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Quality Indicators for Older Persons' Transitions in Care: A Systematic Review and Delphi Process

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Résumé

Nous avons identifié des indicateurs de qualité (IQ) liés aux soins offerts lors des transitions de personnes âgées (> 65 ans). Par une revue systématique, nous avons catalogué les IQ associés aux transitions de soins de personnes âgées qui étaient transférées entre des établissements de soins continus, ainsi qu'entre ceux-ci et des établissements de soins actifs, et inversement. Deux cycles d'enquêtes Delphi ont été effectués. Des experts ont classé la pertinence, la faisabilité et la solidité scientifique des IQ. Notre comité directeur a examiné les IQ concernant la faisabilité de leur capture dans les bases de données administratives canadiennes. Notre recherche a mené à 326 IQ provenant de 53 sources. Un total de 38 indicateurs ont été sélectionnés en considération de la faisabilité de ces mesures dans la pratique actuelle. La plus grande proportion des indicateurs visait les services d'urgence (47 %) et l'efficacité selon les domaines de qualité de l'Institute of Medicine (IOM) (39,5 %). Les indicateurs présentant la meilleure faisabilité étaient ceux liés aux résultats. Notre étude met en évidence un développement insuffisant d'IQ standardisés pour les transitions en pratique, ainsi que des limites dans les systèmes de documentation actuellement en accès libre pour l'obtention de données pertinentes et cohérentes.

Abstract

We identified quality indicators (QIs) for care during transitions of older persons (≥ 65 years of age). Through systematic literature review, we catalogued QIs related to older persons' transitions in care among continuing care settings and between continuing care and acute care settings and back. Through two Delphi survey rounds, experts ranked relevance, feasibility, and scientific soundness of QIs. A steering committee reviewed QIs for their feasible capture in Canadian administrative databases. Our search yielded 326 QIs from 53 sources. A final set of 38 feasible indicators to measure in current practice was included. The highest proportions of indicators were for the emergency department (47%) and the Institute of Medicine (IOM) quality domain of effectiveness (39.5%). Most feasible indicators were outcome indicators. Our work highlights a lack of standardized transition QI development in practice, and the limitations of current free-text documentation systems in capturing relevant and consistent data.

Health care service delivery for Canada's vulnerable older adult population occurs in a number of settings and involves diverse groups of health providers, professions, and services. When the health status and care needs of older persons' (≥ 65 years of age) change, they can be transferred from one health care setting to another (e.g., from their residential facility to acute care settings). Care during transitions of older persons can be fragmented, delayed, not evidence informed, and unsafe (Anderson, Allan, & Finucane, 2000; Coleman, 2003; Crilly, Chaboyer, & Wallis, 2006; Reid et al., 2013; Riaz & Brown, 2019; Trahan, Spiers, & Cummings, 2016). Poor quality of care transitions between residential long-term care (LTC) facilities or community care settings and acute care settings is linked to increased length of stay in hospital, increased dissatisfaction among providers and patients, increased risk of adverse patient events, and decreased quality of health care (Callahan et al., 2012; Coleman & Berenson, 2004; Crilly et al., 2006; McCloskey, 2011; Riaz & Brown, 2019; Scott, 2010; Tisminetzky et al., 2019). Additionally, although there are established quality indicators for care delivery within facility-based care settings (e.g., Resident Assessment Instrument [RAI] indicators), whether these indicators are applicable and used for

transitions remains unclear (Hutchinson et al., 2010). A particular concern is that persons who rely on others during transitions, such as older persons with moderate to severe dementia, receive optimal patient-centered care (Banerjee, 2007).

Health systems require valid and reliable measures of quality to monitor, improve, and maintain high standards of care delivery for frail older persons during care transitions. Clinicians, health care managers, and policy makers are responsible for ensuring that care delivery for older persons across health care settings is monitored and evaluated based on the best available standards. When quality indicators (QIs) are identified and reported in areas of care delivery with high potential for improvement, they can provide measures for quality of care and improved patient outcomes (Hibbard, Stockard, & Tusler, 2005; Kraska, Krummenauer, & Geraedts, 2016).

This study examined the state of established QIs for vulnerable older adults experiencing transition(s) among multiple care settings, which could be between: (1) continuing care and community settings (LTC/nursing homes; assisted or supportive living facilities that provide accommodation, meals, and personal care for those who are medically and physically stable; and independent living with or without home care support); (2) emergency or non-emergency transport via ambulance, hereafter referred to as emergency medical services (EMS); (3) emergency departments (EDs); and (4) hospital in-patient settings (see Figure 1 for settings included). Our aim was to develop and validate a ranked set of evidence-based QIs for evaluating quality of care provided during care transition, and our objectives were to:

1. Systematically review the current state of QI literature for care transitions experienced by older persons
2. Validate QIs for older persons' care transitions through a Delphi process
3. Evaluate the feasibility of implementing the full set of QIs across care transitions
4. Translate findings into practice through an integrated knowledge translation approach

Methods

During Phase 1 we conducted a systematic scoping review, informed by Arksey and O'Malley's framework, in which researchers select the research question, search related studies, select eligible studies, and synthesize and tabulate key information to derive a report of findings (Arksey & O'Malley, 2005). We used the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines to guide reporting of the review (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009). A University Health Research Ethics Board (PRO00069167) provided ethics approval for Phase 2: The Delphi Process and steering committee feasibility review.

Inclusion and Exclusion Criteria

We defined QIs as indicators developed through a predetermined systematic process in which primary data collection and/or stakeholder involvement (Delphi process or expert panel) occurred in the identification or review of indicators (De Koning, 2007). We included all literature examining QIs applied in care settings where older persons receive care during transitions: residential care facilities (LTC/nursing homes, assisted living facilities, independent living with home care support), EMS, EDs, and hospital in-patient settings. We included all types of QIs (structure, process, and outcome). We placed no limitation on year of publication. We excluded literature examining QIs focused on (1) provision of care not within or directly leading to care transitions, (2) care delivery of a specific disease or condition not directly related to the transition process, and/or (3) individuals under the age of 65 (e.g., studies on maternal or child health). We included studies published in English only, as that was the only language shared among team members.

Search Strategy

An academic health sciences librarian assisted in developing the search strategy. Search terms included "quality indicator/standard of care/benchmarking/outcome measures", "quality of health care/process assessment", and "quality improvement/quality assurance". Electronic databases searched included Cochrane Database of Systematic Reviews, Elton B. Stephens Company (EBSCO)host Cumulative Index to the Nursing and Allied Health (CINAHL) Plus, Institute for Scientific Information (ISI) Web of Science, Ovid Embase, Ovid MEDLINE®, and Scopus. Records were downloaded into Endnote™ and duplicates were removed. We actively sought grey literature in academic, government, and institutional Web sites that generated reports of QIs, but did not include theoretical articles, commentaries, or practice guidelines that did not include QIs. We used a previously pilot-tested, Microsoft Access electronic form for data screening and extraction (Tate et al., 2019). See Appendix 1 for detailed search strategy.

