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Journal article

Review article : A primer for clinical researchers in the emergency department : Part VIII. Implementation science: An introduction

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A primer for clinical researchers in the emergency department: Part 8.

Implementation Science: an Introduction.

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Abstract

New research findings may not lead to change in practice, or a change at the front line may be delayed by years. A number of terms have been used to describe efforts and strategies to speed a change in evidence-based practice, such as: implementation science, knowledge translation, research translation and others. In contrast to traditional clinical research, implementation science generally aims to understand and change health professional behaviour to promote evidence uptake as opposed to attempting to change patient behaviour. There are now theoretical frameworks and evolving evidence providing guidance how to change clinician behaviour and, specifically, emerging evidence on how to achieve this in the emergency setting. This review will provide an introduction to implementation science and illustrate how to target evidence practice gaps using emergency department examples.

Introduction

Emergency medicine is rapidly evolving with new, practice-changing evidence becoming available (1). Systematic reviews and clinical practice guidelines are rigorously developed with the aim of appraising, summarising and making research findings more accessible for clinicians. They have, however, as a single strategy been insufficient to consistently improve care, especially in complex settings such as the emergency department (ED) (2, 3). Australian Initiatives such as CareTrack have found that only 57% of healthcare encounters with adult Australians provide appropriate care (i.e. care in line with evidence-based or consensus-based guidelines) (4). Similar results were found for children with adherence to quality of care indicators across 17 conditions at 60% (5). In the ED setting unwarranted variations in effective care have been found for a wide range of conditions including asthma, bronchiolitis, fever, pneumonia, analgesia/sedation, concussion, stroke, acute myocardial infarction (6, 7).

These variations in evidence-based practices have resulted in a call for an increased focus on implementation science in emergency medicine (8). Implementation science aims to identify strategies that are effective in reducing the gap between what we know and what we do, to ensure high quality patient care and outcomes (9). It is defined as the scientific study of methods to promote the uptake of research findings and other evidence-based practices into routine practice (encouraging implementation of effective clinical interventions and de-implementation of relatively ineffective ones), and hence improve quality and safety of health (10, 11). Implementation science differs from clinical research in that it generally aims to understand and change health professional behaviour as opposed to patient behaviour (12).

A wide range of diverse and inconsistent terminology has been used in implementation research which has caused some confusion and limited the progression of the research field. McKibbin et al identified 100 different terms to describe implementation science including knowledge translation, research translation, knowledge transfer, mobilization, exchange, dissemination (13). International efforts are currently underway to develop a common terminology and overarching framework for implementation interventions (14).

The scope of implementation science is broad and can consider any aspect of implementation ranging from observational studies to explore and understand factors affecting implementation and large scale implementation and effectiveness trials of complex interventions (15). Although implementation science and quality improvement (QI) have similar goals i.e. improving the quality of healthcare and use similar research methods, there are some differences. Implementation science aims to produce generalizable knowledge, often by testing hypotheses and is characterised by a broad range of research designs whilst QI research is not intended to be generalisable beyond the setting and population involved and predominately uses quasi-experimental evaluation methods (16).

What implementation strategies have been shown to change practice?

The evidence base for implementation science and the effectiveness of implementation strategies has increased considerably over the last decade. A rich source of synthesised evidence is the Cochrane Effective Practice and Organisation of Care (EPOC) group and its

systematic reviews of educational, behavioural, financial, regulatory and organisational interventions designed to improve health professional practice and the organisation of health care services (epoc.cochrane.org/). There are currently 138 systematic reviews and 49 protocols published in The Cochrane Library. Examples of strategies that improve care in general include audit and feedback (17), educational outreach i.e. trained people visiting clinicians where they practice and providing them with information to change how they practice (not education alone) (18), local opinion leaders/clinical champions (19) and computer generated reminders (20). There are however variations in observed effects for each of these strategies and it is hypothesised that this variation is due to implementation strategies being poorly conceived, not well matched to the contexts they are implemented into and not addressing the key factors influencing practice variation (barriers and enablers) (21).

