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Economic evaluation of intrahospital clinical practices in injury care: protocol for a 10-year systematic review

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ABSTRACT

Introduction Underuse of high-value clinical practices and overuse of low-value practices are major sources of inefficiencies in modern healthcare systems. Injuries are second only to cardiovascular disease in terms of acute care costs but data on the economic impact of clinical practices for injury admissions are lacking. This study aims to summarise evidence on the economic value of intrahospital clinical practices for injury care.

Methods and analysis We will perform a systematic review to identify research articles in economic evaluation of intrahospital clinical practices in acute injury care. We will search MEDLINE and databases such as Embase, Web of Science, NHS Economic Evaluation Database, Cochrane CENTRAL, BIOSIS and CINAHL for randomised or non-randomised controlled trials and observational studies using a combination of keywords and controlled vocabulary. We will consider the following outcomes relative to economic evaluations: incremental cost-effectiveness ratio, incremental cost-utility ratio, incremental net health benefit, incremental net monetary benefit (iNMB) and incremental cost-benefit ratio. Pairs of independent reviewers will evaluate studies that meet eligibility criteria and extract data from included articles using an electronic data extraction form. All outcomes will be converted into iNMB. We will report iNMB for practices classified by type of practice (hospitalisation, consultation, diagnostic, therapeutic-surgical, therapeutic-drugs, therapeutic-other). Results obtained with a ceiling ratio of $50 000 per quality-adjusted life year gained for identified clinical practices will be summarised by charting forest plots. In line with Cochrane recommendations for systematic reviews of economic evaluations, meta-analyses will not be conducted.

Ethics and dissemination Ethics approval is not required as original data will not be collected. This study will summarise existing evidence on the economic value of clinical practices in injury care. Results will be used to advance knowledge on value-based care for injury admissions and will be disseminated through a peer-reviewed article, international scientific meetings and clinical and healthcare quality associations.

Strengths and limitations of this study

- Fill a major knowledge gap on the economic value of intrahospital clinical practices for acute injury care.
- Advance the agenda on value-based healthcare for injury admissions.
- Inform research priorities.
- Represents a crucial step towards the de-adoption of low-value clinical practices in acute injury care.
- For feasibility reasons, restricted to studies published in English since 2009.

INTRODUCTION

In Canada, injuries represent the leading cause of potential years of life lost and cost more than heart and stroke diseases combined.[1] In 2035, the direct costs of injury are expected to reach $C75 billion while they were estimated at $C27 billion in 2007,[1] representing an increase of almost 200%.[2] Injuries represent the third leading cause of potential years of life lost in the USA.[3] The estimated total lifetime medical and work loss costs associated with fatal and non-fatal injuries in the USA were $671 billion in 2013.[4]

Regional variations in injury outcomes between healthcare providers have been observed in Canada, the USA and the UK that are not explained by patient case mix.[5–7] This evidence of suboptimal injury outcomes suggests that efforts must be made to optimise clinical practices in injury care.[8] Value-based healthcare is defined as "care that is tailored for optimising health and wellbeing by delivering what is needed, wanted, clinically effective, affordable, equitable, and responsible in its use of resources".[9 10] When patients do not receive tests and treatments that have been shown to be effective for their condition, we refer to *underuse*.[11] Up to 50% of patients admitted for injury do not receive

recommended care.[12] The economic impact of the *underuse of recommended care* implies missed opportunities of healthcare cost savings, averted productivity losses and the monetised value of potential reductions in morbidity and mortality. When patients undergo tests and treatments that are not supported by evidence and/or could expose them to unnecessary harm, they receive low-value care, widely referred to as *overuse*.[13] Overuse is driven by low-value clinical practices, which consume up to 30% of healthcare resources and threaten the sustainability of affordable and accessible healthcare.[14–17] From an economic evaluation standpoint, the overuse of low-value practices implies inefficiency in resources use that results in a waste of resources. More importantly, low-value practices expose patients to adverse events and delays to effective treatment.[18] The estimated overuse of healthcare services in the USA amounts to $780 billion annually.[19]

To achieve value-based care, guidelines and recommendations should target both underuse and overuse and be supported by data provided from economic evaluations.[20] However, current guidelines on clinical practices in injury care focus almost exclusively on underuse and are rarely supported by evidence of cost-effectiveness.[21–24] This systematic review aims to review evidence of the economic value of intrahospital clinical practices in acute injury care to advance knowledge on value-based care in this patient population.