Screening Procedures

Six research team members (K.T., S.L., R.L., F.C., G.G.C., B.H.R.) met to affirm inclusion and exclusion criteria. Following removal of duplicates, one of four partnered reviewers (K.T., S.L., R.L., F.C.) independently screened every abstract. Partnered reviewers met after review of an initial 200 abstracts to ensure consistent interpretation of the inclusion and exclusion criteria. Discrepancy meetings occurred throughout screening to compare results and ensure clarity of inclusion criteria. When reviewers could not reach consensus through discussion, the senior author (G.G.C.) made the final decision. One of four partnered reviewers (K.T., S.L., R.L., F.C.) independently screened each full text manuscript using similar procedures.

Data Extraction

The following seven data elements were extracted from each study: (1) study characteristics (e.g., year of publication and year[s] of data collection, health care setting, theoretical framework and objectives); (2) study design; (3) identified quality indicators; (4) methods for developing QIs and data source; (5) results; (6) study limitations; and (7) study conclusions. One of four reviewers (K.T., S.L., R.L., F.C.) independently extracted data from each included article, and then each extraction was verified by a second reviewer. We did not appraise study quality, as expert panelists would appraise all possible QIs during the Delphi process (which would be different from the level of quality of the study if the study itself was not on the entirety of the QI development, or was about more than QI development).

Delphi Process for Evaluation

Before the Delphi process in Phase 2, team members reviewed and categorized indicators to avoid duplicate entries and clarify
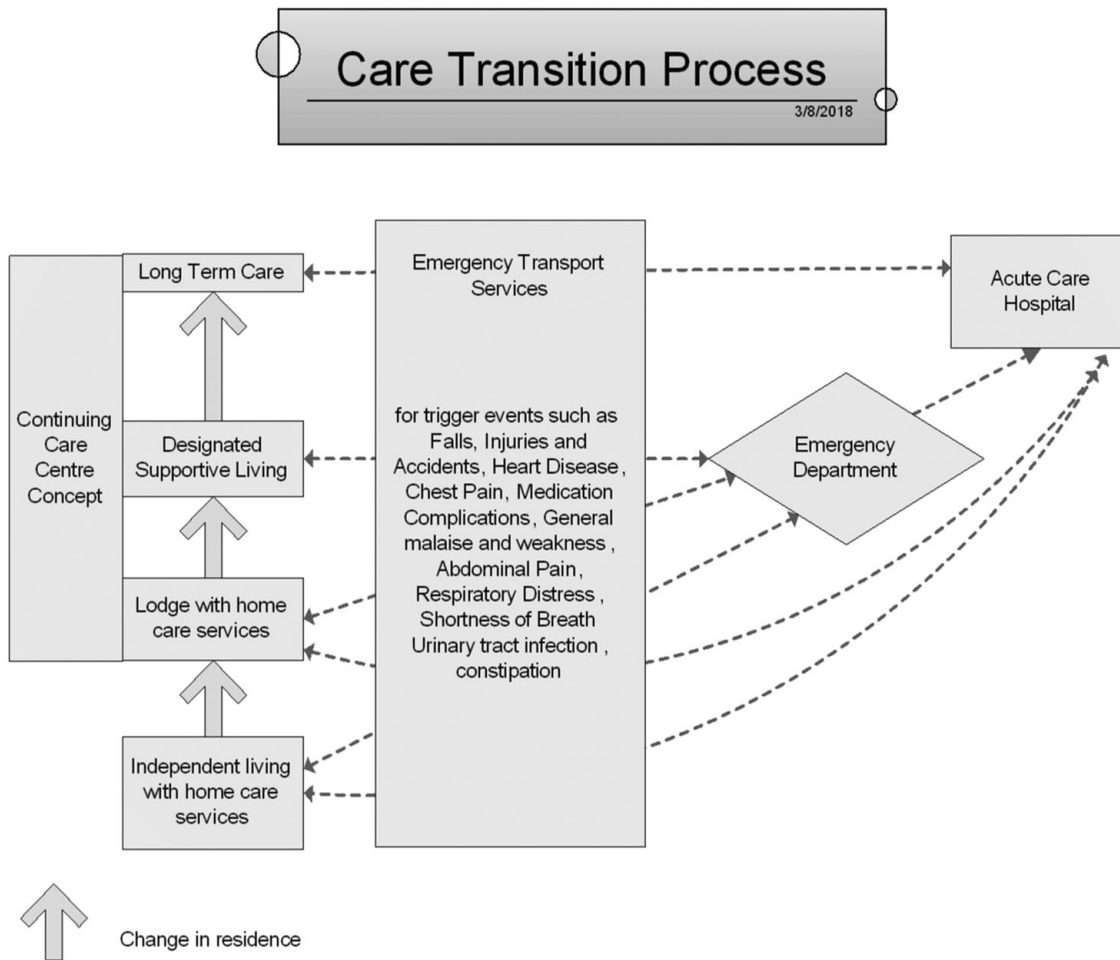
Figure 1. Care transition process

indicator parameters. To map indicators to the most relevant quality domain (Institute of Medicine [U.S.], 2001), six reviewers were paired, and then independently coded extracted indicators from each included study according to: *care setting* (sending continuing care or community setting [residential care facility, home living setting], transport 1, ED, hospital/in-patient, or other continuing care setting, and, if applicable, transport 2, receiving seniors' facilities/home living setting) as seen in Figure 1; *Donabedian framework domain* (structure, process, outcome); and Institute of Medicine (IOM) *Domains of Quality* (safe, effective, patient-centred, timely, efficient, equitable). Discrepancy meetings between partnered reviewers were held after coding was completed to ensured agreement among reviewers.

Integrated Knowledge Approach

We invited experts via e-mail to join our expert panel to review coded QIs across care transitions through a Delphi process using online surveys. We searched for and approached potential expert panelists based on their roles as authors and practice experts from relevant literature, and through suggestions from research team members. The e-mail invitation letter included a link to a Google Form survey to record their willingness to participate. To keep track of both affirmed and declined responses, only the names and e-mail addresses were recorded. No other identifying information

was collected. The expert panelist participation record was kept in a password-protected document accessible only by the local research team. We aimed to recruit at least 20 expert panelist members to ensure a diverse panel (Boulkedid, Abdoul, Loustau, Sibony, & Alberti, 2011).

The Delphi process methods were adapted from Boulkedid et al. (2011). The adapted method had previously been used by a member of our research team (Schull et al., 2010). Study data were collected and managed using REDCap* electronic data capture tools (Harris et al., 2009). We provided each expert panelist with a unique survey link and participant identifier. An invitation and three subsequent e-mail reminders were sent, approximately a week apart from each other, based on a schedule adapted from Dillman, Smyth, and Christian's (Dillman, 2014) method.