Implementation of evidence in the Emergency Department

Implementation research has been identified as a global research priority for emergency medicine (22, 23). However, several reviews undertaken to determine the volume and quality of implementation research in emergency medicine have found very limited evidence in general, and in Australasia in particular (7, 24). Authors have recommended more high-quality rigorous research that uses theory-based approaches to identify the key factors influencing practice variation to inform the design and evaluation of targeted implementation interventions. Implementation research in Australia is emerging with several large multi-centre cluster randomised controlled trials evaluating the effectiveness of implementation

strategies recently completed or close to completion in the clinical areas of head injuries (25), stroke (26) and bronchiolitis (27).

A recent systematic review of implementation strategies that have been evaluated in ED settings to change healthcare provider behaviour identified 33 studies published from 2000-2017, 32 of these were randomised controlled trials. Effective practice change interventions included, but were not limited to, institutional support, local champions, standardized order sets, education and audit and feedback (1).

General principles of Implementation Science: theory

Behaviour change is fundamental to improving the uptake of evidence into practice; for implementation research to be effective it is important to understand behaviour change in developing and evaluating an implementation strategy (8). Any research striving for generalisable knowledge should be guided by and propose to test conceptual frameworks, models and theories (28). Conceptual models can help frame study questions and hypotheses, anchor the background literature, clarify constructs to be measured, and illustrate the relationships to be evaluated or tested (29). Unfortunately, very few implementation studies have used theory, with a review of 235 implementation studies finding only 6% to be explicitly theory based (30).

Multiple theories and theoretical frameworks exist. Choosing an appropriate theory to use in implementation research, however, is often difficult, especially for those without a

background in behavioural sciences (31). The Theoretical Domains Framework (TDF) was developed to make available a wide range of theories relevant to behaviour change for use in implementation research. It draws from over 33 theories of behaviour change and has identified 14 theoretical domains (groupings of theoretical constructs) using an expert consensus and validation process (32, 33). It has been successfully used in a wide range of settings, including emergency medicine to explore factors influencing clinical behaviour change and to design implementation strategies (34). The TDF has recently been incorporated into a simpler model of behaviour called the COM-B (capabilities, opportunity, and motivation) model which forms part of the Behaviour Change Wheel (see Figure 1 (35)).

General principles of Implementation Science: stakeholder involvement

Evidence-based interventions are more likely to be successfully implemented and improvements sustained if it is a 'good fit' for those who shape, deliver and participate in healthcare and it is tailored to (29). Multiple stakeholders need to be engaged from concept development to implementation. It is important that the group of clinicians involved in implementing a change in practice have buy-in i.e. understand the evidence, acknowledge a gap in local practice and are willing to change.

Implementation science– a stepped approach

Several methods are available to inform the design, selection and tailoring of implementation interventions however, there is currently no consensus on the best way to select and apply theory (7). These approaches usually share common steps e.g. identification of barriers,

linking barriers to intervention components, use of theory and user involvement. We describe a stepped approach to developing targeted, theory and evidence-informed implementation interventions that has been successfully used for various implementation problems (36-38).

Step 1. Select and specify the target behaviours: who needs to do what differently, when, where, how and with whom?

The first step in implementation science is to identify and measure the gap between evidence and practice (39). Needs assessment, individual audits and systematic reviews are useful ways to summarise evidence and understand gaps in practice (40). To justify the resources necessary for implementation efforts, the evidence base should be established and valid, preferably synthesised evidence.

The choice of behaviours to target implementation efforts should be informed by criteria such as strength of evidence, how modifiable the behaviour is likely to be, how important it is to bring about the desired change in clinical practice, effect of change (positive and negative) on other related behaviours and how easy it is to measure change (38). Target behaviours are more likely to be interpretable and measured if they are defined in terms of *who* needs to perform the behaviour, *what* they need to do, *when* they need to do it, *how often* they need to do it and *with whom* ? (38).

The evidence-practice gap should ideally be defined as both a performance gap i.e. how current practice compares to 'ideal' practice behaviour and outcome gap i.e. the potential

improvements in healthcare quality that can be achieved if the variation or gap is reduced (8).