METHODS AND ANALYSIS

The structure of the protocol follows the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols guidelines for systematic reviews.[25] Any changes to the protocol will be documented in the final published report.

Patient and public involvement

No patient involved.

Relevant studies

Inclusion criteria

We will include research articles, systematic reviews, reports and guidelines on cost-effectiveness analyses (eg, cost per life year gained), cost-utility analyses (eg, cost per quality-adjusted life year (QALY) gained or cost per disability-adjusted life year averted), cost-benefit and cost-minimisation analyses of intrahospital clinical practices for patients treated in hospital for injury. Clinical practices could include admissions, transfers, consultations and diagnostic or therapeutic procedures. A 'do nothing' strategy, standard care or any other strategy will be considered as potential comparators.

The following outcomes of economic evaluation will be considered: incremental cost-effectiveness ratio ('ICER'), incremental cost-utility ratio ('ICUR'), incremental net monetary benefit ('iNMB'), incremental net health benefit ('iNHB') and the incremental cost-benefit ratio. Studies identifying the results of the economic evaluation as one clinical practice being dominant or dominated will be included. Such results would indicate that one comparator is less costly and more effective than the other. We will restrict the review to studies published in English in the last 10 years (from January 2009) to ensure feasibility of the review and results that are current.

Exclusion criteria

We will not include cost-consequences analyses, budget impact studies, narrative reviews, research protocols or conference abstracts. Studies providing incremental costs without incremental effectiveness or vice versa will not be included. Studies on experimental interventions, military injuries, cadavers or animals will be excluded. Studies in which there is no comparator group will be excluded. Our systematic review will be limited to evidence from high-income countries.

Information sources

We will search MEDLINE (via PubMed), EMBASE, Web of Science, NHS Economic Evaluation Database, Health Technology Assessment Database, EconLit, Tufts CEA Registry, Cochrane CENTRAL, BIOSIS and CINAHL to identify research articles on economic evaluation of clinical practices specific to intrahospital acute injury care. The grey literature will be searched through thesis repositories, injury association websites, healthcare quality websites and the Web of Knowledge. Thesis repositories include Thesis portal Canada, Electronic Thesis Online Service (EThOS), Digital Access to Research Theses (DART)-Europe E-Theses Portal and the National Library of Australia's Trove and ProQuest Dissertations & Theses Global. Healthcare quality websites include the WHO, National Institute for Health and Care Excellence, National Association for Healthcare Quality, National Quality Forum, Lown Institute, Agency for Healthcare Research and Quality, Choosing Wisely, Canadian Institutes for Health Information, Australasian Association for Quality in Healthcare. Injury organisations include the American College of Surgeons, Trauma Association of Canada, International Association for Trauma Surgery and Intensive Care, Australasian Trauma Society, Trauma Audit Research Network, American Association for the Surgery of Trauma, Eastern Association for the Surgery of Trauma, American Trauma Society, British Trauma Society, Orthopaedic Trauma Association, Western Trauma Association, Trauma.org, The Society of Trauma Nurses, International Trauma Anaesthesia and Critical Care Society, the Brain Trauma Foundation and patient advocacy organisations including Safer Healthcare Now!

Search strategy

A rigorous strategy will be designed using a combination of Boolean terms with relevant keywords and subject headings covering 'injury', 'trauma' and 'economic evaluation' for EMBASE (EMBASE tree; EMTREE) and PubMed (Medical Subject Headings; MeSH), and then adapted to the remaining databases (see online

supplementary appendix 1 for the preliminary search strategy of 28 December 2019). Clinicians in the project steering committee and information specialists will be consulted to refine the search strategy using the Peer Review of Electronic Search Strategies checklist.[26] The sensitivity of our search strategy will be evaluated by identifying between 5 and 10 sentinel articles and checking whether they are detected.

Select studies

Data management

Citations will be managed using EndNote software (V.X7.0.1, New York City: Thomson Reuters, 2011). Duplicates will be identified and removed via electronic and manual screening. If multiple publications based on the same dataset are identified, we will select the most recent study or the one with the largest sample size.

Selection process

Pairs of independent reviewers (LM, BC, PAT, IF, TM, KS, SB) will screen all titles, abstracts and full texts to identify eligible studies. Prior to selection, we will evaluate inter-reviewer agreement on eligibility using the first 500 citations. Discrepancies between reviewers will be resolved by consensus. We will re-specify eligibility criteria if necessary and repeat the selection process until an acceptable inter-rater agreement is attained. A third reviewer will adjudicate if necessary (JRG). The level of agreement between reviewers will be assessed with Kappa coefficients[27] and agreement will be considered acceptable if kappa >0.9. If information on eligibility is unavailable or unclear, study authors will be contacted.

