression 11% Diabetes 34%		reduction in emergency room visits per-1,000 patients in year two."			
			1 RCT Ambulatory chronic care clinic vs. Usual care	Older adults Female 48% White 97% Diabetes 51%	ED visits		ECP: Low[e]	Low	Neutral, inconclusive
			1 RCT Primary intensive care vs. Usual care	Adults Female 67% White 31% ≥ 2 hospitalizations in past year Diabetes 26% COPD 20% Chronic heart failure 15% Any psychiatric disorder 47%	ED visits	"The only model that specifically focused on patients with high utilization of inpatient services was the Primary Intensive Care (PIC) model. But, the best evidence available to evaluate this model was low strength as it was limited to one randomized trial of 96 patients with a high risk of bias and it did not find statistically significant reductions in hospitalizations,	ECP: Low[e]	Low	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
						hospital days or emergency department use."			

ADL = activities of daily living; AMSTAR2 = A MeaSurement Tool to Assess systematic Reviews; ACSC = ambulatory care sensitive conditions; ATS = Australian Triage Scale; CMC = children with medical complexity; COE = certainty of evidence; ED = emergency department; COPD = chronic obstructive pulmonary disease; ECP = Evidence-based Practice Center Program of the Agency of Healthcare Research and Quality; EMS = Emergency Medical Services; GP = general practitioner; GRACE = Geriatric Resources for Assessment and Care of Elders; GRADE = grading of recommendation, assessment, development and evaluation; INTERACT = interventions to reduce acute care transfers; LOS = length of stay; MA = meta-analysis; NC = no conclusion; NR = not reported; NRS = non-randomized studies; PED = pediatric emergency department; RCT = randomized controlled trial; SMS = short message service; TBT = time-based target; UK = United Kingdom; US = United States; vs = versus; WIC = walk-in centre.

[a] Low quality or high risk of bias reported by SR authors

[b] Uncertain precision due to missing information and inconsistent reporting in SR

[c] May not be generalizable to Canadian context; however, certainty was not rated down for indirectness

[d] High heterogeneity of effects across primary studies

[e] As reported by SR authors

[f] At least 1 primary study was conducted in Canada

[g] Imprecision due to low number of participants

[h] Health services interventions include delivery arrangements (self-management, case management, information and communication technology, comprehensive geriatric assessment) and implementation strategies (educational materials and meetings for health care professionals).

Table 5: Summary of Findings for Throughput Interventions

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
van den Broek et al. (2023)[18] Narrative synthesis Up to Jan 2023	Care transitions for older adults in the ED	Australia, Belgium, UK, US NR	2 NRS Structured needs assessment by geriatric ED nurse vs. Usual care	Older adults (1 study)	ED LOS	NC	Very uncertain[b]	Moderate	Mixed, inconclusive
			5 NRS Structured needs assessment by nurses or care coordination teams in the ED vs. Usual care	Adults (1 study) Older adults (4 studies) "Self-poisoning" (as referred to by authors) (1 study) "Non-critical conditions" (as referred to by authors) (1 study)	ED revisits	"The interventions, regardless of content and by whom activities were provided (team vs one professional), were associated with reduced ED revisits"	Very uncertain[b,c]	Moderate	Favourable, inconclusive
Anderson et al. (2022)[19] Narrative synthesis Up to Mar 2021	Short-stay crisis units for adult mental health patients	Australia, UK, US NR	4 NRS Short stay crisis unit (behavioural assessment unit, psychiatric assessment and planning unit, psychiatric observation unit, short-term psychiatric decision	Adults Mental health challenges	ED LOS	"In conclusion, there is good evidence that short-stay crisis units, provided for people on a mental health crisis care pathway, can achieve the primary goals of reducing pressure on the emergency department."	GRADE: Moderate[d]	Moderate	Favourable

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			unit, or EmPATH unit) vs. Usual care						
			2 NRS Short stay crisis unit vs. Usual care		ED-related wait times		Some uncertainty	Moderate	Favourable
			1 NRS Short stay crisis unit vs. Usual care		Psychiatric boarding time		Some uncertainty[e]	Moderate	Favourable
					LWBS LAMA			Moderate	Neutral
			1 NRS Short stay crisis unit vs. Usual care		ED presentations via street triage (mobile team)		Very uncertain[a]	Moderate	Favourable, inconclusive
			2 NRS Short stay crisis unit vs. Usual care		Code grey events in the ED		Some uncertainty	Moderate	Favourable
					Restraint procedures			Moderate	Favourable
Detollenaere et al. (2022)[20] Narrative synthesis 2009 to Jan 2021	Any organizational models (methods or interventions to improve operational processes of	Australia, Portugal, The Netherlands, US, UK NR	1 NRS Virtual observational unit for selected pediatric conditions in pediatric ED vs. Usual care	Pediatrics	ED LOS, discharged patients	NC	Very uncertain[a,b,e]	Moderate	Favourable, inconclusive
					ED LOS, admitted patients			Moderate	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
	care delivery) in the ED for children		2 NRS Pediatric ED vs. General ED or usual care		ED LOS		Very uncertain[a,b]	Moderate	Mixed, inconclusive
			1 NRS Pediatric ED vs. General ED		ED visits		Very uncertain[a,b]	Moderate	Unfavourable, inconclusive
			1 NRS Implementation of pediatric ED vs. Usual care		Parental satisfaction		Very uncertain[a,b]	Moderate	Favourable, inconclusive
			2 NRS GP or GP cooperative in ED vs. Usual care		ED LOS	"Integrating a GP or GPC in the ED for less urgent reasons-of-encounter led to a reduction in hospital admission rates for most of the studies (one study reported only lower hospitalisations during out-of-hours) and shorter waiting times."	Very uncertain[b,c]	Moderate	Favourable, inconclusive
			3 NRS GP or GP cooperative in ED vs. Usual care		ED-related wait times		Very uncertain[b,c]	Moderate	Favourable, inconclusive
			1 NRS Pediatrician at triage in ED vs. Conventional registered nurse-driven triage	Pediatrics	ED LOS	"We also identified one publication in which paediatricians did the triage of paediatric patients instead of conventional registered	Very uncertain[b,e]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
						nurse-driven triage. This model did not have a significant effect on hospital admission rates but led to a considerable reduction in the ED LOS."			
			1 NRS Pediatric consultation liaison team vs. Usual care	Pediatrics Mental health challenges	ED LOS	"It appears that a paediatric consultation liaison team has the most consistent effect on hospital admission rates and ED LOS of paediatric patients presenting with mental problems at the ED."	Very uncertain[b,e]	Moderate	Favourable, inconclusive
Jeyaraman et al. (2022)[21] MA Narrative synthesis Up to Jan 2020	Primary HCP at ED triage	Australia, Canada, China, England, France, Oman, The Netherlands, US Urban (26 studies) Rural (1 study)	8 RCTs 22 NRS Primary HCP (GP, NP, or nurse) at triage vs. Traditional nurse-led triage	Pediatrics (5 studies) Adults (3 studies)	ED LOS	"The findings in this systematic review shows that the PHCP-led triage interventions significantly decrease the ED LOS and lead to improvements in key ED patient flow metrics such as PIA, proportion of patients who LWBS, triage time, ED visits and patient satisfaction."	Very uncertain[b,c]	Low	Favourable, inconclusive[f]
			2 RCTs 12 NRS Primary HCP at triage vs. Traditional nurse-led triage	Adults (3 studies) Adult and pediatrics (2 studies) Pediatrics (1 study)	Time to PIA		Very uncertain[b,c]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
		Both urban and rural (2 studies)	6 NRS Primary HCPs at triage vs. Traditional nurse-led triage	Pediatrics (1 study)	ED repeat visits		Very uncertain[a,b]	Low	Favourable, inconclusive[f]
			10 NRS Primary HCP at triage vs. Traditional nurse-led triage	Adults (2 studies) Adult and pediatrics (2 studies)	Patient satisfaction		Very uncertain[a,b]	Low	Favourable, inconclusive[f]
			1 RCT 2 NRS Primary care NP at team triage or Nurse triage-plus (primary care triage nurse with increased authority to order investigations before streaming to ED physician) vs. Traditional nurse-led triage	Adults (1 study)	Time to triage		Very uncertain[b,c]	Low	Favourable, inconclusive
			10 NRS Primary care NP at team triage or Nurse triage-plus	Adults (2 studies) Pediatrics (2 studies) Adults and Pediatrics (1 study)	LWBS		Very uncertain[a,b]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			vs. Traditional nurse-led triage						
			3 NRS Primary care NP at team triage vs. Traditional nurse-led triage	NR	LAMA		Very uncertain[a,b,e]	Low	Favourable, inconclusive
Soster et al. (2022)[22] MA Narrative synthesis Up to Mar 2020	Triage protocols in EDs	Canada, China, Denmark, England NR	10 RCTs Advanced triage protocols vs. Conventional triage or CTAS	Adults (6 studies) Adults and pediatrics (4 studies)	ED LOS (narrative synthesis)	NC	Some uncertainty[c]	Moderate	Favourable[f]
			4 RCTs Advanced triage protocols with Ottawa Ankle Rules vs. Conventional triage or CTAS	Adults (1 study) Adults and pediatrics (3 studies)	ED LOS (MA)	"Using the advanced triage protocol in emergency services made it possible to attain a 36-minute mean reduction in the length of stay of patients in this locus, with greater repercussion in services with prolonged permanence times."	Some uncertainty[c]	Moderate	Favourable[f]
			3 RCTs Advanced triage protocols without Ottawa Ankle Rules vs. Conventional triage, CTAS, or Manchester Triage System	Adults (2 studies) Adults and pediatrics (1 study)	ED LOS (MA)		Some uncertainty[c]	Moderate	Favourable[f]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			4 RCTs Advanced triage protocols (with or without Ottawa Ankle Rules vs. Conventional triage or CTAS	Adults (3 studies) Adults and pediatrics (1 study)	Patient satisfaction	"The triage professionals are competent to initiate diagnostic procedures in triage in a safe manner, as long as they are trained to do so, and these measures reflect an increase in the patients' satisfaction."	GRADE: Moderate[d]	Moderate	Favourable[f]
Tlapa et al. (2022)[23] Narrative synthesis Up to Jun 2022	LEAN health care interventions supported by digital technologies (including simulation, electronic medical records, electronic charting, electronic and patient tracking system, automation, automated infusion system, and ED bed board)	Columbia, Spain, US NR	6 NRS LEAN supported by digital technologies vs. Usual care	Pediatrics (1 study)	ED LOS	"According to our results, most LH interventions supported by DTs have a favourable effect on outcomes oriented to patient flow (TAT, LOS, TOT, waiting time, and LWBS). Therefore, LH and DTs best serve to improve outcomes related to the utilization, coverage, or access to services."	Very uncertain[a,c,e]	Moderate	Favourable, inconclusive
			7 NRS LEAN supported by digital technologies vs. Usual care		ED-related wait times		Very uncertain[a,c,e]	Moderate	Favourable, inconclusive
			4 NRS LEAN supported by digital technologies vs. Usual care		LWBS		Very uncertain[a,e]	Moderate	Favourable, inconclusive
			LEAN supported by digital technologies vs. Usual care		Patient satisfaction	NC	Very uncertain[a,e]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Voaklander et al. (2022)[24] MA Narrative synthesis Up to Jan 2021	Interventions to improve the ED consultation process	Australia, Canada, Singapore, South Korea, Turkey, US NR	1 RCT 16 NRS Interventions to improve ED consultation (e.g., to improve consult responsiveness, to improve access to consultants in the ED, to expedite ED consultations, or to bypass ED consultations) vs. Usual care	Adults (9 studies) Pediatrics (2 studies) Adults and pediatrics (2 studies) Appendicitis (3 studies) Internal medicine (2 studies) Psychiatric (2 studies) Surgical (2 studies) Cardiology (1 study) Critically ill (1 study) End-stage illness (1 study) Pneumonia (1 study) Trauma (1 study)	ED LOS	"The majority of the intervention categories were effective at reducing ED length of stay, with interventions to improve consult responsiveness and improved access to consultants in the ED also being effective in reducing the time for specialists to respond to ED consultation requests."	Very uncertain[b,c]	Low	Favourable, inconclusive[f]
			1 RCT 5 NRS Interventions to improve ED consultation (e.g., to improve consult responsiveness, to improve access to	Adults (4 studies) Adults and pediatrics (1 study) Acute appendicitis (1 study)	Consultation response time		Very uncertain[b,c]	Low	Favourable, inconclusive[f]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			consultants in the ED, or to expedite ED consultations) vs. Usual care						
			2 NRS Interventions to improve consultations in the ED vs. Usual care	Adults Patients with sepsis (1 study)	Other ED-related wait times	NC	Very uncertain[b,e]	Low	Favourable, inconclusive
Berkman et al. (2021)[4] Narrative synthesis Jan 2000 to Mar 2021	Any intervention for adults who have high health care needs	US Urban (4 studies)	4 RCT 2 NRS ED-based models of care (clinical case management, care coordination, or patient navigation) vs. Usual care	Adults Older adults (1 study) 3+ ED visits in past year Substance use challenges (2 studies) Houseless (1 study)	ED visits, all cause	"We found a greater reduction in ED visits in the intervention group, based on consistent and precise evidence from four RCTs and two observational studies (moderate strength of evidence for favourable findings)."	EPC: Moderate[d]	Low	Favourable
Burgess et al. (2021)[25] Narrative synthesis Jan 2000 to Jan 2020	Any nurse-initiated interventions in the ED	Australia, Canada, China, Sweden, Saudi Arabia, The	3 RCTs 12 NRS Nurse-initiated treatments	Adult (7 studies) Pediatrics (6 studies) Neonates (1 study)	Time to treatment	"Nurse-initiated interventions may facilitate progression of care in the ED and have	Very uncertain[b,c]	Low	Favourable, inconclusive[f]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
		Netherlands, US NR	(analgesia, medications, treatment protocols) in the ED vs. Usual care	Pain (6 studies) Asthma (3 studies) Musculoskeletal injury (2 studies)		potential to improve time to treatment."			
			9 NRS Nurse-initiated treatments in the ED vs. Usual care	Adult (4 studies) Pediatrics (3 studies) Traumatic extremity or pain	Time to analgesia	The findings of this review indicate nurse-initiated analgesia is a feasible intervention to achieve timely analgesia for some patients. However, the 30 min benchmark was only achieved in two of the studies."	Very uncertain[b,c]	Low	Favourable, inconclusive[f]
Gottlieb et al. (2021)[26] MA Narrative synthesis Up to Mar 2020	Medical scribes to support clinicians	Australia, Canada, US NR	6 NRS Medical scribes in the ED vs. No intervention	NR	ED LOS, all	"we did not identify an improvement in ED length of stay."	GRADE: Very low[d]	Moderate	Neutral, inconclusive
			4 NRS Medical scribes in the ED vs. No intervention		ED LOS, admitted patients	"Scribes had no effect on ED length of stay for admitted or discharged patients."	GRADE: Very low[d]	Moderate	Neutral, inconclusive
			5 NRS Medical scribes in the ED vs. No intervention		ED LOS, discharged patients		GRADE: Very low[d]	Moderate	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			9 NRS Medical scribes in the ED vs. No intervention		Time to disposition	"Scribes also decreased the length of stay among clinics but did not influence length of stay or time to disposition in the ED setting."	GRADE: Very low[d]	Moderate	Neutral, inconclusive[f]
			2 RCTs 16 NRS Medical scribes in the ED vs. No intervention		Patient satisfaction	"In summary, we found that scribes improved RVUs per hour, RVUs per encounter, patients per hour, clinic length of stay, provider satisfaction, and patient satisfaction."	Very uncertain[b,c]	Moderate	Favourable, inconclusive
Kinnear et al. (2021)[27] Narrative synthesis Jan 2000 to Mar 2019	Dedicated care for urological patients in EDs	UK NR	1 NRS Dedicated registrar vs. No intervention	Urological surgery	Time to theatre	"This first systematic review of dedicated models of care for EUPs suggested that they may offer many benefits. Patients may experience reduced time to theatre"	Very uncertain[g]	Moderate	Favourable, inconclusive
Pulcini et al. (2021)[6] Narrative synthesis Up to Jul 2019	Any intervention to reduce ED visits by children with medical complexities	Australia NR	1 NRS Nurse-led care coordination program (Accelerated care through Emergency	Pediatrics	ED visits	NC	Very uncertain[a,b]	Moderate	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			program) vs. Usual care						
Benabbas et al. (2020)[28] MA Narrative synthesis Up to Apr 2019	Triage liaison providers in EDs	US Urban	9 NRS Triage liaison provider vs. Usual care	NR	ED LOS, all	"Implementation of TLP resulted in reduction of ED-LOS in all except one study however the results were too heterogeneous to pool the data. A subgroup analysis based on disposition, admitted versus discharged from the ED, or type of TLP, physician vs NPP did not decrease the heterogeneity."	Very uncertain[b,c,e,g]	Low	Favourable, inconclusive
			5 NRS Triage liaison provider vs. Usual care		ED LOS, admitted patients			Low	Neutral, inconclusive
			4 NRS Triage liaison provider vs. Usual care		ED LOS, discharged patients			Low	Favourable, inconclusive
			10 NRS Triage liaison provider vs. Usual care		LWBS	"Implementation of TLP reduces LWBS when attending physicians act as TLP however more studies are needed to clarify the role of resident physicians or NPPs as TLPs."	Very uncertain[b,c,e]	Low	Favourable, inconclusive
			2 NRS Triage liaison provider vs. Usual care		LWCA	"We also found a decrease in LWCA when TLP was implemented"	Very uncertain[b,e]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Cicolo et al. (2020)[29] Narrative synthesis 1994 to May 2017	Manchester Triage System in the ED	The Netherlands NR	2 NRS Nurse-implemented Manchester Triage System in ED vs. Usual care	Adults Any complaint (1 study) Acute ischemic stroke (1 study) Female 49% to 50%	Time to treatment, all patients	"The limitations presented do not allow definitive conclusions. However, the included studies showed some improvements in TtT after MTS implementation."	GRADE: Very low[d]	Moderate	Neutral, inconclusive[f]
			1 NRS Nurse-implemented Manchester Triage System in ED vs. Usual care	Adults Any complaint	Time to treatment, patients who arrived via ambulance		Very uncertain[a]	Moderate	Favourable, inconclusive
					Time to treatment, patients referred by GP			Moderate	Favourable, inconclusive
Grant et al. (2020)[7] Narrative synthesis Up to Apr 2020	Any throughput intervention to reduce ED crowding	Australia, Canada, Finland, Jamaica, Korea, Pakistan, Spain, Sweden, Switzerland, The Netherlands, Turkey, UK, US Remote and rural (1 study)	1 RCT 5 NRS Physicians in triage vs. Usual care	NR	ED LOS	"Earlier physician or provider assessment at triage is an effective strategy that makes use of existing resources and modestly improves ED length of stay."	Some uncertainty[c]	Low	Favourable[f]
					LWBS	NC		Low	Favourable, inconclusive[f]
			6 NRS NP- or PA-led triage vs. Usual care		ED LOS		Very uncertain[b,c,e]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			3 NRS NP- or PA-led triage vs. Usual care		LWBS		Very uncertain[b,c,e]	Low	Neutral, inconclusive
			1 RCT 3 NRS Team triage vs. Usual care	Pediatrics (1 study)	ED LOS		Some uncertainty[a]	Low	Favourable
					LWBS		Very uncertain[a,c]	Low	Neutral, inconclusive
			1 RCT 5 NRS Medical scribes in ED vs. Usual care	NR	ED LOS	"Evidence is insufficient to warrant recommendations for or against alternative staffing models. Focusing ED staff on operational improvement is likely to improve performance, regardless of the intervention type."	Some uncertainty[c]	Low	Neutral
			1 NRS Medical scribes in ED vs. Usual care	Pediatrics	LWBS		Very uncertain[a,c]	Low	Unfavourable, inconclusive
			1 NRS Additional on-duty physician per shift in ED vs. Usual care	NR	ED LOS		Very uncertain[a]	Low	Favourable, inconclusive
			1 NRS Team triage initiates testing and rapid disposition vs. Usual care		ED LOS		Very uncertain[a,e]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 NRS New MD signup: patients assigned to physicians automatically by algorithm vs. Usual care		ED LOS		Very uncertain[a,e]	Low	Favourable, inconclusive
			1 NRS New MD signup by algorithm vs. Usual care		LWBS		Very uncertain[a,e]	Low	Unfavourable, inconclusive
			1 NRS Peer pressure (ED physician discharge rates publicized to group by monthly email) vs. Usual care		ED LOS		Very uncertain[a,e]	Low	Favourable, inconclusive
			3 NRS New NP in ED vs. Usual care		ED LOS		Very uncertain[b,c]	Low	Favourable, inconclusive[f]
			1 NRS New NP in ED vs. Usual care		LWBS		Very uncertain[a,b,c]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			2 NRS Physiotherapist as primary provider in ED vs. Usual care	Musculoskeletal injuries	ED LOS		Very uncertain[c]	Low	Favourable, inconclusive
			1 NRS Primary care physician in ED vs. Usual care	Musculoskeletal injuries, fractures, minor wounds	ED LOS		Very uncertain[a]	Low	Favourable, inconclusive
			1 NRS Weekday rounds by attending psychiatrists on ED mental health patients	Mental health challenges	ED LOS		Very uncertain[a]	Low	Neutral, inconclusive
			1 NRS Dedicated neurologist in ED vs. Usual care	NR	ED LOS		Very uncertain[a]	Low	Favourable, inconclusive
					LWBS				
			1 NRS Nurse-initiated X-rays vs. Usual care	Lower limb injuries	ED LOS		Very uncertain[a]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			5 RCTs 13 NRS Changes in diagnostic testing (laboratory testing, POCT, orders at triage, imaging) vs. Usual care	Pediatrics (1 study) Chest pain (1 study) 26 rural and remote EDs (1 study)	ED LOS	"New diagnostic testing and point-of-care testing strategies were also associated with incremental cost, and reductions in length of stay were limited to relevant patient subsets (e.g., those requiring troponin testing), making these interventions best suited to EDs where a large number of patients have similar presentations."	Very uncertain[b,c]	Low	Favourable, inconclusive[f]
			25 NRS Patient streaming (split-flow or fast track) vs. Usual care	Pediatrics (2 studies)	ED LOS	"Introducing a fast track and optimizing processes for important case-mix groups are likely to enhance throughput."	Certain	Low	Favourable
			8 NRS Patient streaming (split-flow or fast track) vs. Usual care	Pediatrics (1 study)	LWBS		Very uncertain[a,b]	Low	Favourable, inconclusive
			1 NRS LEAN vs. Usual care	Pediatrics	ED LOS	NC	Very uncertain[a,b,e]	Low	Unfavourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			2 NRS Information systems with patient tracking or computerized SMS vs. Usual care	NR	ED LOS		Very uncertain[a,b,e]	Low	Favourable, inconclusive
			2 NRS Electronic documentation system or computerized provider order entry with alerts vs. Usual care	NR	ED LOS		Very uncertain[a]	Low	Unfavourable, inconclusive[f]
			2 NRS Electronic documentation system vs. Usual care	NR	LWBS		Very uncertain[a]	Low	Favourable, inconclusive[f]
Mullins et al. (2020)[30] Narrative synthesis	EHRs in EDs	US NR	1 NRS EHR in the ED vs. No intervention	NR	ED LOS, all	"The findings in this review emphasise that EHR use in the ED is	Very uncertain[a,e]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Jan 2009 to Sept 2019			2 NRS EHR in the ED vs. Usual practice or no intervention		ED LOS, discharged patients	associated with length of stay reductions, improved diagnosis accuracy, quality of life improvements and clinical decision changes. Two studies reported length of stay reductions, when compared to retrieving	Very uncertain[a,e]	Moderate	Favourable, inconclusive
Pritchard et al. (2020)[8] Narrative synthesis Up to Jul 2019	Any intervention to reduce ED visits by older adults	Australia NR	1 RCT Pharmacist in ED (medication review + patient interview) vs. Usual care	Older adults 5+ medications daily	ED re-presentations	NC	Some uncertainty[a]	Low	Neutral
Ratsimbazafy et al. (2020)[31] Narrative synthesis Up to Aug 2019	Interventions to prevent unplanned readmissions or ED visits for older patients with falls	Australia, Canada NR	3 NRS ED-based care co-ordination vs. Usual care	Older adults Falls	ED revisits	NC	Very uncertain[b]	High	Neutral, inconclusive[f]
Sharma et al. (2020)[32] Narrative synthesis 1990 to Nov 2019	Nurse interventions to maintain patient flow in EDs	Australia, India, Iran, US Urban (2 studies) Inner city (1 study)	5 NRS Strategic nursing roles in ED (nurse navigator, flow coordinator, or case manager) vs. Usual care	NR	ED LOS	NC	Very uncertain[a,c]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			4 NRS Strategic nursing roles in ED vs. Usual care		ED-related wait times		Very uncertain[a,c]	Low	Favourable, inconclusive
			1 NRS Strategic nursing roles in ED vs. Usual care		Ambulance diversion time		Very uncertain[a]	Low	Favourable, inconclusive
			1 NRS Strategic nursing roles in ED vs. Usual care		Boarding time Access block		Very uncertain[a]	Low	Neutral, inconclusive
			2 NRS Strategic nursing roles in ED vs. Usual care		ED occupancy		Very uncertain[a]	Low	Favourable, inconclusive
			2 NRS Strategic nursing roles in ED vs. Usual care		LWBS		Very uncertain[a,c]	Low	Favourable, inconclusive
			1 NRS Strategic nursing roles in ED vs. Usual care		Patient satisfaction		Very uncertain[a,e]	Low	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 NRS Mental health liaison nurse vs. Usual care		ED-related wait times		Very uncertain[a]	Low	Favourable, inconclusive
			1 NRS NP in triage vs. Usual care		Time to HCP LWBS		Very uncertain[a,e]	Low	Favourable, inconclusive
			1 NRS Nurse coordinator for bed management strategy) vs. Usual care		ED LOS Hold time Ambulance diversion time		Very uncertain[a,e]	Low	Favourable, inconclusive
					LWBS Patient satisfaction			Low	Neutral, inconclusive
Tlapa et al. (2020)[33] Narrative synthesis Jan 2002 to Dec 2018	Lean health care interventions	Australia, Canada, China, Italy, Lebanon, Spain, Sweden, US NR	18 NRS LEAN vs. Usual care	Cardiac (1 study) Mental health (1 study) Radiology (1 study)	ED LOS, all patients	"Considering the dimensions of quality of care, this review presents evidence that LH reduces patient waiting time and length of stay, thus contributing to the provision of accessible and efficient service. Notwithstanding the mostly favourable	Very uncertain[a,b,c]	High	Favourable, inconclusive[f]
			6 NRS LEAN vs. Usual care	NR	ED LOS, admitted patients		Very uncertain[a,c]	High	Favourable, inconclusive[f]
			9 NRS LEAN vs. Usual care		ED LOS, discharged patients		Very uncertain[a,b,c]	High	Favourable, inconclusive[f]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			22 NRS LEAN vs. Usual care		ED-related wait times	findings of LH intervention, we advise caution when generalizing owing to the relatively weak study designs."	Very uncertain[a,b,c]	High	Favourable, inconclusive
			1 NRS LEAN vs. Usual care	NR	Boarding time		Very uncertain[a]	High	Favourable, inconclusive
			11 NRS LEAN vs. Usual care		LWBS	NC	Very uncertain[a,b,c]	High	Favourable, inconclusive[f]
			3 NRS LEAN vs. Usual care		Patient satisfaction		Very uncertain[a,b,c]	High	Favourable, inconclusive[f]
Beals et al. (2019)[34] MA Up to Mar 2018	Pelvic point of care ultrasound for pregnant people	US Urban	2 RCTs 6 NRS Pelvic POC ultrasound vs. Comprehensive ultrasound	Pregnant at <20 weeks gestation with pelvic pain or vaginal bleeding	ED LOS	"The authors of this review believe that the utilization of PPOCUS for evaluation of symptomatic early pregnancy is likely to lead to decreased LOS when employed."	Very uncertain[b,c,e]	Low	Favourable, inconclusive
Cassarino et al. (2019)[35] Narrative synthesis Up to Apr 2019	Early assessment by health and social care professionals for adults in the ED	Australia NR	0 studies Early assessment by interdisciplinary care coordination team in the ED vs. Usual care	Older adults	ED LOS	"In our review, we selected ED length of stay as primary outcome because it is considered a key measure of patient flow and ED performance, but no	NA	Moderate	No evidence