Example for Step 1: Bronchiolitis (41)

Background: Despite evidence indicating that beta-agonists, corticosteroids, adrenaline, antibiotics and x-rays are proven ineffective in infants with bronchiolitis, they are widely used by ED and inpatient staff.

Evidence: Guideline recommendation 1: Do not administer beta 2 agonists to infants, less than 12 months of age, presenting to hospital or hospitalised with bronchiolitis. (NHMRC:A, GRADE: Strong) (42)

Specify target behaviour: Who: Physicians, What: Manage infants with bronchiolitis without administering beta 2 agonists, When: on assessment and during hospital visit, Where: ED and Inpatient, With Whom: ED and inpatient medical team.

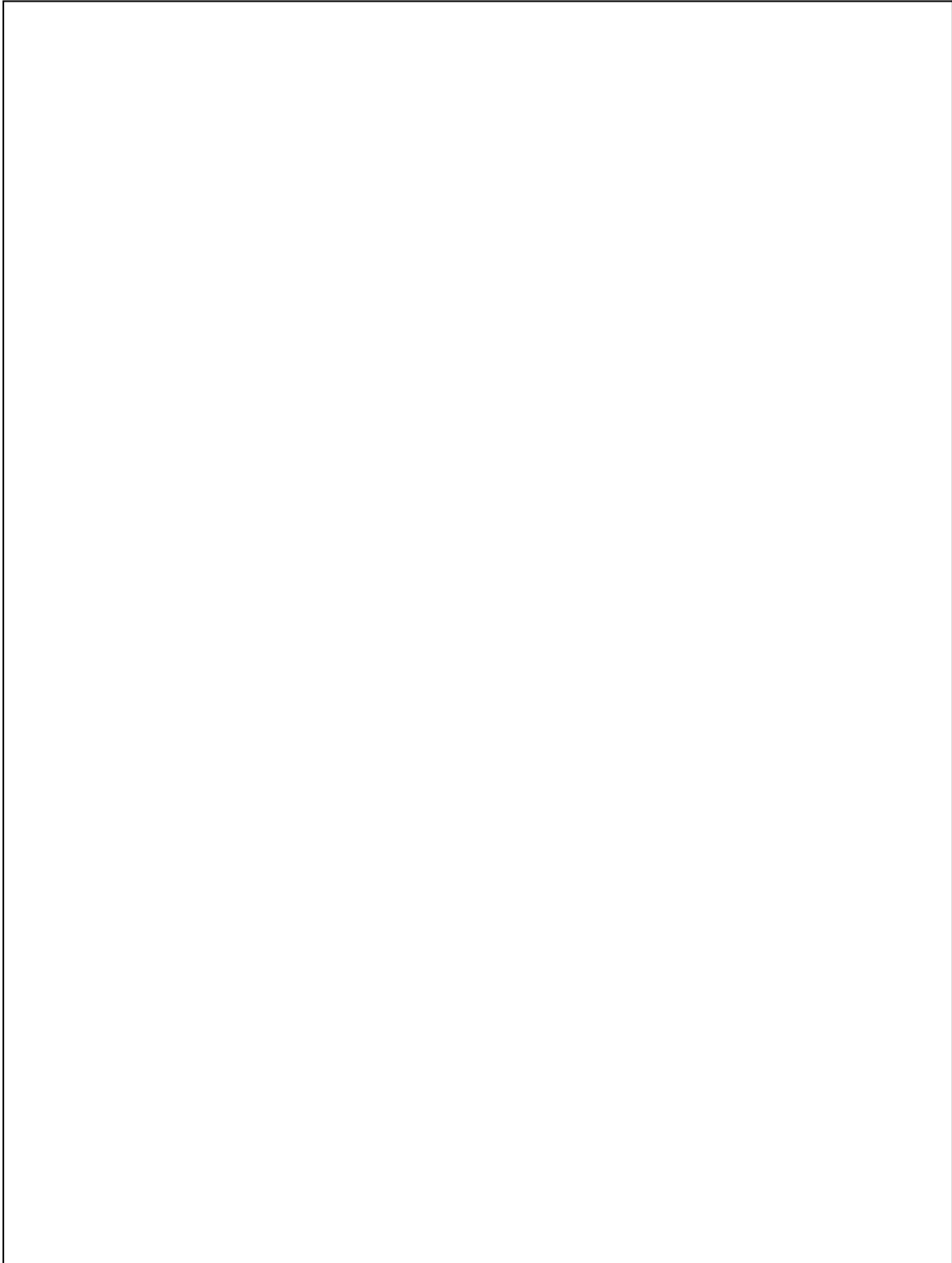
Aim: Establish baseline bronchiolitis management (evidence-practice gap)

