Systematic review of the effectiveness of ten High Impact Initiatives/ Interventions (HIIs) for Recovering Urgent & Emergency Care Services(part of the Independent Evaluation of NHS England delivery plan for recovering urgent and emergency care services (Work package two)

Background

Overview

1. There is a requirement for independent evaluation of the NHS England delivery plan for recovering urgent & emergency care services ('the UEC recovery plan').
2. The recovery plan has two headline objectives over two years:
   - A 30-minute mean response time for Category 2 ambulance in 23/24
   - 76% performance in A&E wait times by end 23/24, measured through the 4-hour target.
3. To deliver the headline objectives, evaluation work has been structured to align with the three domains around which the plan is organised. The proposed systematic review is focused within evaluation work package 2 – including progress against 10 "high impact initiatives" to drive achievement against the two headline objectives.
4. The plan is two years, however interim findings are required, to ensure planning and focus is as effective as possible in year two (24/25).
5. An interim evaluation including this systematic review is due to report in April 2024.

The policy Context: the NHS England delivery plan for recovering urgent and emergency Care Services

The Recovery Plan (January 2023) sets out NHS England's ambition for a health system that provides more and better care in people's homes, gets ambulances to people more quickly when they need them, sees people faster when they go to hospital and helps people safely leave hospital having received the care they need. The plan focuses on two ambitions for the next two years – a 30-minute mean response time for Category 2 ambulance in 23/24 and 76% performance in A&E wait times by end 23/24, measured through the 4-hour target.

Given the interdependency of the urgent and emergency care system, improvements across the patient pathway, including on 12-hour waits from arrival and on discharge from acute, community and mental health hospital settings are also relevant to the delivery plan. Delivering this plan requires a cross-system approach, including primary and community services, mental health, intermediate care and social care. Furthermore, it requires joint working across health and care, to ensure patients get the best care and to ensure patient flow through hospitals and into social care when needed.

The plan sets out actions across several key areas:

- **Increasing capacity** – investing in hospital beds and ambulances and making better use of existing capacity by improving flow.
- **Growing the workforce** – increasing the size of the workforce and supporting staff to work flexibly for patients.
- **Improving discharge** – working jointly with all system partners to strengthen discharge processes, backed up by investment in step-up, step-down and social care, and with a new metric based on when patients are ready for discharge, with the data published ahead of winter.
- **Expanding and better joining up health and care outside hospital** – stepping up capacity in out-of-hospital care, including virtual wards, so that people can be supported at home for their physical and mental health needs, including to avoid unnecessary admissions to hospital.
- **Making it easier to access the right care** – ensuring healthcare works effectively for the public, so people can easily access the care they need, when they need it.

High impact initiatives

NHS England has asked urgent and emergency care systems to focus on 10 High Impact Initiatives; areas anticipated to have the biggest impact on UEC performance for Winter 2023/24. These are:

1. **Urgent community response** increasing volume and consistency of referrals to improve patient care and ease pressure on ambulance services and avoid admission.
2. **Same Day Emergency Care (SDEC)** reducing variation in SDEC provision by providing guidance about operating a variety of SDEC services for at least 12 hours per day, 7 days per week.
3. **Acute frailty** reducing variation in acute frailty service provision. Improving recognition of cases that could benefit from specific frailty services and ensuring referrals to avoid admission.
4. **In-patient flow** reducing variation in inpatient care (including mental health) and length of stay for key iUEC pathways/conditions/cohorts by implementing in-hospital efficiencies and bringing forward discharge processes for pathway 0 patients.
5. **Care Transfer Hubs** implementing a standard operating procedure and minimum standards for care transfer hubs to reduce variation and maximise access to community rehabilitation and prevent re-admission to a hospital bed.
6. **Community beds** reducing variation in inpatient care and length of stay, including mental health, by implementing in-hospital efficiencies and bringing forward discharge processes.
7. **Intermediate care** supporting the operationalisation of ongoing demand and capacity planning, including through improved use of data to improve access to and quality of intermediate care including community rehab.

8. **Single Point of Access (SPoA)** driving standardisation of urgent integrated care co-ordination which will facilitate whole system management of patients into the right care setting, with the right clinician or team, at the right time. This should include mental health crisis pathways and alternatives to admission, eg home treatment
9. **Acute Respiratory Infection Hubs (ARI hubs)** support consistent roll out of services, prioritising acute respiratory infection, to provide same day urgent assessment with the benefit of releasing capacity in ED and general practice to support system pressures.
10. **Virtual wards** standardising and improving care across all virtual ward services to improve the level of care to prevent admission to hospital and help with discharge.