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
						studies evaluated this outcome."			
			2 NRS Early assessment by interdisciplinary care coordination team in the ED vs. Usual care	Older adults Female 55% (1 study) Accessed ED frequently (1 study) Psychiatric or drug and alcohol challenges (1 study)	ED re-attendance	NC	Very uncertain[a,b,c]	Moderate	Neutral, inconclusive
			2 NRS Early assessment by interdisciplinary care coordination team in the ED vs. Usual care	Older adults Accessed ED frequently (1 study) Psychiatric or drug and alcohol challenges (1 study)	Patient satisfaction	"In this systematic review, we found some evidence that HSCPs working in teams can contribute to enhanced quality of care in the ED in the form of reduced hospital admissions, as well as improved patient and staff satisfaction. However, the limited number of studies and the presence of methodological heterogeneity across these studies highlight the need for further	Very uncertain[a,b]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
						investigations on the clinical and cost effectiveness of this model of care using robust study designs and methods."			
			1 NRS Interdisciplinary care coordination team in the ED vs. Usual care	Older adults	HCP workload and team effectiveness	NC	Very uncertain[a,b]	Moderate	Favourable, inconclusive
Considine et al. (2019)[36] Narrative synthesis Up to Aug 2018	Nurse-initiated X-rays in the ED for people with distal limb injuries	Australia, Canada, China, The Netherlands, US NR	3 RCTs 1 NRS Nurse (or NP)-initiated X-rays in the ED vs. Physician (or medical officer)-initiated X-rays (or usual care)	Adults (2 studies) Pediatrics (2 studies) Ankle injuries (2 studies) Extremity trauma (1 study) Distal limb injuries (1 study)	ED LOS	"NIXR does not reduce time to X-ray (very low-quality evidence) or waiting time (very low-to-moderate quality evidence), but there was a trend towards NIXR decreasing ED length of stay (very low- to low-quality evidence)."	GRADE: Low[d]	Moderate	Favourable, inconclusive[f]
			2 NRS Nurse-initiated X-rays in the ED vs. Physician-initiated X-rays	Adults (1 study) Foot, ankle, or knee injuries (1 study) Distal limb injuries (1 study)	Time to X-ray		GRADE: Very low[d]	Moderate	Neutral, inconclusive
			1 RCT 1 NRS	Pediatrics (1 study)	Time from triage to medical assessment		GRADE: Moderate[d]	Moderate	Neutral