Methods: Retrospective cohort study using data from electronic health data sources for all patients 12 months old or less that presented to an emergency department with a diagnosis of bronchiolitis. Date captured: age, vital signs, common therapeutic interventions (bronchodilators, steroids, antibiotics) and investigations (chest x-ray (CXR), viral studies).

Methods that can be used to identify this gap include administrative data audits, observation, surveys and interviews. The size of this gap and the potential for healthcare improvements should also factor into the decision to prioritise target behaviours.

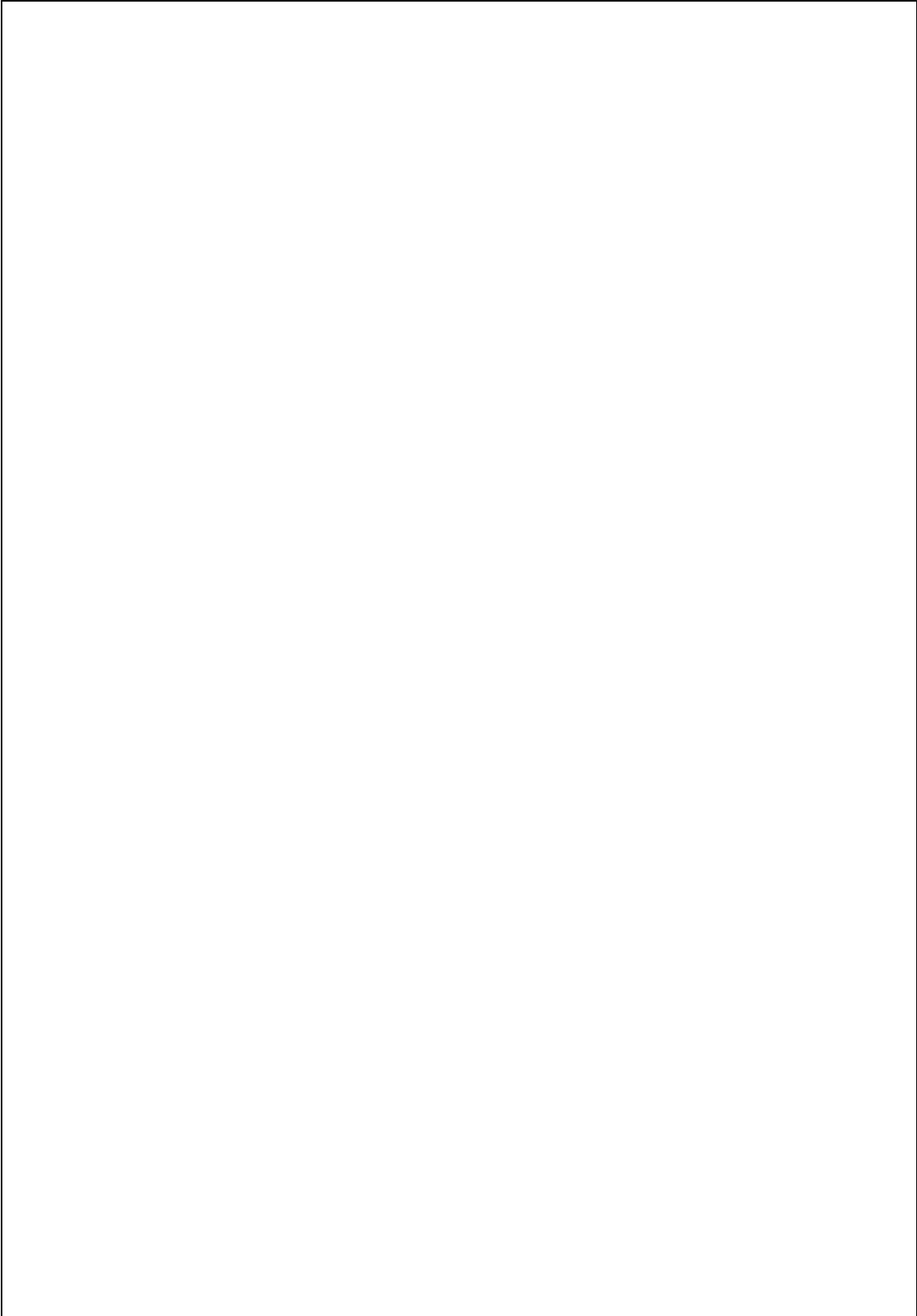
Step 2. Identify the key factors influencing current practice (barriers and enablers) using a theoretical framework – understanding the evidence-practice gap