These interventions cluster around frailty to impact on acute beds (and the two headline metrics). The 10 high impact interventions are not conceived as a package so the expectation is that evidence will be acquired for each intervention separately and then analysed within a common structure. Most of the high impact interventions have been around for a while, however both established and new interventions share a weak empirical basis.

How are the interventions thought to work?

A & E department overcrowding creates a domino effect that delays ambulance response times and extends the 4-hour wait time[i]:

1. **Delayed Patient Transfers:** When A&E departments are overcrowded, paramedics often have to wait to transfer patients, keeping ambulances from responding to new calls.
2. **Ambulance Offload Delays:** Ambulances are delayed at the hospital, waiting to transfer patients into the overcrowded A&E. This reduces the number of ambulances available to respond to emergencies.
3. **Prolonged Treatment Delays:** Overcrowding leads to treatment delays for all patients, including those who arrive by ambulance. This makes it more challenging to meet the 4-hour wait time target.
4. **Increased Waiting Times:** As a result of these delays, patients who arrive by ambulance often face extended waiting times before being seen by a doctor. This can worsen their condition and further strain the system.

Suggested interventions share one or more overarching characteristics that relate to diversion from urgent and emergency systems to other appropriate venues for care; avoidance of conveyance to/presentation at the A&E department; optimising inpatient flow by the use of new roles or systems of care; efficient use of ambulance transport and increased provision of care at scene or at home.

Why is evaluation needed?

The Recovery Plan is considered pivotal to the recovery of urgent and emergency services by March 2025 and is a prime ministerial priority. Investment of £2.6 billion

pounds demands robust evaluation of this plan and its associated interventions. An integrated evaluation will address all aspects of the plan. Within this overall intervention a systematic review of the High Impact Initiatives is a priority given the focus of improvement efforts to deliver the commitments set out in the Recovery Plan for Winter 2023/24.

Aims & objectives

NHS England is co-ordinating an overall evaluation of the UEC recovery plan, in order to understand and assure the outcomes and benefits as described in the plan are delivered as intended. They will also use the evidence base to inform whether the same 10 high impact initiatives should be pursued into 2024/25, or whether initiatives should be prioritised, or conversely, dropped. Furthermore, the systematic review will help in developing future policy approaches to maximise beneficial impact and outcomes for patients, including to identify gaps where more national policy work is required.

Research Questions

NHS England has articulated their research question as follows:

What is the emerging evidence base for the 10 HIIs based on a review of published and grey literature?

Method- evidence synthesis of reviews supplemented by a “deeper dive” into quantitative studies and grey literature as required for each topic.

Sub-questions

What evidence is there for each HII relating to:

- Impact on UEC performance (two headline objectives)
- Cost effectiveness
- Outcomes and benefits

Overall delivery of a systematic review on the strength of the evidence base will help NHS England to focus resource on those HIIs where most work is needed.

Systematic Review Protocol

Review title.
Systematic Review of the Effectiveness of Ten High Impact Initiatives/Interventions (HIIs) for Recovering Urgent & Emergency Care Services

Duration
18 December 2023 - 31 March 2024

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Collaborators.

Members of the Centre for Urgent and Emergency Care Research who are working on the review but who are not listed as review team members.

Review question.

What is the evidence of impact for each of the 10 High Impact Initiatives, in terms of:

- Impact on Urgent and Emergency Care performance (ambulance response times and A&E wait times i.e. the two-headline metric in the Urgent and Emergency Care recovery plan)
- Cost effectiveness
- Intended outcomes and benefits for each

Searches.

MEDLINE (2018 -2023), EMBASE via OvidSP (2018-2023), PsycINFO (2018-2023) Cumulative Index to Nursing and Allied Health Literature via EBSCOhost (2018-2023); CINAHL (2018-2023); Web of Science via Web of Knowledge via ISI (2018 -2023); Health Management Information Consortium via OpenAthens (2018 – 2023); Cochrane Library via Wiley Online Library (2018 – 2023) and Epistemonikos (2018-2023). The period covered marginally predates the NHS Long Term Plan (2019)[1] and is chosen as the last major milestone for UK urgent and emergency care services prior to the current recovery plan. The horizon for the Long Term Plan extends to 2023-2024 therefore covering the full period of this review. Primary publications will be restricted to English only although non-English sources may be covered within individual systematic reviews.