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			Nurse-initiated X-rays in the ED vs. Physician-initiated X-rays	Ankle injuries (1 study) Distal limb injuries (1 study)					
			1 RCT Nurse-initiated X-rays in the ED vs. Physician-initiated X-rays	Adults Minor injuries	Unplanned ED re-attendance	NC	GRADE: Moderate[d]	Moderate	Neutral
			1 RCT 1 NRS Nurse-initiated X-rays in the ED vs. Physician-initiated X-rays	Adults (1 study) Adults and pediatrics (1 study) Ankle or mid-foot injury (1 study)	Missed injuries	"This systematic review has demonstrated that once implemented, NIXR uses no more resources than PIXR (very low-quality evidence), is safe (very low-to-moderate quality evidence) and acceptable to patients (very low-quality evidence)."	GRADE: Very low[d]	Moderate	Mixed, inconclusive[f]
			2 RCTs Nurse-initiated X-rays in the ED vs. Physician-initiated X-rays	Adults Ankle injuries (1 study) Minor injuries (1 study)	Patient satisfaction		GRADE: Very low[d]	Moderate	Neutral, inconclusive[f]
Evans et al. (2019)[37] Narrative synthesis 2000 to April 2018	Liaison psychiatry services in the ED for adults	Canada, Australia, UK, US Rural (1 study)	1 NRS Additional personnel integrated into ED for mental health vs. Usual care	Adults Mental health challenges	ED LOS ED visits LWBS	"There is weak evidence that additional MH personnel in the ED reduced the numbers of patients leaving without being seen."	Very uncertain[a,b]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			3 NRS Additional personnel in ED for mental health (triage NP, care coordinator, community psychiatric nurses, or crisis counsellors) vs. Usual care		ED-related wait times	"All four service models reduced waiting times, particularly those with personnel integrated into the department, in ED triage or co-located"	Very uncertain[a,b,c]	Moderate	Favourable, inconclusive[f]
			1 NRS New triage tool for mental health by crisis counsellor vs. Usual care		Time to consultant LAMA	NC	Very uncertain[a,b]	Moderate	Favourable, inconclusive [f]
			1 NRS Access centre (staffed with 2 social workers and 2 mental health therapists) vs. Usual care		ED-related wait time		Very uncertain[a,b,e]	Moderate	Favourable, inconclusive
			1 NRS Psychiatry daily rounds vs. Usual care		ED LOS, patients with longest boarding time		Very uncertain[a,b,e]	Moderate	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 NRS Psychiatric fast track service vs. Usual care		ED LOS Time from admission disposition to departure Time from disposition to discharge		Very uncertain[a,b,e]	Moderate	Neutral, inconclusive
					Time to triage			Moderate	Favourable, inconclusive
			1 NRS Consultation and liaison service vs. Usual care		ED LOS, admitted patients ED LOS, discharged patients		Very uncertain[a,b,e]	Moderate	Favourable, inconclusive
					LWBS			Moderate	Neutral, inconclusive
			1 NRS External specialist unit (Crisis Assessment Linkage and Management) vs. Usual care		ED LOS	"Although there is some evidence … that external psychiatric units deliver reduced waiting times and higher quality of care in the US, there is limited evidence to determine the most effective LP model"	Very uncertain[a,e]	Moderate	Favourable, inconclusive
			1 NRS External specialist unit (Psychiatric Emergency Service) vs. Usual care		ED-related wait times		Very uncertain[a,e]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 NRS External specialist unit (Psychiatric Emergency Service) vs. Usual care		Boarding time	NC	Very uncertain[a,b,e]	Moderate	Favourable, inconclusive
Kimmel et al. (2019)[38] Narrative synthesis Up to April 2017	Real-time electronic notifications for adults at high-risk of ED visits	UK, US NR	1 NRS Real-time electronic notifications (directly into the patient EHR) of ED recidivism risk (at time of ED visit) vs. No intervention	Adults	ED LOS	NC	Very uncertain[a]	Moderate	Neutral, inconclusive
			3 RCTs 7 NRS Real-time electronic notifications of ED recidivism risk vs. No intervention	Adults 3+ ED visits or admissions in past 6 months – 1 year (5 studies) ED use for high social/behavioral care complexity (3 studies) >50% annual ED visits attributed to pain or "drug seeking" behaviour (as referred to by authors) (3 studies)	ED return visits	"Regarding efficacy, interventions' effect on ED use … was promising but mixed."	Very uncertain[a,b,c]	Moderate	Mixed, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
				Mental health (1 study) Non-cancer pain (1 study)					
Kirkland et al. (2019)[10] MA Narrative synthesis 1990 to Jan 2016	Any diversion strategy for low-acuity patients to bypass the ED or redirect them away from the ED	US NR	1 RCT 1 NRS ED-based diversion (deferred care to non-emergency setting at later date) vs. Usual ED care	Adults	Initial ED attendance	"there also appears to be limited evidence that ED diversion alters subsequent healthcare utilisation"	Very uncertain[a,c,e]	Low	Favourable, inconclusive
			1 NRS ED-based diversion (deferred to on-site primary care clinic) vs. Usual ED care	Adults	Return ED visits	"no differences in subsequent ED utilisation were found"	Very uncertain[b,e]	Low	Neutral, inconclusive
Matifat et al. (2019)[39] Narrative synthesis Up to Sept 2017	Physical therapists in EDs for patients with musculoskeletal disorders	Australia, China, UK NR	7 NRS Physical therapy in ED (usual physical therapist care or care by physical therapists in extended scope practice roles) vs. Usual care	Musculoskeletal disorders (including low back pain, peripheral soft tissue injury, and associated fractures)	ED LOS	"Studies that assessed the impact of ESP or usual physical therapist care on either waiting time or length of stay in the ED clearly demonstrated that it was usually associated with reduced delays. Although almost all included studies reported that ED physical therapy services decreased waiting times	Very uncertain[a,b]	Low	Favourable, inconclusive
			1 RCT 9 NRS Physical therapy in ED vs. Usual care		ED-related wait time		Very uncertain[a,b]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
						as well of length of stay in the ED, these findings need to be interpreted cautiously."			
			4 NRS Physical therapy in ED vs. Usual care		ED repeat presentations	"In terms of safety of care, included studies showed that there were no adverse events or increase of repeat presentation to the ED associated with ESP or usual physical therapist care."	Very uncertain[a,b]	Low	Neutral, inconclusive
			4 NRS Physical therapy in ED vs. Usual care		Adverse events	NC	Very uncertain[a,b]	Low	Neutral, inconclusive
			1 RCT 5 NRS Physical therapy in ED vs. Usual care		Patient satisfaction	"This review presented the potential benefits of ESP or usual physical therapist care in an ED setting. Regardless of the varying methodological quality of the included studies, the potential favourable impact of ED physical therapist care in terms of efficacy of care, patients' satisfaction,	Very uncertain [a,b,c]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
						safety of care, and access to care is supported."			
Thamm et al. (2019)[40] Narrative synthesis Up to Jul 2016	Nurse-led interventions for patients in EDs	Australia, England, Scotland NR	0 studies Advanced Practice Nurse role vs. Usual care	Cancer	ED LOS	"With respect to our primary aim of determining whether cancer patients requiring emergency intervention are treated more efficiently or effectively by APNs than standard care, and whether APNs can help meet NEAT targets, the evidence is unclear."	NA	Critically low	No evidence
			3 RCTs Advanced Practice Nurse role vs. Usual care	Pediatrics (2 studies) Pediatrics and older adults (1 study) Minor injury (1 study) Limb injury (1 study) ATS 4-5 (1 study)	ED wait time	NC	Very uncertain[a,b,c]	Critically low	Favourable, inconclusive
			3 RCTs Advanced Practice Nurse role vs. Usual care	Pediatrics (2 studies) Minor injury (1 study)	ED consultation time		Very uncertain[a,b]	Critically low	Unfavourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
				Soft tissue injury (1 study)					
			2 RCT Advanced Practice Nurse role vs. Usual care	Pediatrics (1 study) Pediatrics and older adults (1 study) Minor injury (1 study) ATS 4-5 (1 study)	ED return visits		Very uncertain[b,c]	Critically low	Neutral, inconclusive
			3 RCTs Advanced Practice Nurse role vs. Usual care	Pediatrics (1 study) Pediatrics and older adults (1 study) Limb injury (1 study) ATS 4-5 (1 study)	Patient satisfaction	"The ability of the nurse to safely care for their patients in a timely manner also assists in both patient and staff satisfaction."	Very uncertain[a,b,c]	Critically low	Favourable, inconclusive
Goncalves-Bradley et al. (2018)[41] Narrative synthesis Up to May 2017	Primary care professionals in EDs	Australia, UK Urban	1 RCT NPs in ED vs. Emergency medicine registrars	Adults Female 47% Pain	ED LOS Time to clinical assessment and treatment	"There is insufficient evidence in this review for decision makers to evaluate the full impact of employing GPs in the ED to care for non-urgent patients and the resulting effect on wait times and overcrowding,	GRADE: Very low[d]	High	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
						as current research has not addressed health outcomes and safety, which are important considerations."			
			1 NRS Sessional GPs in the ED vs. Emergency physicians	Adults Female 47% "Non-urgent problems" (as referred to by authors)	ED re-attendance	"We found very weak evidence that the introduction of primary care professionals to the emergency department (ED) does not modify patients' subsequent use of primary care or the ED."	GRADE: Very low[d]	High	Neutral, inconclusive
Morley et al. (2018)[14] Narrative synthesis Jan 2000 to Jun 2018	Any solutions to ED overcrowding for adults	Australia, Canada, Finland, Korea, Singapore, the Netherlands, UK, US NR	5 NRS Earlier physician assessment (rapid assessment policy, improved triage, medical team evaluation, intervention team, or improved specialty consultation process) vs. Usual care	NR	ED LOS, all	"providing earlier physician assessment on arrival to the ED … have been found to have promising results."	Very uncertain[a]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 NRS Earlier physician assessment vs. Usual care		ED LOS, discharged patients		Very uncertain[a,e]	Moderate	Neutral, inconclusive
			2 NRS Earlier physician assessment vs. Usual care		ED-related wait times		Very uncertain[a]	Moderate	Favourable, inconclusive
			1 NRS Earlier physician assessment vs. Usual care		Ambulance diversion time		Very uncertain[a]	Moderate	Favourable, inconclusive
			3 NRS Earlier physician assessment vs. Usual care		LWBS		Very uncertain[a]	Moderate	Favourable, inconclusive
			1 RCT 3 NRS Physician at triage (physician-led or supported) vs. Usual care		ED LOS	NC	Very uncertain[a,b,e]	Moderate	Favourable, inconclusive
			1 NRS Physician at triage vs. Usual care		ED LOS, discharged patients		Very uncertain[a,e]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 NRS Physician at triage vs. Usual care		Time to physician		Very uncertain[a,e]	Moderate	Favourable, inconclusive
			2 NRS Physician at triage vs. Usual care		Ambulance diversion or bypass time		Very uncertain[a,e]	Moderate	Favourable, inconclusive
			1 NRS Physician at triage vs. Usual care		ED unscheduled return visits		Very uncertain[a,b]	Moderate	Favourable, inconclusive
			1 RCT 1 NRS Physician at triage vs. Usual care		LWBS		Very uncertain[a,b]	Moderate	Favourable, inconclusive
			1 NRS Fast-track vs. Usual care		ED LOS ED-related wait time		Very uncertain[a]	Moderate	Favourable, Inconclusive[f]
			1 NRS Flexible care area vs. Usual care		ED LOS LWBS		Very uncertain[a,b,e]	Moderate	Favourable, inconclusive
			2 RCTs 3 NRS Changes in diagnostic testing (POCT, initiating lab tests in ED, or dedicated		ED LOS		Very uncertain[a,b,e]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			laboratory) vs. Usual care						
			2 NRS Changes in diagnostic testing vs. Usual care		Test turnaround time		Very uncertain[a,b,e]	Moderate	Favourable, inconclusive
			1 NRS Nurse navigator in the ED vs. Usual care		ED LOS		Very uncertain[a]	Moderate	Favourable, inconclusive
			1 NRS Bedside registration vs. Usual care		Time from triage to room		Very uncertain[a,b,e]	Moderate	Favourable, inconclusive
			1 RCT Nurse-initiated protocols vs. Usual care		Time to diagnostic test Time to treatment		Very uncertain[a,b,e]	Moderate	Favourable, inconclusive
			1 RCT Nurse-initiated protocols vs. Usual care		ED LOS		Very uncertain[a,b,e]	Moderate	Mixed, inconclusive
			1 NRS Earlier inpatient consultation (text message reminder) vs. Usual care		ED LOS, admitted patients Disposition time Boarding time		Very uncertain[a,b,e]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 NRS Earlier inpatient consultation (text message reminder) vs. Usual care		Consultation time		Very uncertain[a,b,e]	Moderate	Neutral, inconclusive
			1 NRS Increased ED bed numbers vs. Usual care		Boarding time		Very uncertain[a,b,e]	Moderate	Unfavourable, inconclusive
			1 NRS Increased ED bed numbers vs. Usual care		LWBS		Very uncertain[a,b,e]	Moderate	Neutral, inconclusive
Cabilan et al. (2017)[42] MA Narrative synthesis Up to Jul 2016	Any nurse-initiated medications in the ED	Australia, China, Saudi Arabia, Sweden, The Netherlands NR	1 RCT 3 NRS Nurse-initiated medications in the ED vs. Non-nurse-initiated medications	Adults (3 studies) Pediatrics (1 study) Female 26% to 56% Pain (2 studies) Asthma (1 study) COPD (1 study)	ED LOS	NC	Some uncertainty[b,g]	Critically low	Neutral, inconclusive
			1 RCT 4 NRS Nurse-initiated medications in the ED vs. Non-nurse-	Adults (3 studies) Pediatrics (2 studies) Female 26% to 56%	ED-related wait times	"This systematic review focused on experimental studies which evaluated the practice of nurse–initiated medications including analgesia and	Very uncertain[b,c]	Critically low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			initiated medications	Pain (2 studies) Asthma (1 study) COPD (1 study)		salbutamol in ED. In comparison to non-nurse-initiated analgesia, patients who received nurse-initiated analgesic medication received their medication a mean of 30 min earlier."			
			1 NRS Nurse-initiated medications in the ED vs. Non-nurse-initiated medications	Pediatrics Female 25% Asthma	Time to PIA	NC	Very uncertain[b,e]	Critically low	Neutral, inconclusive
			1 RCT 2 NRS Nurse-initiated medications in the ED vs. Non-nurse-initiated medications	Adults (2 studies) Pediatrics (1 study) Female 26% to 53% Asthma (1 study) Abdominal pain (1 study) COPD (1 study)	Adverse events (low respiratory rate, nausea, vomiting, medication errors, tremors or palpitations)	"The practice is safe and may increase patients' satisfaction with pain management."	Very uncertain[a,b,c]	Critically low	Neutral, inconclusive
			2 NRS Nurse-initiated medications in the ED vs. Non-nurse-initiated medications	Adults (1 study) Pediatrics (1 study) Pain	Patient satisfaction		Very uncertain[a,b]	Critically low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Crede et al. (2017)[43] Narrative synthesis 2000 to 2014	Any intervention to reduce avoidable ED visits and hospital admissions	Australia, Canada, China, Denmark, Northern Ireland, Singapore, UK, US, Inner city (1 study)	1 RCT Patient centred education (on asthma) during ED presentation vs. Usual care	Adults Asthma	ED re-attendance, all	"patient centred education within the ED may offer promise for specific chronic diseases. The results from the study by Smith et al., found no significant difference in ED attendance rates although, after controlling for GP attendances, the intervention group had significantly fewer re-attendances.	Some uncertainty[b,g]	Low	Neutral, inconclusive
					ED re-attendance, discharged patients ED re-attendance, patients with no prior GP			Low	Favourable, inconclusive
			1 NRS Specialist aged care pharmacist (medication reconciliation, review and referral where necessary) in ED vs. Usual care	Older adults	ED LOS	NC	Very uncertain[a,b,g]	Low	Unfavourable, inconclusive
					ED re-attendance			Low	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			2 NRS Specialist nurse assessment in ED vs. Usual care	Older adults Adults Epilepsy (1 study)	ED re-attendance	NC	Very uncertain[b,c]	Low	Neutral, inconclusive
			1 NRS ED medical assessment unit vs. Usual care	Older adults	ED LOS	NC	Very uncertain[b,g]	Low	Favourable, inconclusive
			4 NRS ED assessment, observation, or decision units vs. Usual care	Adults	ED re-attendance	"Observation and assessment wards, allow a greater length of time to assess and manage patients compared to the ED, and this additional time may have contributed to the favourable findings of interventions to prevent re-attendance and readmission in these settings."	Very uncertain[a,c]	Low	Favourable, inconclusive
Huntley et al. (2017)[16] Narrative synthesis	Interventions to avoid hospital admissions in older adults	Italy NR	1 NRS Specialist geriatric ED vs. Conventional ED	Older adults Female 47%	ED visits	NC	Very uncertain[b,g]	Moderate	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Jan 2005 to Dec 2016				Acutely ill	Frequent ED returns (3+ visits over 6 months)				
Newton et al. (2017)[44] Narrative synthesis 2008 to 2015	Interventions for mental health ED presentations in children	Canada, US Urban	2 NRS Screening strategies (laboratory tests or medical clearance) vs. No intervention	Pediatrics Mental health challenges	ED LOS	"In two studies, screening laboratory tests for medical clearance were associated with a longer length of ED stay"	GRADE: Low[d]	Moderate	Unfavourable, inconclusive
			2 NRS Specialized models of care (behavioural health unit or child guidance model) vs. Usual care		ED LOS	NC	GRADE: Low[d,e]	Moderate	Favourable, inconclusive
			1 NRS Specialized models of care (ED-based follow-up team) vs. Usual care		ED return visits	NC	GRADE: Very low[d]	Moderate	Neutral, inconclusive[f]
van Galen et al. (2017)[45] Narrative synthesis Up to Aug 2016	Acute medical units	Australia, China, Ireland, New Zealand, UK NR	5 NRS Acute medical assessment unit vs. Usual care	Pediatrics (1 study) Medically stable (1 study) Multiple medical co-morbidities and	ED LOS	"In most studies, ED LOS also decreased significantly after implementation of an AMU."	Very uncertain[a,c]	Critically low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
				functional impairment (1 study)					
			2 NRS Acute medical assessment unit vs. Usual care	Pediatrics (1 study) Sepsis, pneumonia, ACS, COPD (1 study)	ED-related wait times	"Overall, beneficial effects of implementing an AMU were reported."	Very uncertain[a,g]	Critically low	Favourable, inconclusive
			2 NRS Acute medical assessment unit vs. Usual care	Medical patients	Number of boarded patients in ED	"In addition, several positive effects of the implementation of an AMU on otherwards were reported: a decrease of medical patients who were placed on non-medical beds, and a decrease of transfers to other medical wards, outpatient clinics and the ICU."	Very uncertain[a]	Critically low	Favourable, inconclusive
			1 NRS Emergency assessment unit vs. Usual care	Pediatrics	ED admissions	NC	Very uncertain[a]	Critically low	Favourable, inconclusive
Ho et al. (2016)[46] MA	Nurse use of Ottawa Ankle Rules in the ED	Canada, UK, US NR	2 NRS Nurse or NP-initiated Ottawa Ankle Rules vs.	Adults	ED LOS (registration to disposal)	"The implementation of the refined OARs by emergency nurses was found to minimise	Very uncertain[b,c,g]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Narrative synthesis Up to Aug 2015	for patients with ankle injuries		Physicians not using Ottawa Ankle Rules			unnecessary radiographic-test requests and reduce patients' length of stay in emergency departments"			
			1 RCT 1 NRS Nurse or NP-initiated Ottawa Ankle Rules vs. Physicians not using Ottawa Ankle Rules		Time from triage to disposal		Very uncertain[b,c,g]	Low	Favourable, Inconclusive[f]
Ming et al. (2016)[47] MA Narrative synthesis Up to Jun 2015	Triage team in EDs	Canada, Ireland, US Urban (1 study)	4 RCTs Team triage vs. Single nurse triage	Adults (2 studies) Pediatrics (1 study) Adults and adolescents (1 study)	ED LOS	"From our review, however, there is no conclusive evidence that team triage is superior to single-nurse triage for improving patient flow in the ED in terms of reducing WT or LOS."	GRADE: Low[d]	Low	Neutral, inconclusive[f]
			2 RCTs Team triage vs. Single nurse triage	Adults and adolescents (1 study)	Time to PIA		GRADE: Low[d]	Low	Neutral, inconclusive[f]
			2 RCTs Team triage vs. Single nurse triage	Adults (1 study) Pediatrics (1 study)	ED re-attendance	NC	GRADE: Low[d]	Low	Neutral, inconclusive[f]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			3 RCTs Team triage vs. Single nurse triage	Adults (2 studies) Pediatrics (1 study)	Disappearance from ED		GRADE: Low[d]	Low	Neutral, inconclusive[f]
Abdulwahid et al. (2015)[48] MA Narrative synthesis 1994 to Aug 2014	Interventions where a senior doctor is at triage	Australia, Canada, China, Jamaica, Sweden, US NR	4 RCTs 15 NRS Senior doctor at triage vs. Standard single nurse at triage	NR	ED LOS	"This review demonstrates that SDT positively impacted the total LOS across the majority of the studies reporting this outcome."	Very uncertain[b,c,h]	Moderate	Favourable, inconclusive[f]
			2 RCTS 11 NRS Senior doctor at triage vs. Standard single nurse at triage		ED-related waiting time	"The majority of studies concluded that dedicating a senior doctor in triage reduced the WT for patients to see a doctor."	Very uncertain[b,c,h]	Moderate	Favourable, inconclusive[f]
			1 NRS Senior doctor at triage vs. Standard single nurse at triage		ED re-attendance	NC	Very uncertain[a]	Moderate	Favourable, inconclusive[f]
			2 RCTs 12 NRS Senior doctor at triage vs. Standard single nurse at triage		LWBS	"The majority of studies concluded that dedicating a senior doctor in triage reduced the WT for patients to see a doctor, decreased	Very uncertain[b,c,h]	Moderate	Favourable, inconclusive[f]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 RCT 3 NRS Senior doctor at triage vs. Standard single nurse at triage		LWTC	the LOS and lowered the proportion of LWBS patients as well as the proportion of LWTC patients."	Very uncertain[c]	Moderate	Favourable, inconclusive[f]
			3 NRS Senior doctor at triage vs. Standard single nurse at triage		Patient satisfaction	"Reports on patient satisfaction following introduction of SDT showed contradictory findings across studies. While two recently published studies showed no change in patient satisfaction, recent evidence of weak quality suggests improved patient satisfaction under the SDT model."	Very uncertain[a,b,c]	Moderate	Neutral, inconclusive
Curr et al. (2015) [49] Narrative synthesis 1992 to Jan 2015	Nurse-led initiation of Ottawa ankle rules in the ED for adults	Canada NR	2 RCTs 2 NRS Nurse- (or NP-) led Ottawa Ankle Rules vs. Standard triage protocol	Adults (2 studies) Women 18% to 48% (3 studies) Ankle injuries	ED LOS	"From the evidence examined here, we can issue a weak recommendation for the use of OAR based on low quality evidence where implementation (Table 5) will also be affected by provider preference."	GRADE: Moderate to Low[d]	Low	Favourable, inconclusive[f]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Galipeau et al. (2015)[50] Narrative synthesis 1993 to Jan 2014	Short-stay units in the ED for adults	US Urban	1 RCT Short stay units in the ED vs. Usual care	Adults Female 53% Intermediate or high probability of experiencing acute coronary syndrome	Cardiac-related ED visits	NC	GRADE: Very low[d]	High	Favourable, inconclusive
Jennings et al. (2015)[51] Narrative synthesis 2006 to 2014	NPs in EDs for adults	Australia, Canada, New Zealand, The Netherlands, UK, US Urban (1 study)	1 RCT 8 NRS NP in the ED vs. Usual care	Adults (3 studies) Hand/wrist wounds, hand/wrist fractures and removal of POPs (1 study) Peripheral soft tissue injury (1 study) ATS 3 to 5 (1 study)	ED-related waiting times	"Not-with-standing the above limitations, the narrative findings from this systematic review suggest that emergency nurse practitioner services do impact patient satisfaction and waiting times positively."	Very uncertain[b,c]	Moderate	Favourable, inconclusive[f]
			3 NRS NP in the ED vs. Usual care	Adults (1 study) ATS 3 to 5 (1 study)	Patient satisfaction		Very uncertain[a,b,c]	Moderate	Favourable, inconclusive
Doan et al. (2014)[52] MA Narrative synthesis Dec 2011 to Jul 2014	Rapid viral diagnostic tests for children with acute respiratory infections	Canada, US Urban	3 RCTs Rapid influenza testing vs. Usual care	Pediatrics Respiratory symptoms	ED LOS	"A weak trend toward reduction in antibiotics and ED length of visit was seen, but these were not statistically significant."	Some uncertainty[b]	Moderate	Neutral[f]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 RCT Rapid influenza testing vs. Usual care		ED return visits	NC	Very uncertain[b,e]	Moderate	Neutral, inconclusive
Dobson et al. (2013)[53] Narrative synthesis Up to Aug 2009	Electronic tracking technologies in Pediatrics EDs	NR NR	1 NRS RFID-based patient tracking in the ED vs. Usual care	Pediatrics	Boarding time	"Support exists for the use of electronic tracking to improve patient safety via increased security and improved ED efficiency."	Very uncertain[a,b]	Low	Favourable, inconclusive

AMSTAR2 = A MeaSurement Tool to Assess systematic Reviews; AMU = acute medical unit; APN = Advanced Practice Nurse; ATS = Australian Triage Scale; CTAS = Canada Triage and Acuity Scale; ECP = Evidence-based Practice Center Program of the Agency of Healthcare Research and Quality; ED = emergency department; EmPATH = emergency psychiatric assessment, treatment and health; ESP = extended-scope practice roles; GRADE = grading of recommendation, assessment, development and evaluation; HCP = health care provider; HSCP = Health and social care professional; LAMA = left against medical advice; LOS = length of stay; LP = liaison psychiatry; LWBS = left without being seen; LWTC = left without treatment complete; MH = mental health; MTS = Manchester Triage System; NA = not applicable; NC = no conclusion; NP = nurse practitioner; NEAT = National Emergency Access Target; NPP = non-physician provider; NR = not reported; NRS = non-randomized studies; OAR = Ottawa Ankle Rules; PA = physician assistant; PIA = physician initial assessment; POC = point of care; POCT = point of care testing; PPOCUS = pelvic point of care ultrasound; RCT = randomized controlled trial; RFID = radiofrequency identification; RVU = relative value unit; SDT = senior doctor at triage; SMS = short message service; TAT = turnaround time; TLP = triage liaison provider; TOT = turnover time; UK = United Kingdom; US = United States; vs = versus; WT = wait time.