Important to the success of implementation strategies is a thorough understanding of what factors (barriers and enablers) influence current practice. Previous implementation research in the ED setting has identified factors at the individual clinician, team environment and organisation levels (43-45). Methods that can be used include qualitative interviews, surveys and focus groups and the choice of methods largely depends on the state of the knowledge in the given field (38). Participants should include a wide range of individuals e.g. clinicians, managers, patients who are the target of the improvement efforts. Interview schedules/survey/focus group questions should be guided by a behavioural theory or framework. Interview schedules and example questions for each theoretical domain have been developed to support those wanting to use the TDF (45, 46).



Step 3. Select and tailor implementation intervention components to address modifiable influencing factors

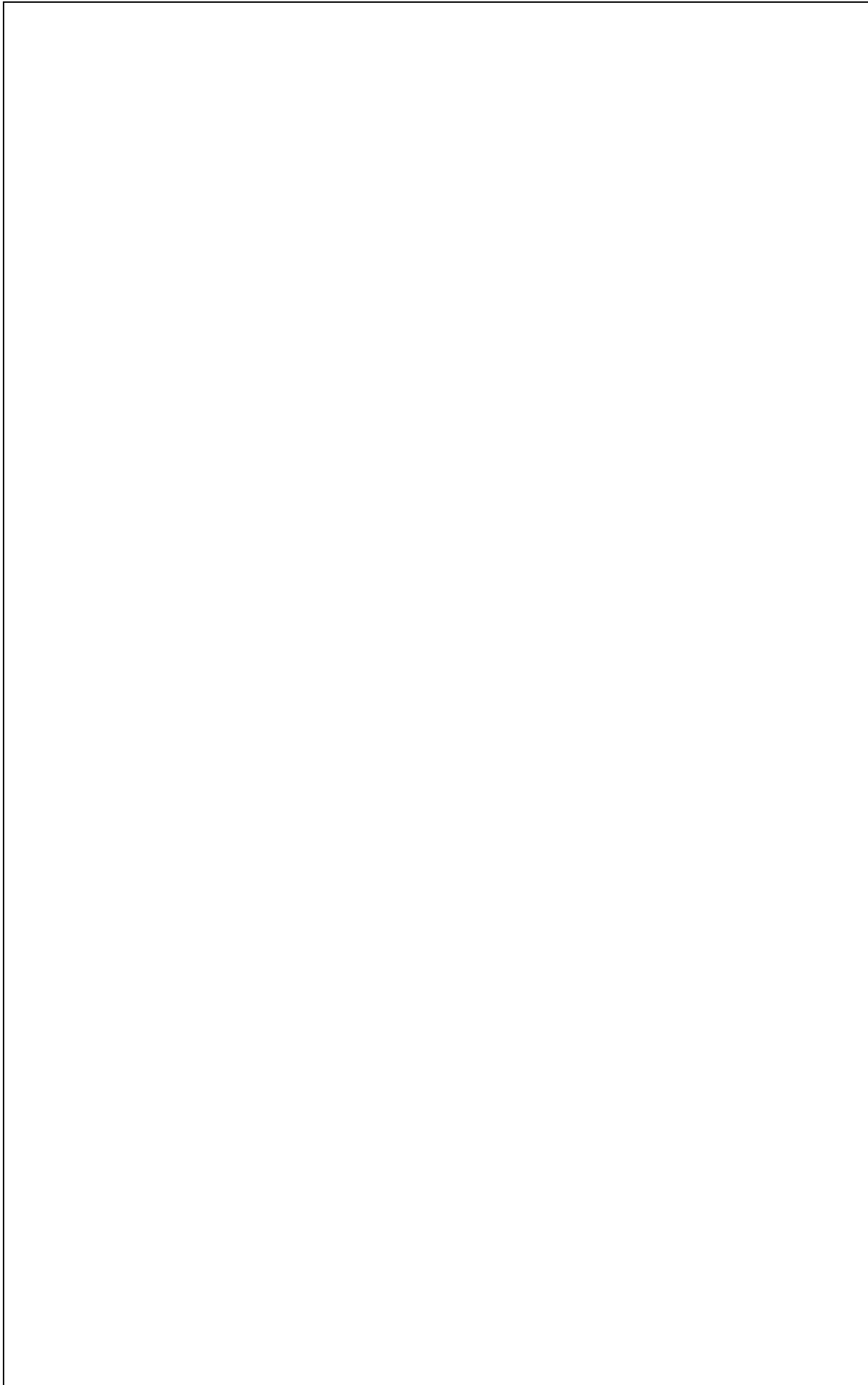
A key reason for the persistent gaps between evidence and practice across all areas of medicine is that there have been few attempts to identify and target factors critical for successful implementation of the evidence-based practice. There is either no explicit implementation strategy or the strategy is based on a ‘best guess’ rather than on a systematic assessment of crucial barriers and enablers (8). Implementation components should be chosen by targeting prospectively identified influencing factors with behaviour change techniques (BCTs), understanding the causal pathway of the intervention and using evidence of effective interventions and feasibility information (36-38). BCTs can be selected by either using validated taxonomies developed to link potentially effective BCTs with relevant theoretical domains (47) or by using the Behaviour Change Wheel to guide selection (see Figure 1, (35)). How these BCTs should be delivered (i.e. mode of delivery) can be informed by synthesised evidence of health professional behaviour change strategies such as Cochrane EPOC systematic reviews. In addition, several systematic reviews of implementation strategies to change health care provider behaviour in the ED have been undertaken (1, 7, 24).