During the study identification phase we will employ a three-stage strategy:

1. Systematic Reviews
2. Randomised Controlled Trials
3. Other major comparative study designs (e.g. cohort studies, case-control studies and before-after studies)

This will enable the review team to identify differential levels of evidence according to the uptake and longevity of each of the ten focal interventions/initiatives and their associated literatures.

Recognised study filters will be used to limit study types within each of the above categories. The final report will define which of three levels of evidence were required in order to evaluate each intervention/initiatives evidence claims.

Reference lists will be followed up at each of the three stages. Where major studies or reviews date from pre-2020 citation searches will be conducted to establish whether more recent studies are available.

A single stage grey literature search will be conducted following the search for systematic reviews (Stage 1). This will focus on review protocol (PROSPERO) and trial protocol registers to future proof stages 1 and 2. Appropriate NICE and Royal College guidelines will also be inspected for other relevant evidence. Other grey literature items will be identified by NHS England workstreams and assessed by the review team for eligibility and quality.

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[1] NHS. The NHS long term plan. 2019. https://www.longtermplan.nhs.uk/

Given the three month time span of the review we do not plan to re-run searches before the final analyses as analysis of further studies will be prohibitive. However, retrieval of unpublished studies, within the grey literature, will be a major feature of the search protocol. Search alerts will be set up to identify additional reviews published following the database searches.

URL to search strategy.

Give a link to the search strategy or an example of a search strategy for a specific database if available (including the keywords that will be used in the search strategies).

For Reviews we will use a generic Urgent and Emergency Care strategy already used for previous reviews by the team e.g.:

1. *Emergency Service, Hospital/
2. *Emergency Medical Services/
3. *Emergency Medicine/
4. (emergency adj2 service*).ab,ti.
5. “emergency care”.ab,ti
6. “urgent care”.ab,ti.
7. “emergency department* ”.ab,ti.
8. “accident and emergency”.ab,ti.
9. casualty.ab,ti.

This will be combined with a reviews filter, optimised for specificity.

For primary studies we will replace the generic strategy with intervention/initiative specific terms see Section 20 and will combine these strategies with study filters for randomised controlled trials and non-randomised comparative studies, respectively.

Condition or domain being studied.

Conditions typically presenting to Urgent and Emergency Care Services in the UK. Studies will describe actual utilisation of services with no attempt to adjudicate the appropriateness of presentation. However, where assessments of appropriateness are included by study authors within a review or study this data will be extracted and presented in the final report.

Participants/population.

Inclusion: Adults and Older adults (over 70). Specifically Paediatric Acute Respiratory Infection Hubs and Paediatric Single Point of Access will be included.

Exclusion: Studies dealing exclusively with obstetric urgent and emergency care because this is handled separate from the standard UEC system.

Intervention(s), exposure(s).

Ten intervention/initiatives as specified by the NHS England Urgent & Emergency Care Services (UEC) recovery plan will be targeted for inclusion as listed below. Each intervention is described together with synonyms and related terms and these will be used to operationalise the review search and selection processes. Systematic reviews that include any of the following in conjunction with other interventions excluded from this review will be included. However only relevant data will be extracted and summarised.

Intervention/Initiative	Anticipated Impact	Synonyms and related terms
1. Urgent community response	increasing volume and consistency of referrals to improve patient care and ease pressure on ambulance services and avoid admission	Rapid response service (RRS); Hospice rapid response service (HRRS); Community-based urgent care service; Urgent home care; Out-of-hours care; After hours care
2. Same Day Emergency Care (SDEC)	reducing variation in SDEC provision by providing guidance about operating a variety of SDEC services for at least 12 hours per day, 7 days per week	Same-day emergency care; Ambulatory emergency care (AEC)
3. Acute frailty	reducing variation in acute frailty service provision Improving recognition of cases that could benefit from specific frailty services and ensuring referrals to avoid admission	Frailty assessment unit; Frailty assessment and intervention; Frailty-in-urgent-care-settings; Older People's Assessment Liaison (OPAL), and Acute Frailty Unit/Service Same-day acute frailty services
4. In-patient flow	reducing variation in inpatient care (including mental health) and length of stay for key iUEC pathways/conditions/cohorts by implementing in-hospital efficiencies and bringing forward discharge processes for pathway 0 patients	Interventions to reduce ED exit block (e.g. full capacity protocols, escalation protocols - alongside discharge planning and coordination which is the main way of improving in-patient flow. To include greater staff and patient involvement, and use of estimated discharge dates). To exclude “boarding”
5. Care Transfer Hubs	implementing a standard operating procedure and minimum standards for care transfer hubs to reduce variation and maximise access to	Discharge coordination teams; Transitional care teams; Virtual discharge teams; Community