Round 1

Expert panelists were asked to rate each QI on five domains using five-point Likert scales: scientific soundness, validity, feasibility, relevance, and importance (Boulkedid et al., 2011; Schull et al., 2011). We provided information to panelists about candidate indicators from original sources including numerator (number of cases that met the QI criteria) and denominator (total number of cases subject to meeting QI criteria), source(s), applicable care setting, and method of QI development. Identified indicators were organized into five transition care settings (sending continuing care

setting [residential care facility or home living setting], transport 1, ED, hospital, transport 2, receiving continuing care setting). We strategically assigned expert panelists across these five settings so that a variety of experts from different specialties (i.e., researchers, clinicians, decision makers, older adults), but with the most expertise in care delivery in that particular setting rated each indicator (i.e., researchers focusing on ED care and geriatricians with experience in ED were assigned to evaluate ED QIs). We used all responses (fully and partially completed) to classify each indicator as *retained, borderline*, or *discarded*. Participants added comments and rationales for each indicator rating to allow for qualitative feedback between rounds (Boulkedid et al., 2011; Schull et al., 2010). Four to seven experts rated each indicator, and all responses were weighted equally and combined. Indicators with a median score ≥ 4 on soundness and at least one of the importance or relevance measures were *retained*. Indicators with scores between 3.0 and 3.9 on soundness and at least one of the importance or relevance measures were *borderline* and kept for repeat assessment (Boulkedid et al., 2011; Schull et al., 2010). Any indicator with a score < 3.0 on soundness was *discarded*.

Round 2

To maintain panelists' continued engagement, we provided feedback between Rounds 1 and 2. Experts were given median scores and their initial individual score for each *borderline* indicator from Round 1. Lists of *retained* and *discarded* indicators from Round 1, including ID number and QI name, were sent to each panelist. Qualitative feedback from participants in Round 1 was used to clarify parameters of QIs. In Round 2, expert panelists were asked either to keep or discard each *borderline* indicator using the same information provided in Round 1. Experts were divided into two groups, each comprising a variety of different specialties (i.e., we aimed to have researchers, clinicians, and older adults with lived experiences, as well as representatives from various care settings distributed evenly between groups). Participants reviewed many of the same indicators from Round 1 in Round 2. *Borderline* indicators that received a vote of *keep* from at least half of the panelists were *retained*; remaining indicators were reclassified as *discarded*. Retained indicators were further assessed for feasibility and accessibility.

Feasibility Review

A steering committee completed a feasibility review of the final indicators from the Delphi rounds to determine whether the current Canadian administrative databases captured each indicator, and how easily such data could be retrieved. The Older Persons' Transitions in Care (OPTIC) steering committee consisted of research team members (academics, data specialists, and health system decision makers) with substantive research, clinical, and administrative data expertise who were representative of various care settings. Prior to the in-person feasibility review, steering committee members searched for available national health systems databases (as well as databases in one Western Canadian province) and extracted data elements that could be used to measure indicators under review. Databases identified and reviewed were Canadian Institute for Health Information's (CIHI) National Ambulatory Care Reporting System (NACRS) and Discharge Abstract Databases (DAD), Alberta Continuing Care Information System (ACCIS), Canadian Patient Experiences Reporting System (CPERS), Continuing Care Reporting System (CCRS), Pharmaceutical Information Network (PIN), and regional databases in Edmonton and Calgary. From these databases, we identified relevant individual data elements (e.g., reported 30-day readmission rates, new medication "flags" that could be used to identify if persons left hospital with new prescriptions) for each indicator, unit of analysis captured, and whether collection of elements was mandatory, optional, or conditionally mandatory.

The OPTIC research team categorized each indicator as either an (1) established QI currently measured with a data set, (2) indicator for which data elements are collected but not used, (3) indicator for which some applicable databases/elements exist but may or may not be collected, or (4) indicator for which no applicable database/elements are currently captured. These categorizations were independently completed by one team member, verified by another, and sent to the data expert for review of indicator data availability prior to the feasibility review. During the in-person feasibility review, the OPTIC steering committee reviewed and discussed individual indicators when it was unclear if and how current data in Canadian administrative databases could be used to measure them. The steering committee determined whether capture of retained indicators was feasible with existing data, required enhanced data collection, and/or was clinically valuable for improving care during transitions of older persons.

Results

Search Results

Our electronic database search yielded 10,487 unique records. Following abstract/title screening, 1,615 articles were retrieved for full text screening, of which a final 41 articles met inclusion criteria. Twelve other sources from grey literature searches met inclusion criteria, for a total of 53 articles. See Figure 2 for PRISMA Flow diagram of search and screening results.

From the 53 articles, 326 candidate QIs were identified for review through the Delphi process. After coding into applicable domains, the 326 QIs ($n = 266$ established and $n = 60$ developing) included 35 (10.7%) structure, 212 (65.0%) process, and 79 (24.2%) outcome indicators. QIs were categorized into timeliness (25%), effectiveness ($n = 24$), safety (21%), patient-centredness (19%), efficiency (10%), and equity (<1%). See Figure 3 for a visual display of review results by Donabedian framework, IOM quality domain, and care setting.

Delphi Process Results

Round 1

Thirty-three of 39 invited experts initially agreed to participate. Participants included researchers on transitional or geriatric care or gerontology, clinicians and decision makers with experience in quality management and/or related research, and older adults with experience as an informal caregiver or recipient of care during a care transition. Twenty-two experts completed the survey for Round 1, three partially completed the survey, five did not complete the survey, and three had to withdraw prior to Round 1 completion because of time constraints.

Of the 326 indicators included in Round 1, 80 were classified as "retained", 92 were classified as "discarded" and 154 were classified as "borderline". The 154 borderline indicators were included in the Round 2 survey, while the 80 retained indicators were moved forward for feasibility review by the steering committee. Although no clear patterns of response emerged based on expert specialty, the majority of indicators from Round 1 were discarded based on lack of "clinical importance or relevance". Specifically, participants felt
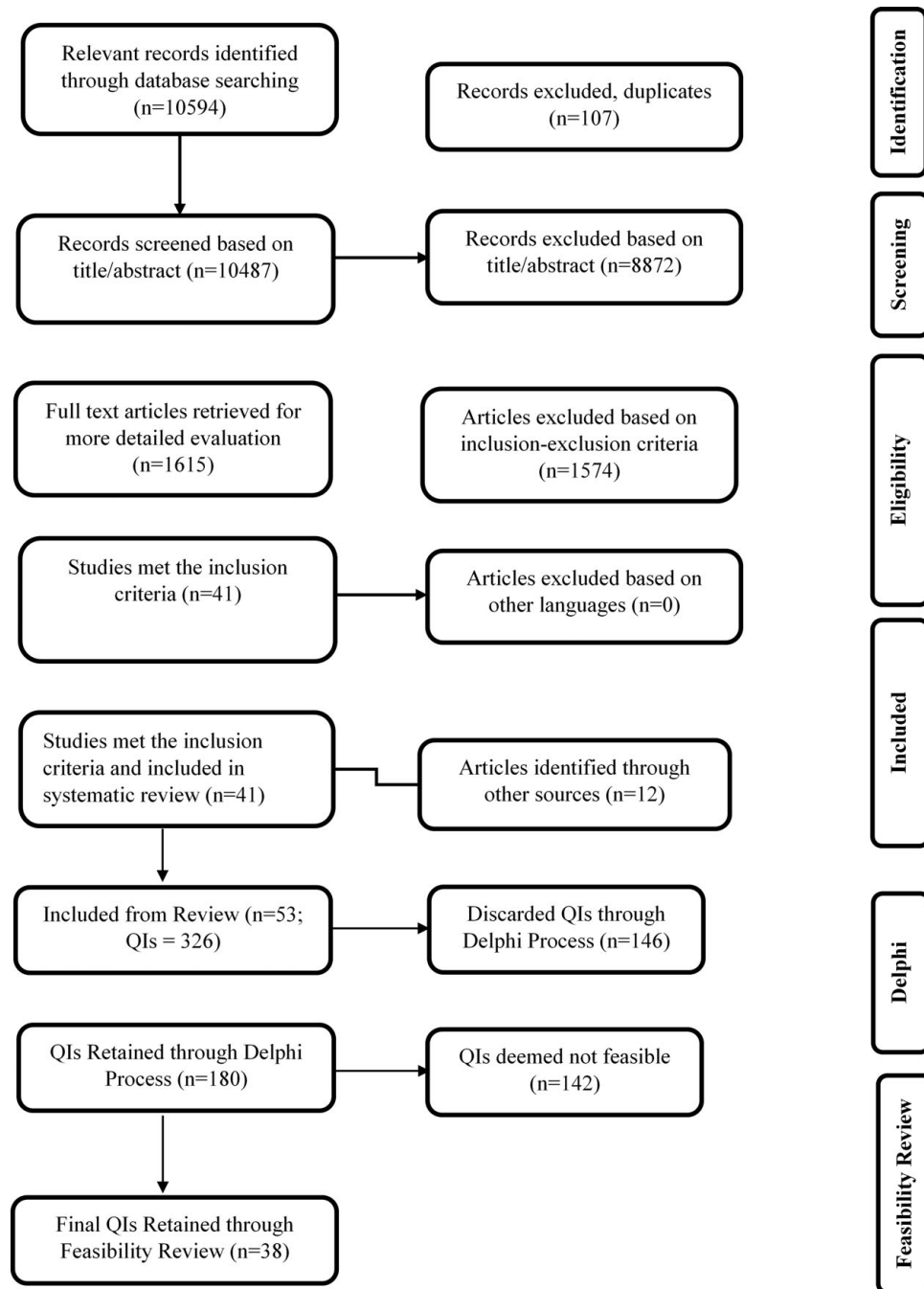
Figure 2. PRISMA diagram