[a] Uncertain precision due to missing information and inconsistent reporting in SR

[b] High risk of bias or low methodological quality reported by SR authors

[c] High heterogeneity in effects across primary studies

[d] As reported by SR authors

[e] May not be generalizable to Canadian context; however, certainty was not rated down for indirectness

[f] At least 1 primary study was conducted in Canada

[g] Imprecision due to small number of participants or very large confidence intervals

[h] Possible publication bias.

Table 6: Summary of Findings for Output Interventions

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
van den Broek et al. (2023)[18] Narrative synthesis Up to Jan 2023	Care transitions for older adults in the ED	Belgium, US NR	1 RCT 2 NRS Discharge services and coordination of services by nurses in ED vs. Usual care	Older adults (2 studies) All ages (1 study) >5 ED visits a year (1 study)	ED revisits	"Discharge planning and the coordination of services by one or more health professionals in the ED seems especially effective in reducing ED revisits for older adults."	Some uncertainty	Moderate	Favourable
			1 RCT 1 NRS Nurse discharge coordinator or patient navigator in ED vs. Usual care	Older adults	Patient satisfaction	"Of the two studies reporting on patient satisfaction, only one reported a significant increase."	Very uncertain[c]	Moderate	Favourable, inconclusive
Pritchard et al. (2020)[8] Narrative synthesis Up to Jul 2019	Any intervention to reduce ED visits by older adults	Hong Kong NR	1 RCT ISAR assessment and referral to services in ED upon discharge vs. Usual care	Older adults	Early return or frequent ED visits	NC	Some uncertainty[d,e]	Low	Neutral
Morley et al. (2018)[14] Narrative synthesis	Any solutions to ED overcrowding for adults	US NR	1 NRS Active bed management vs. Usual care	Adults	ED LOS, admitted patients Ambulance bypass time	NC	Very uncertain[d,e,f]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Jan 2000 to Jun 2018			1 NRS Active bed management vs. Usual care		ED LOS, discharged patients		Very uncertain[d,e,f]	Moderate	Neutral, inconclusive
			1 NRS Flexible acute admission unit for admitted patients and inter-hospital transfers vs. Usual care		ED LOS		Very uncertain[d,e,f]	Moderate	Favourable, inconclusive
Crede et al. (2017)[43] Narrative synthesis 2000 to 2014	Any intervention to reduce avoidable ED visits and hospital admissions	Canada, Denmark, US NR	2 RCTs Enhanced care or discharge planning for hospitalized patients vs. Usual care	Older adults	ED return visits	"The interventions initiated within 72 h of patient admission have aspects that are similar to the above findings. Interventions that involved patient education, enhanced discharge and included patient follow up after discharge have been shown to decrease readmission and ED visits."	Very uncertain[c,f]	Low	Neutral, inconclusive
			1 RCT Conventional discharge planning + personal emergency response system vs.	Older adults	ED return visit	NC	Very uncertain[c,f]	Low	Neutral, inconclusive[b]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			Conventional discharge planning						

AMSTAR2 = A MeaSurement Tool to Assess systematic Reviews; ED = emergency department; GRADE = grading of recommendation, assessment, development and evaluation; ISAR = Identification of Seniors at Risk; LOS = length of stay; NC = no conclusion; NR = not reported; NRS = non-randomized studies; RCT = randomized controlled trial; SR = systematic review; UK = United Kingdom; US = United States; vs = versus.

[a] As reported by SR authors

[b] At least 1 primary study was conducted in Canada

[c] Imprecision due to low number of participants or very wide confidence intervals

[d] Uncertain precision due to missing information and inconsistent reporting in SR

[e] May not be generalizable to Canadian context; however, certainty was not rated down for indirectness

[f] High risk of bias or low methodological quality reported by SR authors

Table 7: Summary of Findings for Post-Discharge Case Management Interventions

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Eustache et al. (2021)[54] MA Narrative synthesis Up to Feb 2020	Telemedicine interventions for post-operative patients	Australia, Canada, Denmark, Spain, US NR	9 RCTs 9 NRS Post-discharge telemedicine with a communication feature (telephone calls, video calls, email follow-up, or app/web base follow-ups) vs. Usual care	Post-operative patients Abdominal/pelvic surgery (6 studies) Cardiac surgery (4 studies) Urologic surgery (3 studies) Breast surgery (2 studies) Mixed surgery (1 study) Orthopedic surgery (1 study) Otorhinolaryngology surgery (1 study)	30-day ED visits	"This review fails to demonstrate a clear reduction ED visits and readmissions to support use of a telemedicine intervention across the board."	Very uncertain[a,b]	Low	Neutral, inconclusive[c]
			3 RCTs 1 NRS Post-discharge telemedicine with a communication feature vs. Usual care	Post-operative patients Cardiac surgery (2 studies) Abdominal/pelvic surgery (1 study) Vascular surgery (1 study)	Patient satisfaction	"While this review fails to demonstrate a clear reduction ED visits and readmissions to support use of a telemedicine intervention, patient satisfaction with the interventions may be sufficient to support their use. Indeed, satisfaction in all studies that reported it was overwhelmingly positive."	Very uncertain[a,b]	Low	Favourable, inconclusive[c]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Pulcini et al. (2021)[6] Narrative synthesis Up to Jul 2019	Any intervention to reduce ED visits by children with medical complexities	US NR	1 NRS Post-surgical care coordination (Care Beyond the Bedside program) vs. Usual care	Pediatrics Cerebral palsy	ED visits	NC	Very uncertain[d,e]	Moderate	Neutral, inconclusive
Pritchard et al. (2020)[8] Narrative synthesis Up to Jul 2019	Any intervention to reduce ED and hospital use by older adults	Australia, US NR	1 RCT Post-discharge home-based patient-centred intervention vs. Usual care	Older adults	ED visits	NC	Some uncertainty[d]	Low	Neutral
			1 NRS Pharmacist evaluation (medical management) in primary care post-discharge vs. Usual care	Older adults Cardiac challenges	ED visits	NC	Very uncertain[d,e]	Low	Neutral, inconclusive
Hesselink et al. (2019)[55] Narrative synthesis Jan 1990 to Mar 2017	Any intervention to alleviate ED overcrowding in older adults NR	Australia, UK NR	2 RCTs Community-based follow-up care vs. Usual care	Older adults Falls (1 study)	ED re-visits	NC	Very uncertain[a,g]	Moderate	Neutral, inconclusive
Hall et al. (2018)[56]	Caseworker-assigned	Scotland, UK, US	4 RCTs	Pediatrics	ED presentations	"There may be associated reductions with respect to ED	GRADE: Low[f]	High	Mixed, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
MA Narrative synthesis Up to Nov 2017	discharge plans for children with chronic lung diseases	Urban	Caseworker-assigned discharge plans (combinations of: written education materials on asthma, home self-management plan, discussion or education session, case management, telephone advice, and family support) vs. Non-caseworker assigned plans	Female 33% to 45% Non-Hispanic black or Hispanic (1 study) Asthma		presentations, however the heterogeneity of the studies limit our confidence in that conclusion, although one of the studies did find significant reductions over six months postdischarge."			
Crede et al. (2017)[43] Narrative synthesis 2000 to 2014	Any intervention to reduce avoidable ED visits and hospital admissions	Canada, China, US NR	2 RCTs 1 NRS Nurse-led telephone / telehealth post discharge intervention vs. Usual care	Older adults (2 studies) Adults and pediatrics (1 study)	ED return visits	NC	Very uncertain[a,b]	Low	Neutral, inconclusive[c]
Health Quality Ontario (2017)[57] Narrative synthesis Up to May 2016	Early follow-up after discharge for patients with heart failure or COPD	China, US NR	1 NRS 7-day post-discharge HCP follow-up vs. Usual care or no intervention	Adults COPD	ED return visits	"Low-quality evidence showed a non-significantly reduced risk of 30-day emergency department visits or death, and of composite risk of readmission or emergency	GRADE: Low[f]	Low	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
						department use"			
			1 NRS 30-day HCP follow-up post-discharge vs. Usual care or no follow-up		ED return visits	"Very low-quality evidence showed a significant difference in rates of 3-month emergency department visits."	GRADE: Very low[f]	Low	Favourable, inconclusive
Vedel et al. (2015)[58] MA Narrative synthesis 1995 to Feb 2014	Transitional care interventions for people with congestive heart failure	Brazil, Canada, US NR	3 RCTs Low-intensity hospital transitional care intervention (post-discharge telephone follow-up) vs. Usual care	Older adults Congestive heart failure	All cause ED visits	NC	Some uncertainty[b]	Moderate	Neutral[c]
			2 RCTs Moderate- to high-intensity hospital transitional care interventions (post-discharge telephone follow-up with home or clinic visit) vs. Usual care		All cause ED visits	"In conclusion, providing TCI to CHF patients reduces readmission and ED visits. High-intensity interventions, regardless of intervention length, seem to be the best option."	Some uncertainty[g]	Moderate	Favourable[c]
Tricco et al. (2014)[59] MA	Quality improvement strategies	Australia, Canada, US Urban	6 RCTs Care coordination strategies (case	Adults (3 studies) Older adults (2 studies)	Proportion of patients with ED visits, all	"We found that quality improvement strategies focused on the coordination of care reduced hospital	Some uncertainty[a,b]	Moderate	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Narrative synthesis Up to May 2014	for coordination of care for people who visit the ED often		management, team changes, promotion of self-management, decision support, and/or clinical information system) vs. Usual care	Female 34% to 73% Mental health challenges (3 studies) Houseless (2 studies) Access the ED often		admissions among patients with chronic conditions other than mental illness and reduced emergency department visits among older patients."			
			2 RCTs Care coordination strategies vs. Usual care	Older adults Female 34% to 73% Mental health challenges (1 study) Access the ED often	Proportion of patients with ED visits, older adults		Certain	Moderate	Favourable
			7 RCTs Care coordination strategies vs. Usual care	Adults (4 studies) Older adults (3 studies) Females 58% to 71% Mental health challenges (2 studies) Access the ED often	Mean number of ED visits per month, all	NC	Some uncertainty[a]	Moderate	Favourable
Rennke et al. (2013)[60] Narrative synthesis	Hospital-initiated care transition strategies for adults	Croatia, US NR	6 RCTs 4 NRS	Adults (8 studies) Older adults (2 studies)	30-day ED visits	"We identified 15 studies showing that interventions successfully reduced	Very uncertain[a,b,d]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Jan 1990 to Sept 2012			Hospital discharge care transition interventions (predischarge, post-discharge, or bridging interventions) vs. Usual care	General medical (8 studies) Surgery (1 study) Mixed diagnoses (1 study)		readmission or ED visit rates after discharge”			

AMSTAR2 = A MeaSurement Tool to Assess systematic Reviews; CGA = comprehensive geriatric assessment; COPD = chronic obstructive coronary disease; ED = emergency department; MA = metal-analysis; GRADE = grading of recommendation, assessment, development and evaluation; NC = no conclusion; NR = not reported; NRS = non-randomized studies; RCT = randomized controlled trial; TCI = transitional care interventions; UK = United Kingdom; US = United States; USA = United States of America; vs = versus.

[a] Serious risk of bias or low quality in most primary studies reported by SR authors

[b] High heterogeneity in effects across primary studies.

[c] At least 1 primary study was conducted Canada

[d] Uncertain precision due to missing information and inconsistent reporting in SR

[e] May not be generalizable to Canadian context; however, certainty was not rated down for indirectness

[f] As reported by SR authors

[g] Imprecision due to low number of participants or very wide confidence intervals.

Table 8: Summary of Findings for Hospital-Wide Collaboration with Emergency Department

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Sharma et al. (2020)[32] Narrative synthesis 1990 to Nov 2019	Nurse interventions to maintain patient flow in EDs	US NR	1 NRS Transitional care model by nurse navigators in hospital (outside ED) vs. Usual care	Stroke	ED visits	NC	Very uncertain[a,b]	Low	Favourable, inconclusive
			1 NRS RN case management delivery model in hospital (outside ED) vs. Usual care	NR	HCP workload	NC	Very uncertain[a,b]	Low	Favourable, inconclusive
Morley et al. (2018)[14] Narrative synthesis Jan 2000 to Jun 2018	Any solutions to ED overcrowding for adults	Korea, the Netherlands, US NR	1 NRS Hospital leadership support vs. Usual care	Adults	ED LOS	NC	Very uncertain[a,b]	Moderate	Favourable, inconclusive
			2 NRS Hospital leadership support vs. Usual care		Boarding time		Very uncertain[a,b]	Moderate	Favourable, inconclusive
			2 NRS Full or independent capacity protocols vs. Usual care		ED LOS		Very uncertain[a,b]	Moderate	Mixed, inconclusive
			1 NRS		Ambulance diversion time		Very uncertain[a]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			Full capacity protocols vs. Usual care						
			1 NRS Full capacity protocols vs. Usual care		LWBS		Very uncertain[a]	Moderate	Neutral, inconclusive
			1 NRS ED-managed inpatient acute care unit outside the ED within the hospital vs. Usual care		Ambulance diversion time LWBS		Very uncertain[a]	Moderate	Favourable, inconclusive

AMSTAR2 = A MeaSurement Tool to Assess systematic Reviews; ED = emergency department; LOS = length of stay; LWBS = left without being seen; NC = no conclusion; NR = not reported; NRS = non-randomized studies; RCT = randomized controlled trial; RN = registered nurse; US = United States; vs = versus.

[a] Uncertain precision due to missing information and inconsistent reporting in SR

[b] May not be generalizable to Canadian context; however, certainty was not rated down for indirectness

[c] High risk of bias or low level of evidence reported by SR authors.

Table 9: Summary of Findings for Policy Reform

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Berkman et al. (2021)[4] Narrative synthesis Jan 2000 to Mar 2021	Any intervention for adults who have high health care needs	US NR	1 NRS Change in how primary care practices receive payments: incentive payments vs. Usual practice	Patients with >2 chronic conditions Depression 54% ADLs requiring human assistance	ED visits, all cause ED visits, admitted patients	"We found insufficient evidence to judge all utilization and clinical and functional outcomes."	Strength of evidence: Insufficient[a]	Low	Favourable, inconclusive
					ED visits, discharged patients ED visits, ACSC			Low	Neutral, inconclusive
			1 NRS Initiative for US Federally Qualified Health Center to obtain Patient-Centred Medical Home status vs. Usual care	Patients with "high health care needs" (as referred to by authors)	ED visits, all cause		Strength of evidence: Insufficient[a]	Low	Neutral, inconclusive
Jones et al. (2021)[61] Narrative synthesis 2000 to 2019	State, regional or national mandated time-based target policy reform for ED LOS	Australia, Canada, England, New Zealand Urban	6 NRS Time-based targets vs. No intervention	Adults (1 study) Pediatrics (1 study)	ED LOS, all patients	"In New Zealand and Australia, TBTs were associated with reduced ED LOS."	GRADE: Low[a]	Moderate	Favourable, inconclusive
			9 NRS	NR	ED LOS, admitted patients		GRADE: Moderate[a]	Moderate	Favourable

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			Time-based targets vs. No intervention						
			1 NRS Time-based targets vs. No intervention		ED LOS, discharged patients		GRADE: Very low[a]	Moderate	Favourable, inconclusive
			7 NRS Time-based targets vs. No intervention	Adults (1 study)	Time to assessment	NC	GRADE: Very low[a]	Moderate	Favourable, inconclusive
			2 NRS Time-based targets vs. No intervention	NR	Time to inpatient team		GRADE: Very low[a]	Moderate	Favourable, inconclusive
			3 NRS Time-based targets vs. No intervention		Boarding time		GRADE: Very low[a]	Moderate	Unfavourable, inconclusive
			1 NRS Time-based targets vs. No intervention		ED occupancy		GRADE: Very low[a]	Moderate	Favourable, inconclusive
			5 NRS Time-based targets vs. No intervention	Adults (1 study)	Mortality in the ED	"In some settings, TBTs were associated with moderate certainty evidence of reductions in mortality in the ED"	GRADE: Low[a]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			7 NRS Time-based targets vs. No intervention	NR	ED re-presentation	NC	GRADE: Very low[a]	Moderate	Favourable, inconclusive
			6 NRS Time-based targets vs. No intervention		Did not wait		GRADE: Moderate[a]	Moderate	Favourable
			1 NRS Time-based targets vs. No intervention		Patient satisfaction		GRADE: Very low[a]	Moderate	Favourable, inconclusive
Grant et al. (2020)[7] Narrative synthesis Up to Apr 2020	Any throughput intervention to reduce ED crowding	Canada NR	1 NRS Change in how practices receive payments: fee-for-service vs. Usual practice	NR	ED LOS	NC	Very uncertain[c]	Low	Neutral, inconclusive[b]
Morley et al. (2018)[14] Narrative synthesis Jan 2000 to Jun 2018	Any solutions to ED overcrowding for adults	Australia, New Zealand NR	6 NRS Nationally mandated time-based targets vs. Usual care	NR	ED LOS	NC	Very uncertain[c]	Moderate	Favourable, inconclusive
			2 NRS Nationally mandated time-		ED-related wait times		Very uncertain[c]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			based targets vs. Usual care						
			3 NRS Nationally mandated time-based targets vs. Usual care		Access block		Very uncertain[c]	Moderate	Favourable, inconclusive
			1 NRS Nationally mandated time-based targets vs. Usual care		ED re-presentations ED occupancy LWBS		Very uncertain[c]	Moderate	Favourable, inconclusive
Reddy et al. (2018)[62] Narrative synthesis 1994 to 2014	Mandated time-based target policy reforms	Australia, England NR	1 NRS Time-based targets vs. No intervention	NR	ED overcrowding	"The findings of this review suggest that targets for ED and ES waiting times may be useful in achieving their aims, and the authors recommend that targets be considered in planning for hospital reforms, specifically measures to improve ED and ES access."	Very uncertain[c]	Moderate	Favourable, inconclusive
			2 NRS Time-based targets vs. No intervention		ED LOS		Very uncertain[c]	Moderate	Mixed, inconclusive
			5 NRS Time-based targets vs. No intervention		ED-wait times		Very uncertain[c]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			1 NRS Time-based targets vs. No intervention		ICU exit block		Very uncertain[c]	Moderate	Unfavourable, inconclusive
			1 NRS Time-based targets vs. No intervention		Mortality in ED		Very uncertain[c]	Moderate	Neutral, inconclusive
			2 NRS Time-based targets vs. No intervention		ED return visits		Very uncertain[b]	Moderate	Mixed, inconclusive
			1 NRS Time-based targets vs. No intervention		Did not wait		Very uncertain[b]	Moderate	Favourable, inconclusive

ADL = activities of daily living; AMSTAR2 = A MeaSurement Tool to Assess systematic Reviews; ACSC = ambulatory care sensitive conditions; ECP = Evidence-based Practice Center Program of the Agency of Healthcare Research and Quality; ED = emergency department; GRADE = grading of recommendation, assessment, development and evaluation; ICU = intensive care unit; LOS = length of stay; LWBS = left without being seen; NC = no conclusion; NR = not reported; NRS = non-randomized studies; RCT = randomized controlled trial; TBT = time-based target; UK = United Kingdom; US = United States; vs = versus.