Step 4. Evaluate and report results of the implementation strategy

For systems change at the organisational level the gold standard method for assessing causality is a Cluster Randomised Controlled Trials (cRCT). Using this method EDs (or similar clusters of care) are randomised rather than individual patients in order to limit contamination of the intervention while outcomes are measured at the patient level (51). Process measures collected using qualitative research methods are essential to provide vital information on fidelity (was the intervention delivered as intended), dose (was the right amount of intervention delivered) and reach (was the intervention received by the intended audience). In addition, if/ how interventions were adapted in a particular context is important information to inform the interpretation of effectiveness.

A consistent finding from systematic reviews of implementation strategies is that most are effective some of the time but the effect size ranges from no effect to a large effect (29). The reason why we are unable to determine how, why, when and for whom these strategies are effective is due to the absence of detailed descriptions of implementation strategies and the lack of a clear theoretical justification for the selection of implementation strategies (30). Standards for conceptualising and reporting of implementation strategies (e.g. Template for Intervention Description and Replication (TIDieR) (52) and Standards for Reporting Implementation Studies (StaRI) (53) have been developed to make implementation interventions and their reporting more transparent.



How can implementation science research improve my clinical practice?

It is every clinician's responsibility to keep up to date with research evidence and improve their clinical practice. Implementation science is an emerging field of research in the ED setting and aims to contribute to local quality improvement initiatives by providing generalisable knowledge of what evidence-based strategies should be used for a particular setting, for what group of providers and for what practice. This article provides a stepped approach of how to understand variation in your particular setting, how to explore some of the reasons for this variation and how to choose or design improvement strategies. This article provides references to key implementation science articles and links to key tools and materials that can be used to inform improvement efforts.

How can emergency clinicians become involved in implementation research?