that some quality indicators were not relevant in Canadian contexts, supported by a Delphi panelist stating, "This is only relevant to UK or Australia ED contexts" in reference to the QI, "Proportion of patients re-attending the ED seen by a more senior member of the ED medical staff (Middle Grade or Consultant)", and another Delphi participant stating (in reference to the QI) "Availability of ED observation beds".

> [Availability of ED observation beds] is very different in different health care systems – in the United States observation beds are often a means to address billing for ED services

Other experts felt that some indicators were not clinically meaningful (e.g., length of stay [LOS] in acute care services).

LOS – hard to determine what is appropriate since this is determined by complexity of the patient. To get a better understanding of transitions and quality of care and patient flow, it is critical to look at unnecessary LOS in acute care (aka Alternate level of care – ALC: patients who are in an acute care bed who no longer need the intensity of care provided by that unit).

Or they may have felt that some indicators were no longer important based on more current best practices (e.g., proportion of LTC residents who experienced an unintentional discontinuation of their statins upon returning to their LTC residence after an acute-care admission).

> [Statins] are often not indicated or no longer effective. Not sure why we would pick Statins to gauge "unintentional discontinuation".
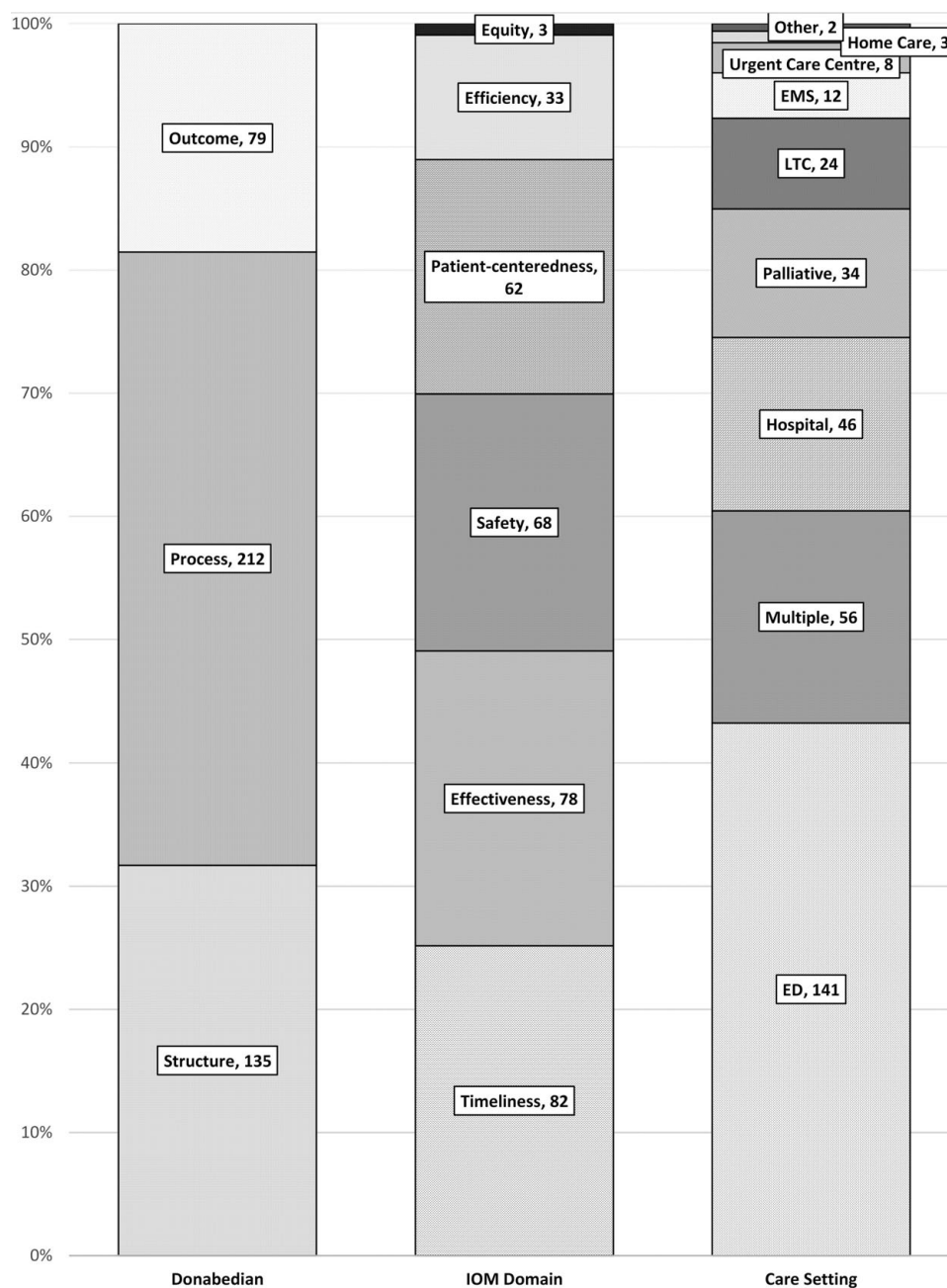
Figure 3. Indicators extracted from systematic review

Round 2

Of 22 experts who completed Round 1 surveys, 19 participated in Round 2. A total of 154 borderline indicators were split into two different surveys of 77 indicators each to ensure survey completion. Of the borderline group of indicators, 100 additional quality indicators were retained.