	community rehabilitation and prevent re-admission to a hospital bed	discharge teams; transfer of care hub; discharge hub/team/cell/; integrated discharge hub/ team/ service; single point of access; home first hub/centre; coordination hub/centre.; home safe; multi-agency hub; transfer care bureau; care point; community assessment team; discharge command centre; front door and hospital discharge; health and social care hub; intermediate care assessment team; onward care team; right care
6. Community beds	reducing variation in inpatient care and length of stay, including mental health, by implementing in-hospital efficiencies and bringing forward discharge processes	Step-down beds; Transitional care beds; Intermediate care beds; Rehabilitation beds; Community recovery beds to include local authority and NHS maintained beds;. P2 beds, D2A beds. Other terms from Community Beds Audit (June 2023)
7. Intermediate care	supporting the operationalisation of ongoing demand and capacity planning, including through improved use of data to improve access to and quality of intermediate care including community rehab	Community-based intermediate care. To include step down, bedded and non-bedded.
8. Single Point of Access (SPoA)	driving standardisation of urgent integrated care co-ordination which will facilitate whole system management of patients into the right care setting, with the right clinician or team, at the right time This should include mental health	Unified Access Point (UAP); Integrated Urgent Care Access (IUCA); Front-door Access (FDA); Centralized Access to Care (CAC); Single

	crisis pathways and alternatives to admission, eg home treatment	Entry Point (SEP); Single Point of Triage
9. Acute Respiratory Infection Hubs (ARI hubs)	support consistent roll out of services, prioritising acute respiratory infection, to provide same day urgent assessment with the benefit of releasing capacity in ED and general practice to support system pressures	Respiratory Infection Hubs; Respiratory Care Clinics; Respiratory Assessment Centers/centres; Upper Respiratory Infection Clinics; ARI Centers/centres; Paediatric Acute Respiratory Infection Hubs
10. Virtual wards	standardising and improving care across all virtual ward services to improve the level of care to prevent admission to hospital and help with discharge	Hospital at home (HAH); Home-based care (HBC); Remote patient monitoring (RPM); Telehealth care; Domiciliary care; Virtual ward

Comparator(s)/control.

Typically before- after- comparisons. However, potentially includes alternative methods of organisation and service delivery as comparators.

Types of study to be included.

We will include systematic reviews and randomised trials to map the impact of interventions/initiatives. We will supplement these with comparative observational studies (including cohort, case–control and before-after studies) where reviews and trials are not sufficiently plentiful, for studies where randomisation is not considered possible and for assessment of harms.

Non-comparative study designs or modelling studies will be excluded.

Context

Evidence will be assessed against a UK context. Health systems of OECD countries will be included (to maximise relevance to the UK health system). Where major health service differences exist between the UK health system and study contexts the implications of these differences will be briefly highlighted.

For inclusion studies will either be conducted in hospital accident and emergency departments or in settings that offer alternative venues for the delivery of urgent and emergency care delivery. Research in low- and middle-income countries only will be excluded.

Patient and public involvement will be managed through both generic and specialist emergency care standing patient groups directed within EnSygN. Patient experience of

urgent and emergency care and its alternatives will inform the overall research question and design of the review with continued involvement extending to the dissemination plans.

Main outcome(s).

The main outcomes for the review will be those targeted by the NHS England Urgent & Emergency Care Services (UEC) recovery plan, namely ambulance response times and A&E wait times. Other intended outcomes and benefits will include 12 hour waits and occupancy, Where the logic chain between high impact interventions and these main outcomes is not established or is unclear then studies for these interventions with hospital admission, length of stay, or ED attendance as outcomes will be included. This decision recognises the strong rationale for expecting reduced attendances/admissions/length of stay to lead to improved ambulance response times and A&E waiting times.