Chart material

Data collection

An electronic data abstraction form will be developed with a detailed instruction manual and piloted on a representative sample of 10 publications. An example of the extraction grid is presented in online supplementary appendix 2. Pairs of reviewers with methodological and content expertise (BC, IF, PAT, MAG) will extract the following information from eligible articles: study design (systematic review, randomised controlled trial, observational study, simulation study), setting (country, year, hospital), type of economic evaluation (cost-effectiveness, cost-minimisation, cost-utility, cost-benefit), perspective of economic evaluation (patient, hospital/clinic, healthcare system or societal), population (age, type of injury, injury severity, sample size), treatment and comparator, primary outcomes of the economic evaluation as stated above and authors' conclusions. Any discrepancies between reviewers will be resolved by consensus and a third reviewer will adjudicate if necessary (JRG). If important information is missing or requires clarification, we will contact study authors using up to three email attempts over 1 month to all listed authors.

Collate, summarise and report on results

Two reviewers (BC, MAG) will independently classify clinical practices according to the type of practice (hospitalisation, consultation, diagnostic, therapeutic-surgical, therapeutic-drugs, therapeutic-device, therapeutic-other). Any disagreements will be adjudicated by a third reviewer (LM). Evidence of cost-effectiveness, cost-utility, cost-benefit or cost-minimisation (or lack of cost-effectiveness, cost-utility or cost-benefit) for clinical practices will be presented by the type and number of studies as well as measures of economic value. All measures will be converted into iNMB using a ceiling ratio (ie, the maximum acceptable willingness to pay per unit of health gain) of $50 000 per QALY gained. We will use a conservative threshold of $50 000 per QALY gained because it is a widely used threshold in the literature for developed countries and using a single threshold will facilitate the comparison between studies. Measures of iNMB based on this threshold will represent a conservative estimate of incremental net monetary benefits. Results obtained with this ceiling ratio for identified clinical practices will be summarised by charting forest plots or league tables. We anticipate that meta-analyses will be inappropriate due to the heterogeneity of cost estimates both within and between settings.[28]

Methodological quality of included studies

Two content experts will independently assess methodological quality using the Consensus on Health Economic Criteria.[29]

ETHICS AND DISSEMINATION

The results of this systematic review will fill a major knowledge gap on the economic value of clinical practices in acute injury care. They will be used to advance knowledge on value-based healthcare in this population. Results will be disseminated through a peer-reviewed article, international scientific meetings and clinical and healthcare quality associations. Ethics approval is not required as original data will not be collected.

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Contributors BC led the development of the protocol and drafted the manuscript. JRG contributed to the development of research objectives and inclusion criteria, elaborated keywords, validated the data extraction form, critically revised the

manuscript and approved the final version. P-AT contributed to the elaboration of keywords, developed and tested the search strategy, critically revised and approved the final version of the manuscript. IF contributed to the elaboration of keywords, developed and tested the search strategy, critically revised and approved the final version of the manuscript. TM contributed to the elaboration of keywords, developed and tested the search strategy, critically revised and approved the final version of the manuscript. SaB contributed to the elaboration of keywords, developed and tested the search strategy, critically revised and approved the final version of the manuscript. KS contributed to the elaboration of keywords, developed and tested the search strategy, critically revised and approved the final version of the manuscript. PA contributed to working definitions, developed keywords, revised the manuscript and approved the final version. SiB contributed to the development of research objectives and inclusion criteria, elaborated keywords, critically revised the manuscript and approved the final version. FL contributed to developing keywords, validated the search strategy and the data extraction form, revised the manuscript and approved the final version. AFT elaborated inclusion criteria and clinically significant outcomes, validated the search strategy, elaborated keywords, revised the manuscript and approved the final version. HTS contributed to the development of research objectives, inclusion criteria, the search strategy and the extraction form, developed keywords, revised the manuscript and approved the final version. MC validated the search strategy and the data extraction form, revised the manuscript and approved the final version. JH contributed to working definitions, developed keywords, revised the manuscript and approved the final version. LM led the development of the protocol and drafted the manuscript. She acts as guarantor for the review.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting or dissemination plans of this research.

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