After both rounds, a total of 180 indicators was retained, while 146 were discarded. Retained indicators generally covered a similar range of transition settings, Donabedian framework types, IOM domains of quality, and care settings compared with the initial identified indicators. However, notable changes among retained indicators included fewer indicators that spanned multiple settings, and fewer indicators specific to transitions and palliative care. Qualitative feedback was not solicited for this round, as the intent was to provide feedback and clarify QI parameters (if possible) for

Delphi panelists between rounds (Boulkedid et al., 2011; Schull et al., 2010). See Figure 4 for Delphi process classification results.

Feasibility Review

Following the OPTIC steering committee's review of the 180 retained QIs for feasibility, 7 indicators were *feasible* based on current use by the CIHI, 31 additional indicators were reconsidered feasible and retained, and 142 indicators were deemed not feasible. Indicators were not feasible if (1) individual chart review was required to ensure data availability ($n = 46$), (2) procedures described in the indicator were not currently being performed ($n = 6$), (3) the indicator was not known to be documented ($n = 17$), (4) further indicator clarification was required in order to reasonably capture the indicator within current data platforms ($n = 8$), and/or (5) the indicator lacked clinical
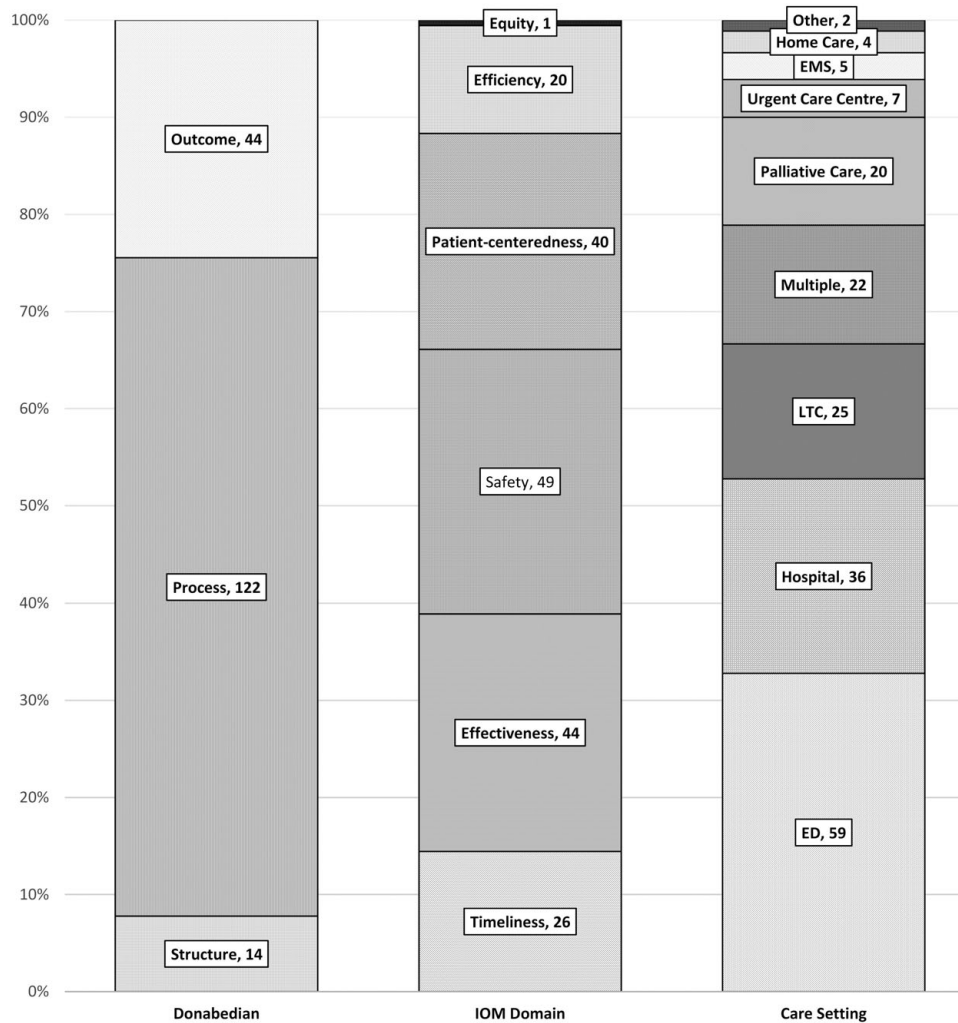
Figure 4. Indicators retained after Delphi process

value or relevance based on current Canadian information systems (e.g., for the indicator "time from first contact with emergency and urgent care systems [EUCS] service to definitive care", more targeted measures for specific conditions could be tracked and used more meaningfully than a general indicator) ($n = 7$).

The final set of 38 *feasible* indicators in 21 articles (see Appendix 2) included the following transition care settings: ED ($n = 18$), seniors' facilities ($n = 4$), transport ($n = 1$), hospital ($n = 5$), palliative care ($n = 7$), and multiple settings ($n = 3$). See Figure 5 for results of the feasibility review by Donabedian framework, IOM quality domain, and care setting, and Table 1 for characteristics of included and feasible QIs.

The steering committee identified knowledge gaps during their deliberations for the feasibility review. These include lack of standardized QI development applied in practice, no feasible indicators related to equity (e.g., age, sex/gender, race), a paucity of appropriate assessments (or documentation of assessments) of older persons across settings, and little to no screening done for baseline function, delirium, dementia, or cognitive impairment. Many proposed indicators require individual chart review.

Discussion

Using a robust mixed-method design and an integrated knowledge translation approach, this study identified 326 QIs cited in the

literature and explored the feasibility of their reporting using standard administrative health databases. After an expert panel review, only 38 QIs were feasible to capture with existing databases and documentation practices within the Canadian context. The majority of feasible indicators relate to acute care settings, outcomes, and process indicators, and aligned with the IOM quality domain of effectiveness. Few available and feasible indicators were identified from EMS transport and seniors' residential care settings, structure indicators, or IOM domains of patient-centredness and equity.