Clinicians have a crucial part to play in implementation research and should take an active role in the overall research process. Clinicians are ideally placed to lead this type of research and can make a number of important contributions starting with the planning stage, proposing implementation questions, identifying implementation barriers and identifying potential solutions to be tested. They can play a role in designing the studies by understanding contextual factors that might impact implementation. In terms of data collection they are in the position of being able to access data sources, interview respondents and can have an important role of making sense and interpreting data. Importantly, clinicians who are providing day-to-day care are ideally placed to promote evidence-based practice change as

clinical champions. The success of implementing any practice change is heavily reliant on senior clinician support, those that are impacted by the change and are required to act on the intervention. As end users it is critical that they are involved throughout the research process. They also have a role in disseminating the results and incorporating lessons learnt. (54).

Conclusions

With a recognition that research findings alone or even systematic reviews and evidence-based guidelines are insufficient to change clinical practice implementation science is becoming increasingly important. As shown in this paper there are resources and pathways available for clinicians and clinician researchers to improve the translation and uptake of knowledge. However, considering the increasing need to implement new knowledge and de-implement obsolete behaviours there is a broad based need to expand the capacity and expertise in implementation science of ED staff and researchers.

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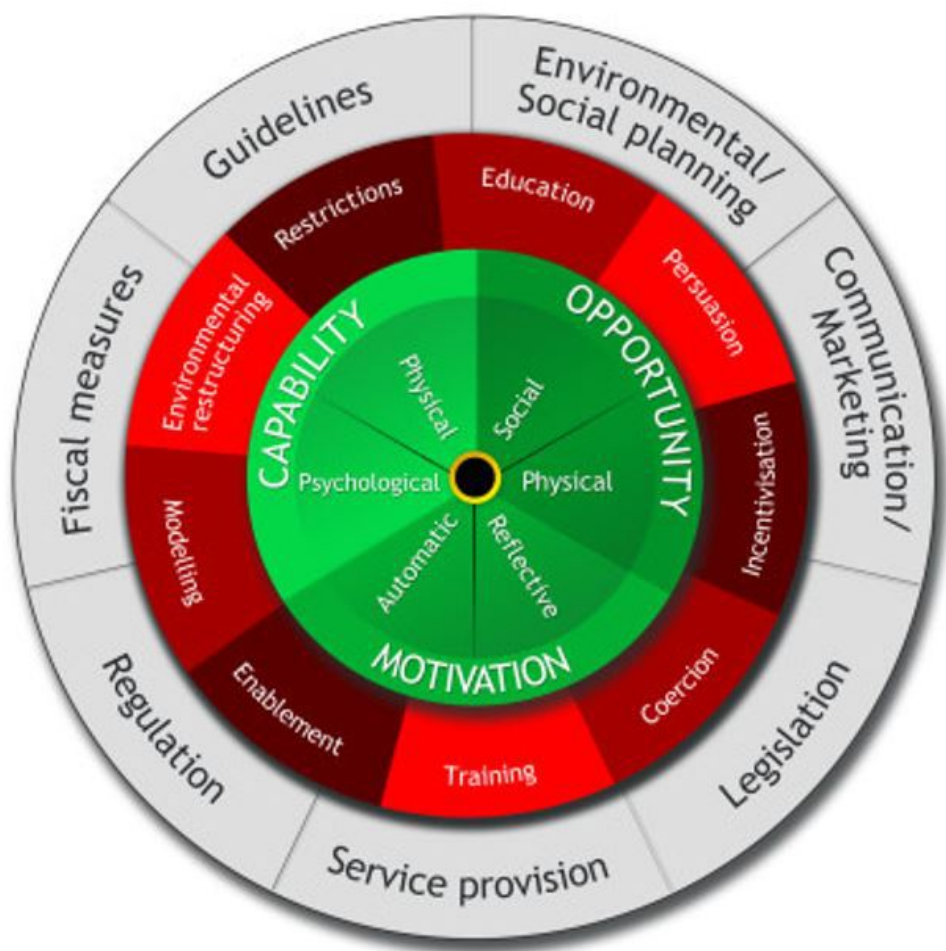
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- Sources of behaviour
- Intervention functions
- Policy categories



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