Additional outcome(s).

Additional outcomes will include any that evaluate the impact of health service delivery interventions on urgent and emergency care e.g. mortality, readmissions, delayed discharge, costs etc. Clinical outcomes will be excluded.

Data extraction (selection and coding).

References will be managed in Endnote. Duplicates will be removed prior to screening for inclusion.

Initial screening will be of systematic reviews; undertaken by one reviewer with all remaining potentially eligible reviews double screened at full text. Reasons for excluding reviews will be recorded. A citation matrix will be constructed. This matrix will assess overlap in the evidence base by mapping each included review against all cited primary studies. Where it is considered that a systematic review has provided sufficient analysis of primary studies these studies will not be included to avoid double counting of the evidence base. However the number of studies within each review will be documented alongside the review.

One primary reviewer will screen study titles of primary studies (RCTs and then other comparative studies) for basic inclusion and exclusion criteria (e.g. not related to urgent or emergency care utilisation, studies of clinical treatments). After the title screen, we will select a 10% random sample of abstracts, and pairs of reviewers will screen abstracts for potential inclusion in the review. During abstract screening coding of exclusion criteria will map non-comparative studies or those that do not evaluate an outcome of interest. A list of studies for interventions which have been evaluated by inadequate or irrelevant studies or which have not been evaluated at all can thus be generated from the coding decisions.

Once satisfactory agreement has been achieved each primary reviewer will screen a proportion of the remaining abstracts for further evaluation using Covidence software. Where inclusion is not clear full texts will be referred to the screening team or to an experienced clinical expert for a definitive verdict.

For each initiative/intervention we will use relevant systematic reviews identified from the searches to inform decisions about which individual identified papers meeting the inclusion criteria to extract data from. We will not extract data from individual papers already included in relevant systematic reviews, instead we will extract data from systematic reviews in to summary tables. All data extraction will be carried out directly in to summary tables rather than detailed data extraction forms, which would subsequently require summarising. Included research is expected to be highly heterogeneous, therefore we will used a simple,

broad template to summarise the key characteristics and findings from each included systematic review. This template will include number of included studies, population and setting, main purpose and objectives, outcomes measured, and key findings and conclusions.

The following data from additional papers not included in the systematic reviews will be extracted in to summary tables: programme title, geographic location, intervention type, study design, target population, study design and methods, enrollment of participants, programme setting, programme duration, impact on urgent or emergency care utilisation, impact on non-urgent or emergency health care utilisation or non-ambulance transport, and financial data related to programme costs and savings.

A data extraction summary table template will be designed in Microsoft Excel and iteratively refined following piloting. Data extraction will be undertaken independently by one reviewer and then checked by a second reviewer. Data will be extracted into the Excel summary table template to optimise tabulation, filtering and sorting and, once completed, will be inserted into the final report. Due to the tight review timescale it will not be possible to solicit missing data from study authors.

Risk of bias (quality) assessment.

We will assign an initial "high quality" rating to systematic reviews and randomized controlled trials (RCTs) and an initial rating of "moderate quality" to:

a) experimental studies with a non-randomized but equivalent control group, in which we judged there would be limited systematic bias in selection for the intervention group; and
b) before-after studies with time series analysis (i.e. following rigorous adjustment)
c) quasi-experimental studies with a non-equivalent control group, with rigorous statistical methods applied to adjust for confounding between groups.
d) studies with non-contemporaneous controls

Simple unadjusted (or inadequately adjusted) before versus after studies would be rated as low quality[ii].

We will then apply a "light touch" quality assessment designed to identify any serious flaws that potentially undermine the rigour or credibility of the study. (For example, limitations in study coverage within a systematic review or issues with sample selection in a primary study). Studies will be downgraded by one descriptor (e.g. high to moderate and moderate to low for each major flaw or accumulation of minor flaws found. This process is analogous to that used by the GRADE system.

Results of the assessment will inform data synthesis by contributing to an overall combined assessment of the available evidence for each intervention. where applicable). The initial assessment will be undertaken by a single reviewer and the combined assessment of the evidence base for each intervention/initiative will be conducted by the entire review team, informed by clinical experts. As a consequence of these quality judgements, together with information on relevance to a UK setting each intervention/initiative will be assigned an overall evidence base rating ("high", "moderate" or "low").

Strategy for data synthesis.