Of the QIs identified in this review, many can be used to monitor and improve transitions to and from EDs and in-patient settings, particularly pertaining to timeliness and safety in the process of care delivery. Target wait times from ED arrival to disposition for older adults are often not met and when older adults are hospitalized, they are at high risk of experiencing adverse events such as medication-related errors and in-hospital death (Cummings et al., 2020; Riaz & Brown, 2019; Tisminetzky et al., 2019). Although many older patients are discharged back to the community, they experience high rates of repeat ED visits and unplanned hospitalizations largely attributed to unresolved problems and limited discharge planning (Ahn, Hussein, Mahmood, & Smith, 2020; Brennan, Chan, Killeen, & Castillo, 2015; Doupe et al., 2012). Identified QIs, although not comprehensive, offer an initial framework to build a suite of QIs for various transitions for older adults. QIs discarded during feasibility review could be re-evaluated as electronic health records
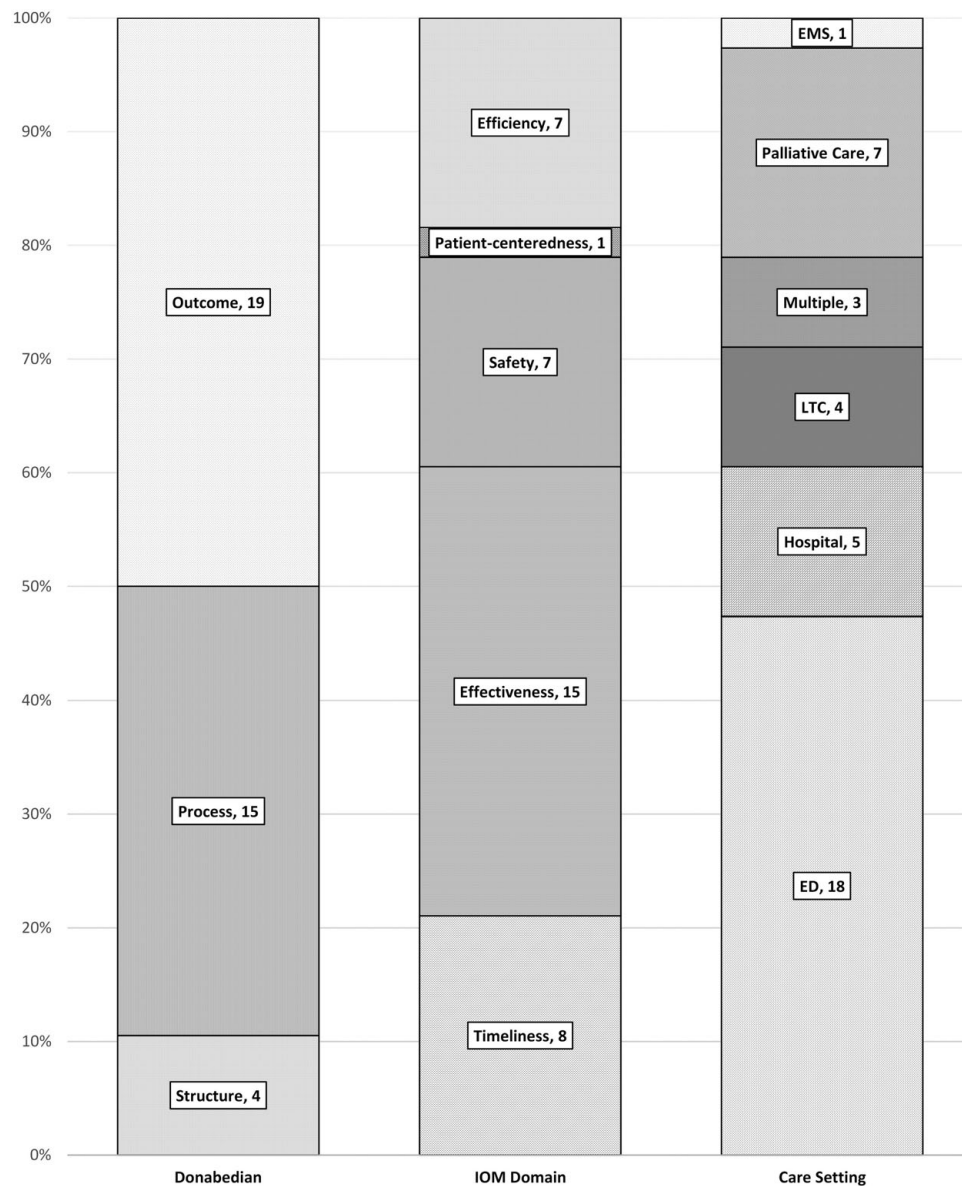
Figure 5. Indicators retained after feasibility review

evolve, to determine if their capture could be feasible by adding or mandating data elements. Further, QIs discarded based on relevance to Canadian contexts could be reviewed to determine whether they could be clinically important if modified and tested here.

The lack of feasible indicators outside of acute care settings is concerning. Issues that occur during the onset of transfer, such as incomplete or missing data on resident condition and goals of care, can negatively influence care throughout the transition process (Griffiths, Morphet, Innes, Crawford, & Williams, 2014). Although data are available for care delivery within continuing care settings (such as RAI-Minimum Data Set [MDS] 2.0 nursing home data), (Estabrooks, Knopp-Sihota, & Norton, 2013) we found a lack of rigorously developed indicators for processes leading up to a decision to transfer and for the initial patient transfer process from continuing care settings. Despite existing research regarding trigger events leading to transfer to acute care services for older persons, only one feasible QI related to a trigger event (falls) was identified and it was only captured as an element of LTC admission, not of

transfer from continuing care to acute care services (Cummings et al., 2020; Dwyer, Stoelwinder, Gabbe, & Lowthian, 2015). Other QI reviews on care delivery for older adult populations report that most indicators focus on examinations and treatment for a specific disease, although limited measures are available to monitor safety and quality concerns where care services intersect (Joling et al., 2018; Laugaland, Aase, & Barach, 2011). Our results confirm the scarcity of available, feasible indicators related to transition onset. These types of indicators are integral in elucidating early concerns in transitions, determining a reference point of patient condition and context influencing perceived quality of the transition, and identifying and evaluating potentially avoidable transitions.

Our review highlights that despite guidelines being available for standardized QI development, validation and prioritization of many QIs do not meet standards of rigor (Kötter, Blozik, & Scherer, 2012). Many QIs were validated through consensus and lacked reported empirical testing; therefore, they still require better reporting on their development methods, pilot testing, operationalization with properly