[a] As reported by SR authors

[b] At least 1 primary study was conducted Canada

[c] Uncertain precision due to missing information.

Table 10: Summary of Findings for Multicomponent Interventions

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
O'Cathain et al. (2022)[3] Narrative synthesis Up to Jan 2021	"Health literacy interventions" (as defined by authors)	Canada, Taiwan, UK, US Urban Remote (1 study)	3 NRS Multicomponent "health literacy" interventions (as referred to by authors) (Written information + person-delivered approach + mass media advertisements) vs. No intervention	Adults (1 study) Pediatrics (1 study) "Non-emergency problems" (as referred to by authors)	ED attendance	NC	Very uncertain[a,b]	Low	Favourable, inconclusive[c]
			2 NRS Multicomponent "health literacy" interventions (as referred to by authors) vs. No intervention	Adults (1 study) "Non-emergency problems" (as referred to by authors)	Patient satisfaction	NC	Very uncertain[a,b,d]	Low	Favourable, inconclusive
			2 RCTs 6 NRS Combination of written education and person-delivered education vs. No intervention	Adults (2 studies) Pediatrics (4 studies) Mainly African American (1 study) Mainly Latina mothers (1 study)	ED attendance		Very uncertain[a,d,f]	Low	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
				"Ethnically diverse" (as referred to by authors) (1 study) Low income (1 study)					
			1 NRS Combination of written education and person-delivered education vs. No intervention	Pediatrics Visited the ED >1 Mainly Latina mothers	ED attendance		Very uncertain[a,b,d,f]	Low	Neutral, inconclusive
			1 RCT 1 NRS Combination of written education and person-delivered education vs. No intervention	Pediatrics (1 study) "Non-emergency problems" (as referred to by authors)	Patient satisfaction		Very uncertain[a,d]	Low	Mixed, inconclusive
Kinnear et al. (2021)[27] Narrative synthesis Jan 2000 to Mar 2019	Dedicated care for urological patients in EDs	Ireland NR	1 NRS Specified clinical pathway + increased theatre capacity vs. No intervention	Urolithiasis	Time to theatre	"This first systematic review of dedicated models of care for EUPs suggested that they may offer many benefits. Patients may experience reduced time to theatre"	Very uncertain[a,d]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Aghajafari et al. (2020)[63] MA Narrative synthesis Up to Oct 2018	ED interventions to support care transitions to outpatient settings for adults	Australia, Canada, China, Scotland, US Urban (22 studies) Rural (1 study)	22 RCTs ED-based multi-component care transition interventions (combinations of the following: educational support, appointment scheduling, telephone or mailed reminders, discharge instructions, case management, outpatient linkages, and home visit therapeutic session) vs. Usual care	Adults (9 studies) Older adults (9 studies) Adults and pediatrics (2 studies) Female 25% to 77% (18 studies) Anxiety disorders (1 study)	ED revisits	"ED-based CTIs do not appear to reduce ED revisit or hospital admission after ED discharge but are effective in increasing follow-up."	GRADE: Low[e]	Moderate	Neutral, inconclusive[c]
			5 RCTs ED-based multi-component care transition interventions vs. Usual care	Adults (1 study) Older adults (1 study) Adults and pediatrics (1 study) Female 42% to 60% (4 studies) Anxiety disorders	Patient satisfaction	NC	Very uncertain[c]	Moderate	Mixed, inconclusive[c]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
				(1 study)					
Grant et al. (2020)[7] Narrative synthesis Up to Apr 2020	Any throughput intervention to reduce ED crowding	Australia, Canada, Jamaica, Pakistan, Spain, Sweden, Switzerland, The Netherlands, Turkey, UK, US NR	14 NRS Integrated approaches in the ED[f] vs. Usual care	NR	ED LOS	"If there is a unifying theme in the "integrated approaches" category, it would be optimizing process efficiency. While some interventions showed large overall length of stay reductions, they were generally more complex and costly. We advise readers to review these approaches and to prioritize other intervention types."	Very uncertain[c,f]	Low	Favourable, inconclusive[c]
			5 NRS Integrated approaches in the ED[g] vs. Usual care	NR	LWBS		Very uncertain[c,f]	Low	Favourable, inconclusive[c]
Hesselink et al. (2019)[55] Narrative synthesis Jan 1990 to Mar 2017	Any intervention to alleviate ED overcrowding in older adults NR	Australia, Canada, Singapore, UK, US NR	3 NRS ED- and hospital-based post-discharge multi-component interventions (combinations of geriatric assessment, geriatrician or geriatric pharmacist, discharge instructions, disposition planning, follow-up care, and MD	Older adults	ED LOS	"Some interventions also demonstrated opposite effects, such as a prolonged ED LOS"	Very uncertain[a,d,f]	Moderate	Unfavourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			management) vs. Usual care						
			4 RCTs 4 NRS ED- and hospital-based post-discharge multi-component interventions vs. Usual care	Older adults ADL needs (1 study) Falls (1 study)	ED re-visits	"Many interventions showed reduced ED revisits for older adults, but lacked statistical significance."	Very uncertain[a,d,f]	Moderate	Neutral, inconclusive[e]
			1 NRS ED- and hospital-based post-discharge multi-component interventions vs. Usual care	Older adults	Time until geriatrician review	NC	Very uncertain[d]	Moderate	Favourable, inconclusive
			2 RCTs Community-based post-discharge multi-component interventions (combinations of the following: geriatric assessment, disposition planning, follow-up	Older adults Falls (1 study)	ED re-visits		Very uncertain[a,d]	Moderate	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			care, MD management) vs. Usual care						
Morley et al. (2018)[14] Narrative synthesis Jan 2000 to Jun 2018	Any solutions to ED overcrowding for adults	Singapore, US NR	1 NRS Physician in triage + bed coordinator + fast-track + consultation process vs. Usual care	NR	ED LOS LWBS	NC	Very uncertain[a,b,d]	Moderate	Neutral, inconclusive
			1 NRS Active bed management + hospital leadership support vs. Usual care		ED LOS, admitted patients Ambulance bypass time Boarding time		Very uncertain[a,b,d]	Moderate	Favourable, inconclusive
			1 NRS Social interventions (educational campaigns + financial disincentives + redirection of non-emergencies from the ED + alternative clinics		ED non-emergency attendance		Very uncertain[a,b,d,f]	Moderate	Favourable, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			for redirected and patients with minor complaints) vs. Usual care						
Crede et al. (2017)[43] Narrative synthesis 2000 to 2014	Any intervention to reduce avoidable ED visits and hospital admissions	Australia, Denmark, Northern Ireland, UK NR	3 RCTs 2 NRS ED-initiated multicomponent post-discharge intervention (CGA at discharge) + post-discharge community component follow-up) vs. Usual care	Older adults	ED re-attendance	"studies that were effective in reducing admissions all included elderly patients, involved assessment by a specialist nurse and provided further treatment and referrals to appropriate providers"	Very uncertain[a,d,g]	Low	Favourable, inconclusive
			2 RCTs Multifactorial fall intervention (ED-based or initiated in ED and continued at home) vs. Usual care	Older adults Falls	ED re-attendance	NC	Very uncertain[a,h]	Low	Neutral, inconclusive
Abraham et al. (2016)[64] MA Narrative synthesis	ED interventions to support care transitions to outpatient settings for children	US Urban	6 RCTs ED-based multi-component care transition interventions	Pediatrics Asthma (4 studies) Minor illnesses (2 studies)	ED readmissions	"Our review highlights the relative success of ED-based interventions in improving outpatient follow-up, while having limited success in reducing ED readmissions."	GRADE: Low[e]	Low	Neutral, inconclusive

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
Up to Feb 2015			(combinations of the following: educational support, appointment scheduling, telephone or mailed reminders, discharge instructions, monetary incentives, nurse support line, and case management program) vs. Usual or enhanced usual care	Acute illness (1 study) "Non-urgent concerns" (as referred to by authors) (1 study)					
Lowthian et al. (2015)[65] MA Narrative synthesis Up to Dec 2013	ED discharge for older adults	Canada, China, Australia, Singapore, US NR	3 RCTs 5 NRS ED-community multi-component care transition strategies (systematic risk screening, CGA, tailored discharge plans, liaison/link with primary care and community care, and/or post ED telephone	Older adults High risk of poor outcomes (5 studies)	Unplanned ED re-presentations	"Meta-analysis identified no evidence for effectiveness of current care models."	Some uncertainty[f]	Low	Neutral[c]

First Author, Year, Synthesis, Search Dates	Focus	Country, Setting	Type of studies, Intervention-Comparison	Population, Condition	Outcome	Conclusions by Authors	Certainty	AMSTAR2	Effectiveness
			follow-up) vs. Usual care						

ADL = activities of daily living; AMSTAR2 = A MeaSurement Tool to Assess systematic Reviews; CGA = Comprehensive Geriatric Assessment; ED = emergency department; LOS = length of stay; LWBS = left without being seen; MD = medical doctor; NC = no conclusion; NR = not reported; NRS = non-randomized studies; RCT = randomized controlled trial; UK = United Kingdom; US = United States; vs = versus.

[a] Uncertain precision due to missing information and inconsistent reporting in SR

[b] May not be generalizable to Canadian context; however, certainty was not rated down for indirectness

[c] At least 1 primary study was conducted in Canada

[d] Low quality or high risk of bias reported by SR authors

[e] As reported by SR authors

[f] High heterogeneity in effects across studies

[g] Examples of ED-based integrated approaches: rapid triage + replace gurneys with recliners + divide ED into high and low acuity areas; team-based 2 hour evaluation + early senior consultation; rapid patient assessment by consultants + PCO testing; medical scribes + computerized physician order entry; physician in triage + split flow; triage to internal waiting area + registration efficiencies + flexible nursing ratios + demand-based physician scheduling

[h] Imprecision due to low number of participants.

Appendix 5: Confidence in the Results of Systematic Reviews Included in the Summary of Systematic Review Evidence on Interventions

Table 11: AMSTAR 2 Ratings for Each Included Systematic Review

References	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Overall Confidence
Dick et al. (2023)[2]	Y	Y	N	O	Y	N	O	Y	Y	N	No MA	No MA	N	Y	No MA	Y	Low
van den Broek et al. (2023)[18]	N	Y	N	O	Y	Y	O	O	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Anderson et al. (2022)[19]	Y	Y	N	O	Y	Y	O	Y	Y	N	Y	N	Y	Y	Y	Y	Moderate
Detollenaere et al. (2022)[20]	Y	O	N	O	Y	Y	O	O	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Jeyaraman et al. (2022)[21]	Y	Y	N	O	Y	Y	O	Y	Y	N	Y	Y	Y	Y	N	Y	Low
O'Cathain et al. (2022)[3]	Y	Y	N	O	Y	Y	Y	Y	Y	N	No MA	No MA	N	N	No MA	N	Low
Soster et al. (2022)[22]	Y	Y	N	O	Y	Y	O	Y	Y	N	Y	N	Y	Y	Y	N	Moderate
Tlapa et al. (2022)[23]	Y	Y	Y	O	Y	Y	O	N	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Voaklander et al. (2022)[24]	Y	Y	N	O	Y	Y	O	Y	Y	N	Y	Y	Y	Y	N	Y	Low
Berkman et al. (2021)[4]	Y	Y	N	O	Y	Y	Y	Y	Y	N	N	N	Y	Y	N	Y	Low
Burgess et al. (2021)[25]	Y	Y	Y	O	Y	Y	Y	Y	Y	N	No MA	No MA	N	N	No MA	Y	Low
Eustache et al. (2021)[54]	Y	Y	Y	O	Y	Y	O	Y	Y	N	Y	Y	Y	Y	N	Y	Low
Gottlieb et al. (2021)[26]	Y	Y	N	O	Y	Y	O	Y	Y	Y	Y	N	Y	Y	Y	Y	Moderate
Jones et al. (2021)[61]	Y	Y	N	O	Y	Y	Y	O	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Kinnear et al. (2021)[27]	Y	Y	N	O	Y	Y	N	O	Y	Y	No MA	No MA	Y	N	No MA	Y	Moderate
Leduc et al. (2021)[5]	Y	Y	N	Y	Y	N	O	Y	Y	Y	No MA	No MA	Y	N	No MA	Y	Moderate

References	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Overall Confidence
Pulcini et al. (2021)[6]	Y	Y	Y	O	Y	Y	O	Y	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Aghajafari et al. (2020)[63]	Y	Y	N	O	Y	Y	O	Y	Y	Y	Y	N	Y	Y	Y	N	Moderate
Benabbas et al. (2020)[28]	Y	Y	N	O	N	N	O	Y	Y	N	Y	N	N	Y	N	N	Low
Cicolo et al. (2020)[29]	Y	Y	N	O	Y	Y	Y	Y	Y	N	No MA	No MA	Y	Y	No MA	N	Moderate
Grant et al. (2020)[7]	Y	Y	N	O	Y	N	O	N	Y	N	Y	N	Y	Y	N	N	Low
Mullins et al. (2020)[30]	Y	Y	N	O	N	N	O	Y	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Pritchard et al. (2020)[8]	Y	Y	N	O	Y	Y	O	Y	Y	N	No MA	No MA	N	Y	No MA	Y	Low
Ratsimbazafy et al. (2020)[31]	Y	Y	N	O	Y	Y	O	Y	Y	Y	No MA	No MA	Y	Y	No MA	Y	High
Sharma et al. (2020)[32]	N	N	N	O	N	N	Y	O	Y	N	No MA	No MA	Y	Y	No MA	Y	Low
Tlapa et al. (2020)[33]	Y	Y	Y	O	Y	Y	Y	O	Y	N	No MA	No MA	Y	Y	No MA	Y	High
Beals et al. (2019)[34]	Y	Y	N	O	Y	N	O	O	Y	N	Y	N	Y	Y	N	Y	Low
Cassarino et al. (2019)[35]	Y	Y	N	O	Y	Y	O	Y	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Considine et al. (2019)[36]	Y	Y	N	O	Y	N	O	O	Y	Y	No MA	No MA	Y	Y	No MA	Y	Moderate
Evans et al. (2019)[37]	Y	O	N	O	N	Y	N	O	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Godard-Sebillotte et al. (2019)[9]	Y	Y	N	O	Y	Y	O	O	Y	N	Y	Y	Y	Y	N	Y	Low
Hesselink et al. (2019)[55]	Y	Y	N	O	Y	Y	O	O	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Kimmel et al. (2019)[38]	Y	Y	N	O	Y	Y	O	Y	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Kirkland et al. (2019)[10]	Y	Y	Y	O	Y	Y	O	Y	Y	N	Y	N	Y	Y	N	Y	Low
Matifat et al. (2019)[39]	Y	N	N	O	Y	Y	O	O	Y	N	No MA	No MA	Y	N	No MA	Y	Low
Poku et al. (2019)[11]	Y	O	N	O	Y	Y	O	Y	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate

References	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Overall Confidence
Rushton et al. (2019)[12]	Y	Y	N	O	N	N	Y	Y	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Santosaputri et al. (2019)[13]	Y	Y	Y	O	Y	N	Y	O	Y	N	No MA	No MA	Y	Y	No MA	N	Moderate
Thamm et al. (2019)[40]	Y	N	Y	O	Y	Y	N	Y	Y	N	No MA	No MA	N	Y	No MA	Y	Critically Low
Goncalves-Bradley et al. (2018)[41]	Y	Y	Y	O	N	Y	Y	Y	Y	Y	No MA	No MA	Y	Y	No MA	Y	High
Hall et al. (2018)[56]	Y	Y	N	O	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	High
Morley et al. (2018)[14]	N	Y	N	O	N	Y	O	O	Y	N	No MA	No MA	Y	N	No MA	Y	Moderate
Reddy et al. (2018)[62]	Y	Y	N	O	N	Y	O	O	Y	N	No MA	No MA	Y	N	No MA	Y	Moderate
Cabilan et al. (2017)[42]	Y	N	Y	O	Y	Y	Y	Y	Y	N	Y	N	Y	Y	N	Y	Critically Low
Crawford et al. (2017)[15]	Y	N	N	O	Y	N	N	Y	Y	N	No MA	No MA	Y	N	No MA	N	Low
Crede et al. (2017)[43]	Y	N	N	O	Y	Y	N	Y	Y	N	No MA	No MA	Y	Y	No MA	Y	Low
Health Quality Ontario (2017)[57]	Y	N	N	O	N	N	O	Y	Y	N	No MA	No MA	Y	Y	No MA	N	Low
Huntley et al. (2017)[16]	Y	Y	N	O	Y	N	N	Y	Y	N	No MA	No MA	Y	N	No MA	Y	Moderate
Newton et al. (2017)[44]	Y	O	N	Y	Y	Y	O	Y	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
van Galen et al. (2017)[45]	Y	N	N	O	Y	Y	O	O	Y	N	No MA	No MA	N	Y	No MA	Y	Critically Low
Abdulwahid et al. (2016)[48]	Y	Y	Y	O	N	N	Y	O	Y	N	Y	Y	Y	Y	Y	Y	Moderate
Abraham et al. (2016)[64]	Y	N	N	O	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Low
Ho et al. (2016)[46]	Y	N	N	O	Y	Y	N	Y	Y	N	Y	N	Y	Y	Y	Y	Low
Ming et al. (2016)[47]	Y	O	N	O	Y	Y	O	Y	Y	N	Y	N	Y	Y	N	N	Low
Curr et al. (2015)[49]	N	N	Y	O	N	Y	Y	Y	Y	Y	No MA	No MA	Y	Y	No MA	N	Low
Galipeau et al. (2015)[50]	Y	Y	Y	Y	Y	Y	O	Y	Y	Y	No MA	No MA	Y	Y	No MA	Y	High

References	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Overall Confidence
Jennings et al. (2015)[51]	N	O	N	O	Y	Y	N	O	Y	N	No MA	No MA	Y	Y	No MA	Y	Moderate
Lowthian et al. (2015)[65]	Y	O	Y	O	N	Y	O	O	Y	N	Y	Y	Y	Y	N	Y	Low
Vedel et al. (2015)[58]	Y	O	N	O	Y	Y	O	Y	Y	N	Y	Y	Y	Y	Y	Y	Moderate
Doan et al. (2014)[52]	Y	O	N	O	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Moderate
Tricco et al. (2014)[59]	Y	O	N	O	Y	Y	O	Y	Y	N	Y	N	Y	Y	Y	Y	Moderate
Dobson et al. (2013)[53]	N	N	N	O	Y	N	N	O	Y	N	No MA	No MA	Y	Y	No MA	N	Low
Peterson et al. (2013)[17]	Y	N	Y	O	Y	Y	Y	Y	Y	N	No MA	No MA	Y	Y	No MA	Y	Low
Rennke et al. (2013)[60]	Y	N	N	O	Y	Y	N	O	Y	N	No MA	No MA	Y	Y	No MA	Y	Low

Y = yes; N = no; O = partial yes; No MA = no meta-analysis conducted.