We will conduct a narrative synthesis of each group of studies under each of the ten intervention/initiative headings. No attempt will be made to compare studies across

intervention categories. However where studies relate to more than one category links and cross-referrals will be made across categories for informational purposes.

Reviews and RCTs will be used to evaluate the quantity and quality of evidence for impact of the ten high impact initiatives/interventions. Where these levels of evidence are not considered sufficient for such a judgement comparative observational studies will also be included. We anticipate that features of target populations, interventions, their implementation and the outcome measures used to evaluate them will be heterogeneous. We will investigate this heterogeneity qualitatively against the likely effect on impact to identify positive and negative contributions to overall impact. Synthesised data will be presented in the form of tables, narrative summaries and diagrams as appropriate.

Analysis of subgroups or subsets.

Attention will be paid to subgroups with characteristics identified from the literature as prognostic for increased risk of hospital admission, for example: age, lifestyle factors, previous hospital admission, ethnicity. Where significant data is available these will be presented in separate tables, figures, narratives and diagrams.

Type and method of review.

Type of review

Cost effectiveness	Yes
Intervention	Yes
Review of Reviews	Yes
Service Delivery	Yes
Systematic Review	Yes

Other registration details.

This review protocol will also be uploaded to the NIHR Evidence Synthesis Programme programme entry for EnSygN – Sheffield and will be linked from the EnSygN – Sheffield web site.

Funding Details

This review is funded by the NIHR Evidence Synthesis Programme

Dissemination plans.

The main output will be a peer-review journal article. The version for NHS England will be supported by extensive data tables giving access to the full findings of the review with a template completed for each of the ten initiatives/interventions. A short briefing suitable for distribution will be prepared and sent to lead clinicians and healthcare professionals in the National Health Service.

Do you intend to publish the review on completion?

Yes

Keywords.

Systematic review, Hospitalization, Emergency Service, Hospital; Health Services Needs and Demand; urgent care

Any additional information.

This review is being undertaken to inform future selection of high impact initiatives for urgent and emergency services by NHS England.

Breakdown of resource estimation

EnSygN: Ten High Impact Interventions December 2023 – March 2024

Project task	Total PWD FY1[AB1]	PWD FY2	Total PWD
Scoping and protocol development	34		34
Creation of Reviews Database by Intervention	5		5
Supplementary Literature searches	15		15
Screening and study selection	44		44
Data extraction and quality assessment	50		50
Report/paper writing and internal review	48	6	54
Dissemination planning and activities	10	3	13
PPI	11	2	13
Meetings with client	2		2
Regular team meetings	13		13
General project management/administration	10	2	12
	237	13	242

PWD = Person working days

[AB1] April 2023 to March 2024

Preliminary Timetable:

Review stage	Started	Completed
Preliminary searches	01/12/2023	08/12/2023
Creation of Reviews Database by Intervention	15/12/2023	04/01/2024
Registration of protocol on PROSPERO	w/b 03/01/2024	
Piloting of the study selection process	04/01/2024	08/01/2024
Formal screening of search results against eligibility criteria (reviews)	08/01/2024	31/01/2024
Data extraction and quality assessment (reviews)	01/02/2024	22/02/2024

PPI (Initial Findings)	w/b 15/02/2024	
Supplementary literature searches (other quantitative studies & grey literature)	01/02/2024	22/02/2024
Formal screening of search results against eligibility criteria (other quantitative studies & grey literature)	08/02/2024	28/02/2024
Data extraction and quality assessment (other quantitative studies & grey literature)	15/02/2024	08/03/2024
Data analysis	15/02/2024	15/03/2024
Report/paper writing and internal review	01/03/2024	29/03/2024
Report to NHS England	31/03/2024	
Report to NIHR	15/04/2024	
PPI (Dissemination)	w/b 15/03./2024	

[i] Savioli G, Ceresa IF, Gri N, Bavestrello Piccini G, Longhitano Y, Zanza C, et al. Emergency Department Overcrowding: Understanding the Factors to Find Corresponding Solutions. Journal of Personalized Medicine [Internet]. 2022 Feb 14;12(2):279. Available from: http://dx.doi.org/10.3390/jpm12020279

[ii] Goodacre S. Uncontrolled before-after studies: discouraged by Cochrane and the EMJ. Emerg Med J. 2015 Jul;32(7):507-8. doi: 10.1136/emermed-2015-204761.