Table 1. Final set of retained indicators

Care Setting	IOM Domain	Donabedian Framework	Quality Indicator	Numerator/Denominator (if applicable)
Continuing care	Effectiveness	Outcome	Percentage of residents who had multiple emergency department (ED) visits within a 30 day period (Health Quality Ontario, 2021)	Number of LTC residents who had more than one ED visit in the month/ total number of LTC residents who had an ED visit in the month
	Safety	Process	Number of LTC residents asked about falls (Saliba et al., 2005)	Number of LTC residents or their proxies asked about the occurrence of falls on admission and quarterly/all LTC residents
		Outcome	Percentage of clients who have had medication reconciliation completed on transfer to LTC (Health Quality Ontario, 2021)	Number of clients with completed medication reconciliation on transfer to LTC/total number of clients transferred into LTC
			Percentage of short-stay residents who were re-hospitalized shortly following a LTC admission (Research Triangle Institute, 2012)	Not reported
Emergency medical services	Timeliness	Process	Ambulance offload time (Schull et al., 2011)	Time from patient/ambulance arrival to transfer of care to ED staff
ED	Effectiveness	Outcome	Percentage of people who leave the A&E/ED without being seen (College of Emergency Medicine UK, 2011; Schull et al., 2011; United Kingdom Department of Health, 2010; Wakai et al., 2013)	Not reported
			In-patient days in ED (Tregunno et al., 2004)	Not reported
			Frequency of ED visits (Grunfled et al., 2008)	Not reported
			Percentage of emergency readmissions within 7 days for serious, emergency, or urgent conditions (Coleman & Nicholl, 2010)	Number of emergency readmissions within 7 days for serious, emergency, or urgent conditions/all live discharges
		Process	Potentially avoidable ED visits for LTC residents (Health Quality Ontario, 2021)	Not reported
	Efficiency	Process	Percentage of hospital emergency admissions for acute exacerbations of urgent conditions that could be managed out of hospital or in other settings without admission to in-patient bed (Coleman & Nicholl, 2010)	Not reported
		Outcome	Total ED time (non-admissions) (Australian Commission on Safety and Quality in Health Care and NSW Therapeutic Advisory Group Inc., 2014)	Not applicable
			Total ED time (admissions) (Australian Commission on Safety and Quality in Health Care and NSW Therapeutic Advisory Group Inc., 2014)	Not applicable
		Structure	Presence of a dedicated ED clinical information system (Wakai et al., 2013)	Not applicable
			Availability of electronic ordering (and obtaining) results of radiology and laboratory investigations (Wakai et al., 2013)	Not applicable
	Timeliness	Process	Time to nursing assessment (Tregunno et al., 2004)	Not reported
			Time from arrival in the ED to first physician assessment, by CTAS (College of Emergency Medicine UK, 2011; Schull et al., 2011; United Kingdom Department of Health, 2010; Wakai et al., 2013; Welch et al., 2011)	Not applicable
			Time to first dose of analgesic in all painful conditions requiring analgesia (Australian Commission on Safety and Quality in Health Care and NSW Therapeutic Advisory Group Inc.,, 2014; Maritz et al., 2010; Schull et al., 2011)	Not applicable
			Time interval from patient referral from ED medical team to patient assessment by inpatient medical specialty team (Wakai et al., 2013)	Not applicable

(Continued)

Table 1. *Continued*

Care Setting	IOM Domain	Donabedian Framework	Quality Indicator	Numerator/Denominator (if applicable)
			ED length of stay (time from first documented contact in the ED to the time of physical departure from the ED (overall and by CTAS) (College of Emergency Medicine UK, 2011; Health Quality Ontario, 2021; Joint Commission, 2015; Schull et al., 2011; Wakai et al., 2013; Welch et al., 2011)	Not applicable
			Percentage of admitted patients transferred to an in-patient ward within 6 hours of ED arrival (Wakai et al., 2013)	Not reported
			Time to antibiotics in sepsis of any cause (Wakai et al., 2013)	Not applicable
		Structure	Radiographic reporting by imaging department within 24 hours (Wakai et al., 2013)	Not applicable
Hospital (in-patient)	Effectiveness	Outcome	Rate of 30-day all-cause readmission for medical and surgical patients (Health Quality Ontario, 2021)	Cases with an urgent readmission within 30 days of discharge/number of episodes of care discharged between April 1 and March 1 of the fiscal year for surgical and medical patients
			Rate of unplanned readmissions (Berenholtz et al., 2002)	
			Percentage of home care clients with unplanned hospital readmissions within 30 days of referral from hospital to home care after acute hospital discharge (Health Quality Ontario, 2021)	Number of unplanned hospitalizations by home care patients newly referred to home care services within 30 days of initial hospital discharge/number of home care applications from patients referred from hospital who received a home care service visit
	Safety	Outcome	Rate of adverse events (Santana & Stelfox, 2013)	All discharges of patients with a primary injury diagnosis and one of the following secondary diagnoses: decubitus ulcer, hospital acquired infection (any type of pneumonia, blood stream, or wound), iatrogenic pneumothorax, foreign body left during procedure, myocardial infarction, acute renal failure/all discharges of patients with a primary injury diagnosis
			Percentage of patients whose current medicines are documented and reconciled at admission (Australian Commission on Safety and Quality in Health Care and NSW Therapeutic Advisory Group Inc.,, 2014; Health Quality Ontario, 2021)	Number of patients whose current medicines are documented and reconciled at admission/number of patient records in sample
		Process	Percentage of patients receiving sedatives at discharge who were not taking them at admission (Australian Commission on Safety and Quality in Health Care and NSW Therapeutic Advisory Group Inc.,, 2014)	Number of patients receiving sedatives at discharge who were not taking them at admission/number of patients receiving sedatives at discharge in sample
Palliative care	Effectiveness	Outcome	Number of emergency room visits in the last 3 months of life (Earle et al., 2003)	Not applicable
			>1 hospitalization in the last month of life (Earle et al., 2005)	Not applicable
			>1 emergency room visit in the last month of life (Earle et al., 2005)	Not applicable
			Time spent in an acute care hospital in the last 3 months of life (Earle et al., 2003)	Not applicable
		Process	Follow-up in the community in the last 6 months of life (Gagnon et al., 2004)	Not applicable
			Follow-up by family physicians in last 6 months of life (Gagnon et al., 2004)	Not reported
	Patient-centredness	Outcome	Number of admissions in the last 6 months of life (Gagnon et al., 2004)	Not applicable

(Continued)

Table 1. *Continued*

Care Setting	IOM Domain	Donabedian Framework	Quality Indicator	Numerator/Denominator (if applicable)
Multiple care settings	Safety	Structure	An up-to-date medication list readily available in the medical record that is accessible to all health care providers, which includes over-the-counter medications (Shrank et al., 2007)	Not applicable
		Process	Interpreter or translated materials used to facilitate communication (for a vulnerable older person who is deaf or does not speak English) (Research ANd Development (RAND) Health Corporation, 2007).	Not reported
	Timeliness	Process	Time from first contact with an emergency and urgent care systems service to clinical assessment (Coleman & Nicholl, 2010).	Not applicable

Note. Sources for included Quality Indicators can be seen in Appendix 2. IOM = Institute of Medicine; LTC = long-term care; A&E = accident & emergency department; CTAS = Canadian Triage Acuity Scale.

developed numerators and denominators (where applicable), and evaluation through more robust quantitative and mixed-methods designs (Kötter et al., 2012; Terrell et al., 2009; Wakai et al., 2013). Unfortunately, QIs have been used in applied research or practice without the preceding research necessary to ensure validity and utility of these measures after their initial identification (Mansoor & Al-Kindi, 2017; Saver et al., 2015). Moreover, some QIs (e.g., thresholds for certain types of screening related to cancer, diabetes, and dementia, as well as QIs for prescribing practices for diabetes) that are currently being used in hospital settings and are tied to financial incentives, are selected because of their measurement ease and availability rather than because of their evidence base or representation as true markers of care quality (Saver et al., 2015). Even among QI sets considered to be of high quality (interRAI-Home Care QIs, Agency for Healthcare Research and Quality prevention QI sets, and *Assessing Care of Vulnerable Elders* [ACOVE]-3 indicator sets), only ACOVE-3 indicators have scored high enough for methodological quality based on "scientific evidence" (Burkett, Martin-Khan, & Gray, 2017; De Koning, 2007; Joling et al., 2018; Wenger et al., 2007). Further study will ensure that QIs for older persons' care transitions meet established standards of development, and will determine resources required to capture data to measure QIs (van Teijlingen & Hundley, 2002).

Our findings suggest that little to no systematic screening for baseline function, delirium, dementia, or cognitive impairment is occurring and feasibly captured as older persons transition through acute care settings (Cummings et al., 2020). Some care activities may be performed, but are not documented, some are documented but are not easy to capture, and some may not be performed at all in current care settings.