Domains of the AMSTAR 2 tool, critical domains are in bold: 1 = eligibility criteria contained all PICO components; **2 = contained a statement that the methods were established a priori and noted deviations from the protocol**; 3 = explained selection of study designs; **4 = comprehensive literature search strategy**; 5 = study selection done in duplicate; 6 = data extraction done in duplicate; 7 = list of excluded studies with justification; 8 = included studies described in detail; **9 = satisfactory technique for appraising study-level risk of bias**; 10 = reported funding sources of included studies; **11 = if meta-analysis was performed, methods were appropriate**; 12 = if meta-analysis was performed, potential impact of study-level risk of bias was assessed; **13 = accounted for risk of bias of included studies when interpreting results**; 14 = satisfactory explanation for and discussion of heterogeneity in results; **15 = if a quantitative synthesis was performed, there was an adequate investigation of publication bias**; 16 = reported conflicts of interest.

Appendix 6: Overlap of Primary Studies Across SRs Included in the Summary of Systematic Review Evidence on Interventions

A list of primary studies and the overlap between systematic reviews can be found in the Overlap Table.

Appendix 7: Excluded Studies List

Table 12: Excluded Studies and Exclusion Reasons for Summary of Systematic Review Evidence on Interventions

Reference	Exclusion Reason
Abraham J, Meng A, Tripathy S, Kitsiou S, Kannampallil T. Effect of health information technology (HIT)-based discharge transition interventions on patient readmissions and emergency room visits: a systematic review. *J Am Med Inform Assoc*. 2022;29(4):735-748.	Not systematic review
Acosta-Garcia H, Alfaro-Lara ER, Sanchez-Fidalgo S, et al. Intervention effectiveness by pharmacists integrated within an interdisciplinary health team on chronic complex patients. *Eur J Public Health*. 2020;30(5):886-899.	Ineligible intervention
Addition of Advanced Practice Registered Nurses to the Trauma Team: An Integrative Systematic Review of Literature. *J Trauma Nurs*. 2019;26(3):E3-E4.	Not systematic review
Adibhatla S, Lurie T, Betz G, et al. A Systematic Review of Methodologies and Outcome Measures of Mobile Integrated Health-Community Paramedicine Programs. *Prehosp Emerg Care*. 2022:1-11.	Ineligible intervention
Adjemian R, Moradi Zirkohi A, Coombs R, Mickan S, Vaillancourt C. Are emergency department clinical pathway interventions adequately described, and are they delivered as intended? A systematic review. *Int J Care Coord*. 2017;20(4):148-161.	Not systematic review
Afnan MAM, Ali F, Worthington H, Netke T, Singh P, Kajamuhan C. Triage nurse prediction as a covariate in a machine learning prediction algorithm for hospital admission from the emergency department. *Int J Med Inform*. 2021;153:104528.	Not systematic review
Afnan MAM, Netke T, Singh P, et al. Ability of triage nurses to predict, at the time of triage, the eventual disposition of patients attending the emergency department (ED): a systematic literature review and meta-analysis. *Emerg Med J*. 2021;38(9):694-700.	Ineligible intervention
Agarwal P, Poeran J, Meyer J, Rogers L, Reich DL, Mazumdar M. Bedside medication delivery programs: suggestions for systematic evaluation and reporting. *Int J Qual Health Care*. 2019;31(8):G53-G59.	Not systematic review
Ahmed S, Manaf NH, Islam R. Effects of Lean Six Sigma application in healthcare services: a literature review. *Rev Environ Health*. 2013;28(4):189-94.	Not systematic review
Ahsan KB, Alam MR, Morel DG, Karim MA. Emergency department resource optimisation for improved performance: a review. *J Ind Eng Int*. 2019;15(1):253-266.	Not systematic review
Akbulut S, Hargura AS, Garzali IU, Aloun A, Colak C. Clinical presentation, management, screening and surveillance for colorectal cancer during the COVID-19 pandemic. *World J Clin Cases*. 2022;10(26):9228-9240.	Not systematic review
Al Busaidi O, Lee S, Kortbeek JB, et al. Complications of appendectomy and cholecystectomy in acute care surgery: A systematic review and meta-analysis. *J Trauma Acute Care Surg*. 2020;89(3):576-584.	Ineligible intervention

Reference	Exclusion Reason
Al Sattouf A, Farahat R, Khatri AA. Effectiveness of Transitional Care Interventions for Heart Failure Patients: A Systematic Review With Meta-Analysis. *Cureus*. 2022;14(9):e29726.	Ineligible intervention
Alam N, Hobbelink EL, van Tienhoven AJ, van de Ven PM, Jansma EP, Nanayakkara PW. The impact of the use of the Early Warning Score (EWS) on patient outcomes: a systematic review. *Resuscitation*. 2014;85(5):587-94.	Ineligible intervention
Aldehaim AY, Alotaibi FF, Uphold CR, Dang S. The Impact of Technology-Based Interventions on Informal Caregivers of Stroke Survivors: A Systematic Review. *Telemed J E Health*. 2016;22(3):223-31.	Not systematic review
Almasi S, Rabiei R, Moghaddasi H, Vahidi-Asl M. Emergency Department Quality Dashboard; a Systematic Review of Performance Indicators, Functionalities, and Challenges. *Arch Acad Emerg Med*. 2021;9(1):e47.	Ineligible outcome
Alquthami AH, Pines JM. A systematic review of noncommunicable health issues in mass gatherings. *Prehosp Disaster Med*. 2014;29(2):167-75.	Not systematic review
Alrawashdeh A, Nehme Z, Williams B, Stub D. Review article: Impact of 12-lead electrocardiography system of care on emergency medical service delays in ST-elevation myocardial infarction: A systematic review and meta-analysis. *Emerg Med Australas*. 2019;31(5):702-709.	Ineligible intervention
Alter DN. Point-of-Care Testing for the Emergency Department Patient: Quantity and Quality of the Available Evidence. *Arch Pathol Lab Med*. 2021;145(3):308-319.	Not systematic review
Amadi-Obi A, Gilligan P, Owens N, O'Donnell C. Telemedicine in pre-hospital care: a review of telemedicine applications in the pre-hospital environment. *Int J Emerg Med*. 2014;7:29.	Not systematic review
Amalia SR, Lestari P, Ningrum AG. Causative Factor of Delay in Maternal Referral - Systematic Review. *Indones Midwifery Health Sci J*. 2022;6(1):1-14.	Ineligible intervention
American College of Surgeons Committee on T, American College of Emergency Physicians Pediatric Emergency Medicine C, National Association of Ems P, American Academy of Pediatrics Committee on Pediatric Emergency M, Fallat ME. Withholding or termination of resuscitation in pediatric out-of-hospital traumatic cardiopulmonary arrest. *Pediatrics*. 2014;133(4):e1104-16.	Not systematic review
Angelini D, Howard E. Obstetric triage: a systematic review of the past fifteen years: 1998-2013. *MCN Am J Matern Child Nurs*. 2014;39(5):284-97; quiz 298-9.	Not systematic review
Ansell D, Crispo JAG, Simard B, Bjerre LM. Interventions to reduce wait times for primary care appointments: a systematic review. *BMC Health Serv Res*. 2017;17(1):295.	Not systematic review
Arango-Granados MC, Bustamante Cristancho LA, Zarama CÃ³rdoba V. Bedside Thoracic Ultrasonography for the Critically Ill Patient: From the Emergency Department to the Intensive Care Unit. *J Radiol Nurs*. 2020;39(3):215-228.	Not systematic review

Reference	Exclusion Reason
Aregbesola A, Tam CM, Kothari A, Le ML, Ragheb M, Klassen TP. Glucocorticoids for croup in children. *Cochrane Database Syst Rev*. 2023;1:CD001955.	Ineligible intervention
Arruzza E, Chau M, Dizon J. Systematic review and meta-analysis of whole-body computed tomography compared to conventional radiological procedures of trauma patients. *Eur J Radiol*. 2020;129:109099.	Ineligible intervention
Arsenault-Lapierre G, Henein M, Gaid D, Le Berre M, Gore G, Vedel I. Hospital-at-Home Interventions vs In-Hospital Stay for Patients With Chronic Disease Who Present to the Emergency Department: A Systematic Review and Meta-analysis. *JAMA Netw Open*. 2021;4(6):e2111568.	Ineligible outcome
Asadourian PA, Lu Wang M, Demetres MR, Imahiyerobo TA, Otterburn DM. Closing the Gap: A Systematic Review and Meta-Analysis of Enhanced Recovery After Surgery Protocols in Primary Cleft Palate Repair. *Cleft Palate Craniofac J*. 2022:10556656221096631.	Ineligible intervention
Assaye AM, Wiechula R, Schultz TJ, Feo R. Impact of nurse staffing on patient and nurse workforce outcomes in acute care settings in low- and middle-income countries: a systematic review. *JBI Evid Synth*. 2021;19(4):751-793.	Ineligible intervention
Atkins PE, Thompson Bastin ML, Morgan RJ, Laine ME, Flannery AH. Pharmacist involvement in sepsis response and time to antibiotics: A systematic review. *J Am Coll Clin Pharm*. 2023;6(8):942-953.	Ineligible intervention
Auener SL, Remers TEP, van Dulmen SA, Westert GP, Kool RB, Jeurissen PPT. The Effect of Noninvasive Telemonitoring for Chronic Heart Failure on Health Care Utilization: Systematic Review. *J Med Internet Res*. 2021;23(9):e26744.	Not systematic review
Auger KA, Kenyon CC, Feudtner C, Davis MM. Pediatric hospital discharge interventions to reduce subsequent utilization: a systematic review. *J Hosp Med*. 2014;9(4):251-60.	Not systematic review
Australasian College for Emergency Medicine (ACEM). Solutions to Access Block. https://acem.org.au/getattachment/Content-Sources/Advancing-Emergency-Medicine/Better-Outcomes-for-Patients/Access-Block-(1)/Hospital-Access-Targets/National-Cabinet-Health-Minister-briefing-4.pdf?lang=en-AU.	Not systematic review
Azeredo TR, Guedes HM, Rebelo de Almeida RA, Chianca TC, Martins JC. Efficacy of the Manchester Triage System: a systematic review. *Int Emerg Nurs*. 2015;23(2):47-52.	Ineligible intervention
Bahr SJ, Solverson S, Schlidt A, Hack D, Smith JL, Ryan P. Integrated literature review of postdischarge telephone calls. *West J Nurs Res*. 2014;36(1):84-104.	Not systematic review
Baker J. Effects of ambulatory emergency care on organisational and patient outcomes. *Nurs Manag (Harrow)*. 2018;25(4):36-41.	Not systematic review
Bakshi S, Carlson LC, Gulla J, et al. Improving care coordination and reducing ED utilization through patient navigation. *Am J Manag Care*. 2022;28(5):201-206.	Not systematic review

Reference	Exclusion Reason
Barrett R, Terry L. Patients' and healthcare professionals' experiences and perceptions of physiotherapy services in the emergency department: a qualitative systematic review. *Int J Emerg Med*. 2018;11(1):42.	No comparator
Baugh JJ, White BA, Biddinger PD, et al. To solve our new emergency care crisis, let's start with the old one. *Am J Emerg Med*. 2020;38(10):2000-2001.	Not systematic review
Becker C, Zumbrunn S, Beck K, et al. Interventions to Improve Communication at Hospital Discharge and Rates of Readmission: A Systematic Review and Meta-analysis. *JAMA Netw Open*. 2021;4(8):e2119346.	Ineligible intervention
Beckerleg W, Wooller K, Hasimjia D. Interventions to reduce emergency department consultation time: A systematic review of the literature. *CJEM*. 2020;22(1):56-64.	Not systematic review
Beckhaus AA, Riutort MC, Castro-Rodriguez JA. Inhaled versus systemic corticosteroids for acute asthma in children. A systematic review. *Pediatr Pulmonol*. 2014;49(4):326-34.	Ineligible intervention
Bezerra HS, Brasileiro Costa AL, Pinto RS, Ernesto de Resende P, Martins de Freitas GR. Economic impact of pharmaceutical services on polymedicated patients: A systematic review. *Res Social Adm Pharm*. 2022;18(9):3492-3500.	Ineligible intervention
Bhat S, Varghese C, Xu W, et al. Outcomes following out-of-hours acute cholecystectomy: A systematic review and meta-analysis. *J Trauma Acute Care Surg*. 2022;92(2):447-455.	Ineligible intervention
Bigham BL, Kennedy SM, Drennan I, Morrison LJ. Expanding paramedic scope of practice in the community: a systematic review of the literature. *Prehosp Emerg Care*. 2013;17(3):361-72.	Not systematic review
Bilazarian A, Hovsepian V, Kueakomoldej S, Poghosyan L. A Systematic Review of Primary Care and Payment Models on Emergency Department Use in Patients Classified as High Need, High Cost. *J Emerg Nurs*. 2021;47(5):761-777.e3.	Not systematic review
Birtwell K, Planner C, Hodkinson A, et al. Transitional Care Interventions for Older Residents of Long-term Care Facilities: A Systematic Review and Meta-analysis. *JAMA Netw Open*. 2022;5(5):e2210192.	Ineligible intervention
Bjornson C, Russell K, Vandermeer B, Klassen TP, Johnson DW. Nebulized epinephrine for croup in children. *Cochrane Database Syst Rev*. 2013;10:CD006619.	Ineligible intervention
Blackley SV, Huynh J, Wang L, Korach Z, Zhou L. Speech recognition for clinical documentation from 1990 to 2018: a systematic review. *J Am Med Inform Assoc*. 2019;26(4):324-338.	Not systematic review
Bond R. Troponin testing in primary care: can it improve diagnosis and prevent admission? *J Paramed Pract*. 2022;14(8):322-331.	Ineligible intervention
Bonetti AF, Reis WC, Mendes AM, et al. Impact of Pharmacist-led Discharge Counseling on Hospital Readmission and Emergency Department Visits: A Systematic Review and Meta-analysis. *J Hosp Med*. 2020;15(1):52-59.	Ineligible intervention

Reference	Exclusion Reason
Boonstra A, Laven M. Influence of artificial intelligence on the work design of emergency department clinicians a systematic literature review. *BMC Health Serv Res*. 2022;22(1):669.	Not systematic review
Booth A, Preston L, Baxter S, Wong R, Chambers D & Turner J. Interventions to manage use of the emergency and urgent care system by people from vulnerable groups: a mapping review. *Health Serv Deliv Res*. 2019;7(33).	Not systematic review
Boston L, Gobbell K, McCann-Van Dokkum J, Schwartz E, Stafford R. Who's Who in the PACU? Role Designation During Emergencies. *J Perianesth Nurs*. 2022;37(4):e25-e25.	Not systematic review
Bou Malham C, El Khatib S, Cestac P, Andrieu S, Rouch L, Salameh P. Impact of pharmacist-led interventions on patient care in ambulatory care settings: A systematic review. *Int J Clin Pract*. 2021;75(11):e14864.	Ineligible intervention
Boylen S, Cherian S, Gill FJ, Leslie GD, Wilson S. Impact of professional interpreters on outcomes for hospitalized children from migrant and refugee families with limited English proficiency: a systematic review. *JBI Evid Synth*. 2020;18(7):1360-1388.	Ineligible intervention
Brackett T, Comer L, Whichello R. Do lean practices lead to more time at the bedside? *J Healthc Qual*. 2013;35(2):7-14.	Not systematic review
Braet A, Weltens C, Sermeus W. Effectiveness of discharge interventions from hospital to home on hospital readmissions: a systematic review. *JBI Database System Rev Implement Rep*. 2016;14(2):106-73.	Ineligible intervention
Brambilla A, Mangili S, Das M, Lal S, Capolongo S. Analysis of Functional Layout in Emergency Departments (ED). Shedding Light on the Free Standing Emergency Department (FSED) Model. *Appl Sci*. 2022;12(10):5099.	Not systematic review
Briggs R, McDonough A, Ellis G, Bennett K, O'Neill D, Robinson D. Comprehensive Geriatric Assessment for community-dwelling, high-risk, frail, older people. *Cochrane Database Syst Rev*. 2022;5:CD012705.	Ineligible intervention
Brink A, Alsma J, van Attekum LA, et al. Predicting inhospital admission at the emergency department: a systematic review. *Emerg Med J*. 2022;39(3):191-198.	Ineligible outcome
Bucci S, de Belvis AG, Marventano S, et al. Emergency Department crowding and hospital bed shortage: is Lean a smart answer? A systematic review. *Eur Rev Med Pharmacol Sci*. 2016;20(20):4209-4219.	Not systematic review
Bulow C, Clausen SS, Lundh A, Christensen M. Medication review in hospitalised patients to reduce morbidity and mortality. *Cochrane Database Syst Rev*. 2023;1:CD008986.	Ineligible intervention
Butler M, Schultz TJ, Halligan P, et al. Hospital nurse-staffing models and patient- and staff-related outcomes. *Cochrane Database Syst Rev*. 2019;4:CD007019.	Ineligible intervention
Butterworth JE, Hays R, McDonagh ST, Richards SH, Bower P, Campbell J. Interventions for involving older patients with multi-morbidity in decision-making during primary care consultations. *Cochrane Database Syst Rev*. 2019;10:CD013124.	Ineligible intervention

Reference	Exclusion Reason
Cabral E, Castro WRS, Florentino DRM, et al. Response time in the emergency services. Systematic review. *Acta Cir Bras*. 2018;33(12):1110-1121.	Not systematic review
Cai H, Chowdhury M. Emergency department design in response to pandemics: a systematic literature review. In: Bliss AM, Kopec D, eds. *Architectural Factors for Infection and Disease Control (1st ed.)*. New York (NY): Routledge; 2022:126-165.	Not systematic review
Cai KJ, Su SQ, Wang YG, Zeng YM. Dexamethasone Versus Prednisone or Prednisolone for Acute Pediatric Asthma Exacerbations in the Emergency Department: A Meta-Analysis. *Pediatr Emerg Care*. 2021;37(12):e1139-e1144.	Ineligible intervention
Cao HJ, Cheng N, Wang RT, Huang XY, Wu JR. Comparison between Xingnaojing Injection () and Naloxone in Treatment of Acute Alcohol Intoxication: An Updated Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Chin J Integr Med*. 2019;25(12):926-935.	Ineligible intervention
Caprara C, Visintin F, Puggelli F. Crowding in Paediatric Emergency Department, A Review of the Literature and a Simulation-Based Case Study. Proc Int Conf *Health Care Syst Eng*. 2017;210:293-295.	Not systematic review
Castro-Rodriguez JA, Pincheira MA, Escobar-Serna DP, Sossa-Briceno MP, Rodriguez-Martinez CE. Adding nebulized corticosteroids to systemic corticosteroids for acute asthma in children: A systematic review with meta-analysis. *Pediatr Pulmonol*. 2020;55(10):2508-2517.	Ineligible intervention
Cates CJ, Welsh EJ, Rowe BH. Holding chambers (spacers) versus nebulisers for beta-agonist treatment of acute asthma. *Cochrane Database Syst Rev*. 2013;9:CD000052.	Ineligible intervention
Cetin-Sahin D, Cummings GG, Gore G, et al. Taxonomy of Interventions to Reduce Acute Care Transfers From Long-term Care Homes: A Systematic Scoping Review. *J Am Med Dir Assoc*. 2023;24(3):343-355.	Ineligible intervention
Chan J, Griffith LE, Costa AP, Leyenaar MS, Agarwal G. Community paramedicine: A systematic review of program descriptions and training. *CJEM*. 2019;21(6):749-761.	Ineligible intervention
Chan SS, Cheung NK, Graham CA, Rainer TH. Strategies and solutions to alleviate access block and overcrowding in emergency departments. *Hong Kong Med*. 2015;21(4):345-52.	Not systematic review
Chang E, Ali R, Seibert J, Berkman ND. Interventions to Improve Outcomes for High-Need, High-Cost Patients: A Systematic Review and Meta-Analysis. *J Gen Intern Med*. 2023;38(1):185-194.	Duplicate
Chauhan U, McAlister FA. Comparison of Mortality and Hospital Readmissions Among Patients Receiving Virtual Ward Transitional Care vs Usual Postdischarge Care: A Systematic Review and Meta-analysis. *JAMA Netw Open*. 2022;5(6):e2219113.	Not systematic review
Chen CE, Chen CT, Hu J, Mehrotra A. Walk-in clinics versus physician offices and emergency rooms for urgent care and chronic disease management. *Cochrane Database Syst Rev*. 2017;2:CD011774.	Ineligible intervention

Reference	Exclusion Reason
Chen KH, Chen CC, Liu HE, Tzeng PC, Glasziou PP. Effectiveness of paediatric asthma clinical pathways: a narrative systematic review. *J Asthma*. 2014;51(5):480-92.	Ineligible intervention
Cheng CW, Huang YB, Chao HY, Ng CJ, Chen SY. Impact of the COVID-19 Pandemic on Pediatric Emergency Medicine: A Systematic Review. *Medicina (B Aires)*. 2022;58(8):17.	Ineligible intervention
Chennareddy S, Kalagara R, Smith C, et al. Portable stroke detection devices: a systematic scoping review of prehospital applications. *BMC Emerg Med*. 2022;22(1):111.	Not systematic review
Chhabra S, Eagles D, Kwok ESH, Perry JJ. Interventions to reduce emergency department door-to- electrocardiogram times: A systematic review. *CJEM*. 2019;21(5):607-617.	Ineligible intervention
Chilala CI, Kassavou A, Sutton S. Evaluating the Effectiveness of Remote Behavioral Interventions Facilitated by Health Care Providers at Improving Medication Adherence in Cardiometabolic Conditions: A Systematic Review and Meta-Analysis. *Ann Behav Med*. 2023;57(2):99-110.	Ineligible intervention
Choi JY, Rajaguru V, Shin J, Kim KI. Comprehensive geriatric assessment and multidisciplinary team interventions for hospitalized older adults: A scoping review. *Arch Gerontol Geriatr*. 2023;104:104831.	Not systematic review
Chowdhury SZ, Baskar PS, Bhaskar S. Effect of prehospital workflow optimization on treatment delays and clinical outcomes in acute ischemic stroke: A systematic review and meta-analysis. *Acad Emerg Med*. 2021;28(7):781-801.	Ineligible intervention
Christensen M, Lundh A. Medication review in hospitalised patients to reduce morbidity and mortality. *Cochrane Database Syst Rev*. 2013;2:CD008986.	Ineligible intervention
Ciapponi A, Fernandez Nievas SE, Seijo M, et al. Reducing medication errors for adults in hospital settings. *Cochrane Database Syst Rev*. 2021;11:CD009985.	Ineligible intervention
Coaston A, Lee SJ, Johnson J, Hardy-Peterson M, Weiss S, Stephens C. Mobile Medical Clinics in the United States Post-Affordable Care Act: An Integrative Review. *Popul Health Manag*. 2022;25(2):264-279.	Not systematic review
Coffey A, Leahy-Warren P, Savage E, et al. Interventions to Promote Early Discharge and Avoid Inappropriate Hospital (Re)Admission: A Systematic Review. *Int J Environ Res Public Health*. 2019;16(14):2457.	Ineligible intervention
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Seo HJ, Sohng KY, Chang SO, Chaung SK, Won JS, Choi MJ. Interventions to improve hand hygiene compliance in emergency departments: a systematic review. *J Hosp Infect*. 2019;102(4):394-406.	Ineligible intervention

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Sezgin D, Hendry A, Liew A, et al. Transitional palliative care interventions for older adults with advanced non-malignant diseases and frailty: a systematic review. *J Integr Care*. 2020;28(4):387-403.	Ineligible intervention
Shaat MS, Gillani SW, Mohiuddin S, Menon V, Azhar A, Jiaan N. Influence of Clinical Pharmacist's Interventions on Clinical Outcomes of Patients With Pneumonia in the Emergency Department of Tertiary Care Healthcare Setting. *Infect Dis Clin Pract (Baltimore MD)*. 2022;30(2):1-6.	Ineligible intervention
Shamsi MB, Vaziri S, Mozaffari HR, Mirzaei M. Systematic Review of Drug-Related Hospital Admissions: Common Errors in Reporting. *Bull Emerg Trauma*. 2020;8(3):205-206.	Not systematic review
Shankar KN, Bhatia BK, Schuur JD. Toward patient-centered care: a systematic review of older adults' views of quality emergency care. *Ann Emerg Med*. 2014;63(5):529-550.e1.	Ineligible intervention
Sharafi S, Ziaee A, Dahmardeh H. What are the outcomes of hospice care for cancer patients? A systematic review. *Support Care Cancer*. 2022;31(1):64.	Ineligible intervention
Sharifi Kia A, Rafizadeh M, Shahmoradi L. Telemedicine in the emergency department: an overview of systematic reviews. *Z Gesundh Wiss*. 2022;Jan 27:1-15.	Not systematic review
Sharma S, Rafferty AM, Boiko O. The role and contribution of nurses to patient flow management in acute hospitals: A systematic review of mixed methods studies. *Int J Nurs Stud*. *2020*;110:*103709*.	Duplicate
Shillan D, Sterne JAC, Champneys A, Gibbison B. Use of machine learning to analyse routinely collected intensive care unit data: a systematic review. *Crit Care*. 2019;23(1):284.	Not systematic review
Sithamparapillai A, Grewal K, Thompson C, Walsh C, McLeod S. Intra-articular lidocaine versus intravenous sedation for closed reduction of acute anterior shoulder dislocation in the emergency department: a systematic review and meta-analysis. *CJEM*. 2022;24(8):809-819.	Ineligible intervention
Skorga P, Young CF. Primary care professionals providing non-urgent care in hospital emergency departments. *Int J Evid Based Healthc*. 2013;11(3):206-207.	Not systematic review
Slyer JT, Ferrara LR. The effectiveness of group visits for patients with heart failure on knowledge, quality of life, self-care, and readmissions: a systematic review. *JBI Database System Rev Implement Rep*. 2013;11(7):58-81.	Ineligible intervention
Smith SM, Holland AE, McDonald CF. Beyond forest plots: clinical gestalt and its influence on COPD telemonitoring studies and outcomes review. *BMJ Open*. 2019;9(12):e030779.	Not systematic review

Reference	Exclusion Reason
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Soh YY, Zhang H, Toh JJY, Li X, Wu XV. The effectiveness of tele-transitions of care interventions in high-risk older adults: A systematic review and meta-analysis. *Int J Nurs Stud*. 2023;139:104428.	Ineligible intervention
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Son YJ, Lee Y, Lee HJ. Effectiveness of Mobile Phone-Based Interventions for Improving Health Outcomes in Patients with Chronic Heart Failure: A Systematic Review and Meta-Analysis. *Int J Environ Res Public Health*. 2020;17(5):1749.	Ineligible intervention
Souter B, Jones A, Sheppard L, Crowe M. Extended Scope Physiotherapists are Effective and Safe in the Emergency Department: A Systematic Review and Meta-Analysis. *Internet J Allied Health Sci Pract*. 2022;20(3):1-21.	Not systematic review
Souza DL, Korzenowski AL, Alvarado MM, et al. A Systematic Review on Lean Applications' in Emergency Departments. *Healthcare (Basel)*. 2021;9(6):19.	Not systematic review
Staib A, Sullivan C, Griffin B, Bell A, Scott I. Report on the 4-h rule and National Emergency Access Target (NEAT) in Australia: time to review. *Aust Health Rev*. 2016;40(3):319-323.	Not systematic review
Stall N, Nowaczynski M, Sinha SK. Systematic review of outcomes from home-based primary care programs for homebound older adults. *J Am Geriatr Soc*. 2014;62(12):2243-51.	Ineligible intervention
Stefanacci RG, Reich S, Casiano A. Application of PACE Principles for Population Health Management of Frail Older Adults. *Popul Health Manag*. 2015;18(5):367-72.	Not systematic review
Stephens CT, Chaudhry R. Direct Admission to the Operating Room for Severe Trauma. *Curr Anesthesiol Rep*. 2022;12(2):177-182.	Not systematic review
Stephenson MD, Lisy K, Stern CJ, Feyer AM, Fisher L, Aromataris EC. The impact of integrated care for people with chronic conditions on hospital and emergency department utilization: a rapid review. *Int J Evid Based Healthc*. 2019;17(1):14-26.	Not systematic review
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Stevens L. Nurses plastering and splinting in the emergency department: an integrative review. *Aust J Adv Nurs*. 2017;35(2):38-50.	Not systematic review
Stevenson MD, Fox JW. Recurrent ED visits by children: where do we go from here? *Acad Emerg Med*. 2014;21(4):465-6.	Not systematic review

Reference	Exclusion Reason
Straumann GSH, Austvoll-Dahlgren A, Holte HH, Wisborg T. Effect of requiring a general practitioner at scenes of serious injury: A systematic review. *Acta Anaesthesiol Scand*. 2018;62(9):1194-1199.	Ineligible outcome
Stredny CM, Abend NS, Loddenkemper T. Towards acute pediatric status epilepticus intervention teams: Do we need "Seizure Codes"? *Seizure*. 2018;58:133-140.	Not systematic review
Strom C, Stefansson JS, Fabritius ML, Rasmussen LS, Schmidt TA, Jakobsen JC. Hospitalisation in short-stay units for adults with internal medicine diseases and conditions. *Cochrane Database Syst Rev*. 2018;88:CD012370.	Ineligible outcome
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Strudwick K, Nelson M, Martin-Khan M, Bourke M, Bell A, Russell T. Quality indicators for musculoskeletal injury management in the emergency department: a systematic review. *Acad Emerg Med*. 2015;22(2):127-41.	Ineligible intervention
Sul AR, Lyu DH, Park DA. Effectiveness of telemonitoring versus usual care for chronic obstructive pulmonary disease: A systematic review and meta-analysis. *J Telemed Telecare*. 2020;26(4):189-199.	Ineligible intervention
Surbhi S, Chen M, Shuvo SA, et al. Effect of continuity of care on emergency department and hospital visits for obesity-associated chronic conditions: A federated cohort meta-analysis. *J Natl Med Assoc*. 2022;114(5):525-533.	Not systematic review
Sutarsa IN, Kasim R, Slimings C, Bain-Donohue S, Barnard A. Effects of employing primary care doctors in hospital to improve the quality of care and health outcomes of rural patients: A systematic scoping review. *Aust J Rural Health*. 2021;29(4):492-501.	Not systematic review
Synnot A, Karlsson A, Brichko L, et al. Prehospital notification for major trauma patients requiring emergency hospital transport: A systematic review. *J Evid Based Med*. 2017;10(3):212-221.	Ineligible intervention
Tabner AJ, Johnson GD, Fakis A, Surtees J, Lennon RI. beta-Adrenoreceptor agonists in the management of pain associated with renal colic: a systematic review. *BMJ Open*. 2016;6(6):e011315.	Not systematic review
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Tam-Tham H, Cepoiu-Martin M, Ronksley PE, Maxwell CJ, Hemmelgarn BR. Dementia case management and risk of long-term care placement: a systematic review and meta-analysis. *Int J Geriatr Psychiatry*. 2013;28(9):889-902.	Ineligible intervention
Tasai S, Kumpat N, Dilokthornsakul P, Chaiyakunapruk N, Saini B, Dhippayom T. Impact of Medication Reviews Delivered by Community Pharmacist to Elderly Patients on Polypharmacy: A Meta-analysis of Randomized Controlled Trials. *J Patient Saf*. 2021;17(4):290-298.	Ineligible intervention

Reference	Exclusion Reason
Taylor ML, Thomas EE, Snoswell CL, Smith AC, Caffery LJ. Does remote patient monitoring reduce acute care use? A systematic review. *BMJ Open*. 2021;11(3):e040232.	Ineligible intervention
Desert Regional Medical Center. The surge plan: improving emergency department overcrowding. Emeryville (CA): Vituity; 2018: https://www.vituity.com/healthcare-insights/the-surge-plan-improving-emergency-department-overcrowding/.	Not systematic review
Thomas R, Huntley A, Mann M, et al. Specialist clinics for reducing emergency admissions in patients with heart failure: a systematic review and meta-analysis of randomised controlled trials. *Heart*. 2013;99(4):233-9.	Ineligible outcome
Ti L, Ti L. Leaving the Hospital Against Medical Advice Among People Who Use Illicit Drugs: A Systematic Review. *Am J Public Health*. 2015;105(12):e53-9.	Not systematic review
Timmins F, Catania G, Zanini M, et al. Nursing management of emergency department violence-Can we do more? *J Clin Nurs*. 2023;32(7-8):1487-1494.	Not systematic review
Toaimah FH, Mohammad HM. Rapid Intravenous Rehydration Therapy in Children With Acute Gastroenteritis: A Systematic Review. *Pediatr Emerg Care*. 2016;32(2):131-5.	Ineligible intervention
Torrego A, Sola I, Munoz AM, et al. Bronchial thermoplasty for moderate or severe persistent asthma in adults. *Cochrane Database Syst Rev*. 2014;3:CD009910.	Ineligible intervention
Tortosa-Alted R, Martinez-Segura E, Berenguer-Poblet M, Reverte-Villarroya S. Handover of Critical Patients in Urgent Care and Emergency Settings: A Systematic Review of Validated Assessment Tools. *J Clin Med*. 2021;10(24):5376.	Ineligible intervention
Tortosa-Alted R, Reverte-Villarroya S, Martinez-Segura E, Lopez-Pablo C, Berenguer-Poblet M. Emergency handover of critical patients. A systematic review. *Int Emerg Nurs*. 2021;56:100997.	Ineligible intervention
Totten AM, Hansen RN, Wagner J, et al. Telehealth for Acute and Chronic Care Consultations. *(Comparative effectiveness review no. 216)*. Rockville (MD): *Agency for Healthcare Research and Quality*; 2019: https://www.ncbi.nlm.nih.gov/books/NBK547239/pdf/Bookshelf_NBK547239.pdf.	Ineligible intervention
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Tran QK, Fairchild M, Yardi I, Mirda D, Markin K, Pourmand A. Efficacy of Ultrasound-Guided Peripheral Intravenous Cannulation versus Standard of Care: A Systematic Review and Meta-analysis. *Ultrasound Med Biol*. 2021;47(11):3068-3078.	Ineligible intervention
Transformation of urgent and emergency care: models of care and measurement. London (UK): NHS England and NHS Improvement; 2020: https://www.england.nhs.uk/wp-content/uploads/2020/12/transformation-of-urgent-and-emergency-care-models-of-care-and-measurement.pdf.	Not systematic review

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Trindade LF, Boell JEW, Lorenzini E, et al. Effectiveness of care transition strategies for colorectal cancer patients: a systematic review and meta-analysis. *Support Care Cancer*. 2022;30(7):6251-6261.	Ineligible intervention
Troyer L, Brady W. Barriers to effective EMS to emergency department information transfer at patient handover: A systematic review. *Am J Emerg Med*. 2020;38(7):1494-1503.	Ineligible intervention
Tsou C, Robinson S, Boyd J, et al. Effectiveness of Telehealth in Rural and Remote Emergency Departments: Systematic Review. *J Med Internet Res*. 2021;23(11):e30632.	Not systematic review
Tyrrell CSB, Mytton OT, Gentry SV, et al. Managing intensive care admissions when there are not enough beds during the COVID-19 pandemic: a systematic review. *Thorax*. 2021;76(3):302-312.	Ineligible intervention
Udaya R, Sivakanesan R. Synopsis of Biomarkers of Atheromatous Plaque Formation, Rupture and Thrombosis in the Diagnosis of Acute Coronary Syndromes. *Curr Cardiol Rev*. 2022;18(5):53-62.	Not systematic review
Uhl S, Bloschichak A, Moran A, et al. Telehealth for Substance Use Disorders: A Rapid Review for the 2021 U.S. Department of Veterans Affairs and U.S. Department of Defense Guidelines for Management of Substance Use Disorders. *Ann Intern Med*. 2022;175(5):691-700.	Ineligible intervention
Ullah N, Thompson MJ, Qureshi AI. Earlier thrombolytic treatment is associated with better outcomes following acute ischaemic stroke. *Evid Based Nurs*. 2014;17(4):107.	Not systematic review
Ullman K, McKenzie L, Bart B, et al. The Effect of Medical Scribes in Emergency Departments: A Systematic Review. *J Emerg Med*. 2021;61(1):19-28.	Ineligible intervention
Ullman K, McKenzie L, Bart B, et al. The Effect of Medical Scribes in Cardiology, Orthopedic, and Emergency Departments: A Systematic Review. *(Evidence synthesis program project #09-009)*. Washington (DC): U.S. Department of Veterans Affairs; 2020: https://www.ncbi.nlm.nih.gov/books/NBK570894/pdf/Bookshelf_NBK570894.pdf.	Ineligible intervention
Umar TP, Jain N. Debunking the myth of using "quiet" in clinical departments: an integrative overview of available literature. *Ann Med Surg (Lond)*. 2022;82:104792.	Not systematic review
van Melle MA, van Stel HF, Poldervaart JM, de Wit NJ, Zwart DLM. Measurement tools and outcome measures used in transitional patient safety; a systematic review. *PLoS ONE*. 2018;13(6):e0197312.	Ineligible intervention
van Turenhout EC, Bossers SM, Loer SA, Giannakopoulos GF, Schwarte LA, Schober P. Pre-hospital transfusion of red blood cells. Part 2: A systematic review of treatment effects on outcomes. *Transfus Med*. 2020;30(2):106-133.	Ineligible intervention
van Vuuren J, Thomas B, Agarwal G, et al. Reshaping healthcare delivery for elderly patients: the role of community paramedicine; a systematic review. *BMC Health Serv Res*. 2021;21(1):29.	Not systematic review

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Varndell W, Elliott D, Fry M. Assessing, monitoring and managing continuous intravenous sedation for critically ill adult patients and implications for emergency nursing practice: A systematic literature review. *Australas Emerg Nurs J*. 2015;18(2):59-67.	Ineligible intervention
Varndell W, Fry M, Elliott D. Quality and impact of nurse-initiated analgesia in the emergency department: A systematic review. *Int Emerg Nurs*. 2018;40:46-53.	Not systematic review
Varndell W, Topacio M, Hagness C, Lemon H, Tracy D. Nurse-performed focused ultrasound in the emergency department: A systematic review. *Australas Emerg Care*. 2018;21(4):121-130.	Ineligible intervention
Varney J, Weiland TJ, Jelinek G. Efficacy of hospital in the home services providing care for patients admitted from emergency departments: an integrative review. *Int J Evid Based Healthc*. 2014;12(2):128-41.	Not systematic review
Vernon E, Hughes MC, Kowalczyk M. Measuring effectiveness in community-based palliative care programs: A systematic review. *Soc Sci Med*. 2022;296:114731.	Ineligible intervention
Vindrola-Padros C, Singh KE, Sidhu MS, et al. Remote home monitoring (virtual wards) for confirmed or suspected COVID-19 patients: a rapid systematic review. *EClinicalMedicine*. 2021;37:100965.	Not systematic review
Vipond J, Mennenga HA. Screening, Brief Intervention, and Referral to Treatment by Emergency Nurses: A Review of the Literature. *J Emerg Nurs*. 2019;45(2):178-184.	Not systematic review
Vyas S. Chapter Twelve - Extended reality and edge AI for healthcare 4.0: systematic study. In: Khan S, Alam M, Banday SA, Usta MS, eds. *Extended Reality for Healthcare Systems*. Cambridge (MA): Academic Press; 2023:229-240.	Not systematic review
Walker K, Honan B, Haustead D, et al. Review article: Have emergency department time-based targets influenced patient care? A systematic review of qualitative literature. *Emerg Med Australas*. 2021;33(2):202-213.	No comparator
Walker N, Medlow S, Georges A, et al. Emergency Department Initiated Mental Health Interventions for Young People: A Systematic Review. *Pediatr Emerg Care*. 2022;38(7):342-350.	Ineligible intervention
Wang C, Xiong B, Cai L. Effects of Tolvaptan in patients with acute heart failure: a systematic review and meta-analysis. *BMC Cardiovasc Disord*. 2017;17(1):164.	Ineligible intervention
Wang CH, Tsai MS, Chang WT, et al. Active compression-decompression resuscitation and impedance threshold device for out-of-hospital cardiac arrest: a systematic review and metaanalysis of randomized controlled trials. *Crit Care Med*. 2015;43(4):889-96.	Ineligible intervention
Ward MM, Jaana M, Natafgi N. Systematic review of telemedicine applications in emergency rooms. *Int J Med Inform*. 2015;84(9):601-16.	Not systematic review
Watson T, Tindall R, Patrick A, Moylan S. Mental health triage tools: A narrative review. *Int J Ment Health Nurs*. 2023;32(2):352-364.	Not systematic review

Reference	Exclusion Reason
Weeda E, Gilbert RE, Kolo SJ, et al. Impact of Pharmacist-Driven Transitions of Care Interventions on Post-hospital Outcomes Among Patients With Coronary Artery Disease: A Systematic Review. *J Pharm Pract*. 2021;:8971900211064155.	Ineligible intervention
Weeks LE, Macdonald M, Martin-Misener R, et al. The impact of transitional care programs on health services utilization in community-dwelling older adults: a systematic review. *JBI Database System Rev Implement Rep*. 2018;16(2):345-384.	Ineligible intervention
Weragama K, Mudgil P, Whitehall J. Diagnostic Stewardship-The Impact of Rapid Diagnostic Testing for Paediatric Respiratory Presentations in the Emergency Setting: A Systematic Review. *Children (Basel)*. 2022;9(8):1226.	Ineligible intervention
Westwood M, Ramaekers B, Grimm S, et al. High-sensitivity troponin assays for early rule-out of acute myocardial infarction in people with acute chest pain: a systematic review and economic evaluation. *Health Technol Assess*. 2021;25(33):1-276.	Ineligible intervention
Whitaker J, O'Donohoe N, Denning M, et al. Assessing trauma care systems in low-income and middle-income countries: a systematic review and evidence synthesis mapping the Three Delays framework to injury health system assessments. *BMJ Glob Health*. 2021;6(5): e004324.	Not systematic review
Williams AH, Stotter G, Hefford C, Warren J, Darlow B. Impacts of advanced physiotherapy: A narrative literature review. *N Z J Physiother*. 2019;47(3):150-159.	Not systematic review
Williamson A, Martineau AR, Sheikh A, Jolliffe D, Griffiths CJ. Vitamin D for the management of asthma. *Cochrane Database Syst Rev*. 2023;2:CD011511.	Ineligible intervention
Willman MW, Liss DB, Schwarz ES, Mullins ME. Do heroin overdose patients require observation after receiving naloxone? *Clin Toxicol (Phila)*. 2017;55(2):81-87.	Not systematic review
Willrich Boell JE, Flores Trindade L, Bernat Kolankiewicz AC, CaÃ±on-MontaÃ±ez W, Pituskin E, Lorenzini E. Care Transitions of Colorectal Cancer Patients from Hospital to Community: Systematic Review and Meta-analysis Protocol. *Revista Cuidarte*. 2021;12(3):1-10.	Not systematic review
Winasti W, Elkhuizen S, Berrevoets L, van Merode G, Berden H. Inpatient flow management: a systematic review. *Int J Health Care Qual Assur*. 2018;31(7):718-734.	Not systematic review
Wira CR, Dodge K, Sather J, Dziura J. Meta-analysis of protocolized goal-directed hemodynamic optimization for the management of severe sepsis and septic shock in the Emergency Department. *West J Emerg Med*. 2014;15(1):51-9.	Ineligible intervention
Wolfe I, Satherley RM, Scotney E, Newham J, Lingam R. Integrated Care Models and Child Health: A Meta-analysis. *Pediatrics*. 2020;145(1): e20183747.	Ineligible intervention
Wongtanasarasin W, Srisurapanont K. Efficacy of bicarbonate therapy for adults with cardiac arrest: A systematic review and meta-analysis of randomized-controlled trials. *Turk J Emerg Med*. 2021;21(1):24-29.	Ineligible intervention

Reference	Exclusion Reason
Woo BFY, Lee JXY, Tam WWS. The impact of the advanced practice nursing role on quality of care, clinical outcomes, patient satisfaction, and cost in the emergency and critical care settings: a systematic review. *Hum Resour Health*. 2017;15(1):63.	Ineligible intervention
Wozney L, Curran J, Archambault P, et al. Electronic Discharge Communication Tools Used in Pediatric Emergency Departments: Systematic Review. *JMIR Pediatr Parent*. 2022;5(2):e36878.	Not systematic review
Wozney L, Curran J, Archambault P, et al. Electronic Discharge Communication Tools Used in Pediatric Emergency Departments: Systematic Review. *JMIR Pediatr Parent*. 2022;5(2):e36878.	Duplicate
Wuytack F, Meskell P, Conway A, et al. The effectiveness of physiologically based early warning or track and trigger systems after triage in adult patients presenting to emergency departments: a systematic review. *BMC Emerg Med*. 2017;17(1):38.	Ineligible outcome
Wylie K, Crilly J, Toloo GS, et al. Review article: Emergency department models of care in the context of care quality and cost: a systematic review. *Emerg Med Australas*. 2015;27(2):95-101.	Not systematic review
Xia X, Wu J, Zhang J. The effect of online versus hospital warfarin management on patient outcomes: a systematic review and meta-analysis. *Int J Clin Pharm*. 2018;40(6):1420-1429.	Ineligible intervention
Xu Y, Xu W, Wang A, et al. Diagnosis and treatment of traumatic vascular injury of limbs in military and emergency medicine: A systematic review. *Medicine (Baltimore)*. 2019;98(18):e15406.	Not systematic review
Yang L, Ye LG, Ding JB, Zheng ZJ, Zhang M. Use of a full-body digital X-ray imaging system in acute medical emergencies: a systematic review. *Emerg Med J*. 2016;33(2):144-51.	Ineligible intervention
Yang YF, Hoo JX, Tan JY, Lim LL. Multicomponent integrated care for patients with chronic heart failure: systematic review and meta-analysis. *ESC Heart Fail*. 2022;10(2):791-807.	Ineligible intervention
Yang Z, Ganguli I, Davis C, et al. Physician- versus practice-level primary care continuity and association with outcomes in Medicare beneficiaries. *Health Serv Res*. 2022;57(4):914-929.	Not systematic review
Yarmohammadian M, Rezaei F, Haghshenas A, Tavakoli N. Overcrowding in emergency departments: A review of strategies to decrease future challenges. *J Res Med Sci*. 2017;22:23.	Not systematic review
Yarmohammadian MH, Rezaei F, Haghshenas A, Tavakoli N. Overcrowding in emergency departments: A review of strategies to decrease future challenges. *J Res Med Sci*. 2017;22:23.	No comparator
Yeo JW, Ng ZHC, Goh AXC, et al. Impact of Cardiac Arrest Centers on the Survival of Patients With Nontraumatic Out-of-Hospital Cardiac Arrest: A Systematic Review and Meta-Analysis. *J Am Heart Assoc*. 2022;11(1):e023806.	Ineligible intervention

Reference	Exclusion Reason
Yeung CH, Santesso N, Pai M, et al. Care models in the management of haemophilia: a systematic review. *Haemophilia*. 2016;22 Suppl 3(Suppl 3):31-40.	Ineligible intervention
Yeung T, Shannon B, Perillo S, Nehme Z, Jennings P, Olaussen A. Review article: Outcomes of patients who are not transported following ambulance attendance: A systematic review and meta-analysis. *Emerg Med Australas*. 2019;31(3):321-331.	Ineligible intervention
Yonemoto N, Nagai S, Mori R. Schedules for home visits in the early postpartum period. *Cochrane Database Syst Rev*. 2021;7:CD009326.	Ineligible intervention
Young C, Patey C, Norman P, et al. Identifying relevant topics and training methods for emergency department flow training. *CJEM*. 2022;24(8):837-843.	Not systematic review
Zanza C, Longhitano Y, Leo M, et al. Practical Review of Mechanical Ventilation in Adults and Children in the Operating Room and Emergency Department. *Rev Recent Clin Trials*. 2022;17(1):20-33.	Not systematic review
Zare S, Mobarak Z, Meidani Z, Nabovati E, Nazemi Z. Effectiveness of Clinical Decision Support Systems on the Appropriate Use of Imaging for Central Nervous System Injuries: A Systematic Review. *Appl Clin Inform*. 2022;13(1):37-52.	Ineligible intervention
Zhang L, Mendoza-Sassi RA, Wainwright C, Klassen TP. Nebulised hypertonic saline solution for acute bronchiolitis in infants. *Cochrane Database Syst Rev*. 2017;12:CD006458.	Ineligible intervention
Zhang Z, Chen L, Xu P, et al. Effectiveness of automated alerting system compared to usual care for the management of sepsis. *NPJ Digit Med*. 2022;5(1):101.	Ineligible intervention
Zheng Y, Qi S. Feasibility of Same-Day Discharge After Appendectomy in Pediatric Patients: A Systematic Review and Meta-Analysis. *Front Pediatr*. 2022;10:944405.	Ineligible intervention
Zhong C, Wong C, Cheung W, et al. Peri-discharge complex interventions for reducing 30-day hospital readmissions among heart failure patients: overview of systematic reviews and network meta-analysis. *Perspect Public Health*. 2022;142(5):263-277.	Not systematic review
Zhong H, Ni XJ, Cui M, Liu XY. Evaluation of pharmacist care for patients with chronic obstructive pulmonary disease: a systematic review and meta-analysis. *Int J Clin Pharm*. 2014;36(6):1230-40.	Ineligible intervention
Zhu X, Niu R, Bai F, Zhang Z. The application of pre-hospital first aid mode in patients with acute stroke: meta-analysis. *Folia Neuropathol*. 2022;60(3):284-291.	Ineligible intervention

Appendix 8: Protocol Amendments

Table 13: Protocol Deviations for Environmental Scan and Summary of Systematic Review Evidence on Interventions

Section	Protocol Page	Amendment	Rationale
Title	1	We conducted a Summary of Systematic Review Evidence rather than an Overview of Reviews.	Due to protocol amendments outlined in this table, we did not meet the standard of an overview of reviews.
Research Questions	7	We amended the Environmental Scan research questions 2 and 3 to include international literature	Due to the limited amount of Canadian literature that we identified, including international literature allowed us to report contextual factors contributing to ED overcrowding. This also enabled us to describe how and why input-throughput-output and contextual factors contribute to ED overcrowding.
Methods – Overview of Reviews on Interventions: Information Sources and Search Strategy	16	We conducted regular alerts; however, we did not screen or include citations in the report.	We experienced time- and resource-constraints related to the project deadline.
Methods – Overview of Reviews on Interventions: Eligibility and Selection Process	21	We added another level of screening. Two reviewers independently screened full texts according to the following criteria: (1) focus on ED overcrowding (e.g., clearly state that the SR was addressing ED overcrowding or that interventions were aimed at alleviating ED overcrowding), (2) use satisfactory methods for assessing and reporting risk of bias; specifically, that assessed allocation concealment and blinding for RCTs and confounding and selection bias for NRS (i.e., fulfilled AMSTAR2 item #9), and (3) reported numerical findings for most of the primary studies. A third reviewer	Due to the large scope of the literature, we added additional inclusion criteria to ensure our final list of SRs were the most relevant in addressing the research question.

Section	Protocol Page	Amendment	Rationale
		resolved discrepancies between the 2 screeners.	
Methods – Overview of Reviews on Interventions: Selecting Systematic Reviews for Data Synthesis	21	We did not select 1 SR for inclusion per intervention-comparison-outcome to deal with primary study overlap. We included all 64 SRs and mapped the overlap in primary studies across includes SRs. We did not assess the impact of the overlaps observed on the results per intervention-comparison outcome.	We experienced resource-constraints and challenges related to the limited description of the interventions and comparators by the SR authors, restricting the ability to define the overlaps in PICOs.
Methods – Overview of Reviews on Interventions: Data Extraction of Included SRs	22	We did not pilot test the data extraction form. One reviewer did the full data extraction with partial verification (7/64 SRs) by a second reviewer.	We experienced time- and resource-constraints related to the project deadline.
Methods – Overview of Reviews on Interventions: Data Extraction of Included SRs	22	For each SR, we limited the amount of information we extracted and presented in our report. We did not extract the following: inclusions and exclusion criteria, sample sizes within individual primary studies, risk of bias or methodological quality of the studies included in the SRs, how the intervention was implemented, duration of intervention, results (e.g., effect sizes, confidence intervals) or associated measures (e.g., heterogeneity).	We experienced time-and resource-constraints related to the project deadline.
Methods – Overview of Reviews on Interventions: Data Extraction of Included SRs	23	We did not investigate discrepancies (e.g., in reported results, or risk of bias or methodological quality appraisals) across overlapping SRs or reconcile conflicting conclusions across SRs reporting results for the same intervention-comparison-outcome.	We experienced time- and resource-constraints related to the project deadline.

Section	Protocol Page	Amendment	Rationale
Methods – Methodological Quality of the Included SRs	23	We did not record formal reasons to support the overall assessment of confidence for each SR using AMSTAR 2.	We experienced time- and resource-constraints related to the project deadline.

AMSTAR2 = A MeaSurement Tool to Assess systematic Reviews; ED = emergency department; NRS = non-randomized studies; PICO = Population, Intervention(s), Comparator, Outcome; RCT = randomized controlled trial; SR = systematic review.

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