Tracking of current available indicators relies primarily on chart review, potentially from multiple care settings. Having standardized documentation that prompts certain assessments or activities to be completed (vs. solely free-text charting) offers a robust opportunity to improve both care provided and continuity in care (Hustey & Palmer, 2010; Terrell et al., 2005; Zafirau, Snyder, Hazelett, Bansal, & McMahon, 2012). Antiquated and fragmented electronic tracking systems need to be consolidated and advanced to allow health care decision makers to better evaluate and improve older persons' care during transitions, in recognition of their distinct care needs (Allen, Hutchinson, Brown, & Livingston, 2014). Standardized electronic documentation (e.g., drop-down menus, checklists) (McLane et al., 2022) also needs to be completed across care settings to maximize benefits of using large clinical and administrative databases efficiently. Standardized electronic documentation allows for reliable, feasible tracking, and enhances the quality and completeness of the data tracked (Vuokko, Mäkelä-Bengs, Hyppönen, Lindqvist, & Doupi, 2017). Provincial policies, clinical guidelines, and practice standards should provide direction and governance related to data specifications and documentation practices that will allow for effective data integration across care settings and regions.

The electronic capture of valid and reliable data can be used for secondary purposes, such as creation of QI dashboards for audit-feedback targeted at improving care for older persons (Lloyd, 2017; Vuokko et al., 2017). With a standardized electronic data platform, related QIs can be captured together and thereby support display of QI information with statistical interpretations for knowledge users. (Schall et al., 2017). This is a necessary step to incorporate concepts of statistical process control (using statistics to monitor and improve quality), health informatics, and meaningful use of indicators in health care systems to consider context and missing data

to drive change (Lloyd, 2017; Office of the National Coordinator for Health Information Technology, 2015; Spath, 2013; Tashobya et al., 2016). Ensuring data completeness has the potential to reduce the amount of superfluous data being captured and thereby reduce resources needed to retrieve such data (Arthofer & Girardi, 2017).

No feasible equity indicators were identified that clearly compared care received by older persons to care received by the general population or by older persons living in their homes. However, risk-adjusted QIs can statistically account for the influence of variables such as age, sex, and chronic conditions on the values and subsequent interpretation of QIs (Joling et al., 2018). Unfortunately, many QIs identified in this study, and in another review of QIs in older persons' community care, are neither risk adjusted nor accompanied by strategies for risk adjustment in published reports (Joling et al., 2018). Having almost no information on how care is provided for older persons compared with other populations is alarming, as older persons are identified as one of the most disadvantaged and vulnerable patient groups (Johnstone & Kanitsaki, 2008). It is imperative that future research related to care transitions focus on development and validation of feasible equity indicators with parameters that include comparators by age (Williams & Mohammed, 2009). A minimum set of essential, cross-setting transition QIs are needed, and should be rigorously developed, validated, and evaluated using available guidelines.

Limitations and Strengths

The systematic review component of this study may be limited by publication and selection bias. Key weaknesses in QIs for transitions were related to validation, empirical testing, and reporting of their development. Difficulties emerged when seeking knowledgeable experts in both older persons' transitions in care and QIs. Many potential panelists were acknowledged as experts in older persons' care but were unfamiliar with what constituted rigor in QI development, despite criteria being described and available on the online surveys. This study only examined *feasibility* related to data capture of QIs in Canadian contexts, and our findings may not be transferable to other regions in which health policy, health care delivery systems, and health informatics systems differ.

Strengths of our study included systematic selection of indicators through trained and independent research staff, and the diversity and number of experts included in our Delphi process and steering committee for feasibility review. A comprehensive search strategy was used to mitigate publication bias and to avoid selection bias. Efforts to maintain rigor were evident through individual coding, extraction, and consensus methods used in the Delphi process and feasibility review. Diversity in both the expert panel and steering committee reduced risk of monopolization of one discipline or setting, allowing for representation from stakeholders across the continuum of care.

Conclusion

Although numerous QIs have been developed and reported, the number of feasible QIs for older persons' transitions in care is distressingly small. QIs that do exist for older persons' transitions in care are primarily for acute care settings, and almost none exist for tracking transitions *across settings*. A set of cross-setting transition QIs is needed, and should be developed, validated, and properly operationalized using available

guidelines. Measurement and documentation practices need to be improved, to increase the feasibility of capturing QIs rather than having a system complacent about adapting and implementing QIs that conform to current poor reporting practices. Future QI development should focus on standardized electronic reporting systems to better track data across settings. Each setting involved in care transitions should be held accountable for improving the quality of care experienced by older persons during transitions.

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Appendix 1: MULTIFILE Search Strategy

1. quality indicators, health care/ or benchmarking/
2. (benchmark* or trigger tool*).ti,ab,kf.
3. ((quality adj3 (indicator* or measure* or metric*)) or (quality adj3 criteri*) or performance indicator* or performance measure* or clinical indicator* or clinical measure* or outcome indicator* or ((performance or clinical or outcome) adj3 metric*)).ti,ab,kf.
4. ((quality and (standard* or measure* or indicator* or metric*)) or (performance and (indicator* or measure* or metric*))).ti,kf.
5. (practice guidelines as topic/ or practice guideline.pt. or ((clinical or practice) adj guideline*).ti,ab,kf.) and (((safe* or efficien* or effective* or timel* or equit* or patient cent*) adj3 (care or service*)) or quality or indicator*).ti,ab,kf.
6. ("quality of health care"/ or "outcome assessment (health care)"/ or "Process Assessment (Health Care)"/ or quality assurance, health care/) and (((safe* or efficien* or effective* or timel* or equit* or patient cent*) adj3 (care or service*)) or indicator*).ti,ab,kf.
7. audit.ti,ab,kf,hw. and (((safe* or efficien* or effective* or timel* or equit* or patient cent*) adj3 (care or service*)) or quality or indicator*).ti,ab,kf.
8. or/1-7
9. nursing homes/ or Intermediate Care Facilities/ or skilled nursing facilities/ or homes for the aged/
10. (((extended care or long term care or intermediate or skilled or residential) adj2 (facilit* or facilities)) or residential care).ti,ab,kf.
11. (assisted living or lodge or lodges).ti,ab,kf.
12. emergency medical services/ or advanced trauma life support care/ or emergency medical service communication systems/ or exp emergency service, hospital/ or emergency services, psychiatric/
13. (emergency adj2 (room* or center* or centre* or facilit* or department* or ward* or service*)).ti,ab,kf.
14. or/9-13
15. 8 and 14
16. home care services/ or home health nursing/
17. (((home or community) adj2 care) or ((home or community) and (supportive living or supportive care))).ti,ab,kf.
18. 16 or 17

Appendix 2: Sources for included Quality Indicators

Australian Commission on Safety and Quality in Health Care and NSW Therapeutic Advisory Group Inc. (2014). *National quality use of medicines indicators for Australian hospitals (ACSQHC), Sydney.* Retrieved 26 January 2021 from https://www.safetyandquality.gov.au/sites/default/files/migrated/SAQ127_National_QUM_Indicators_V14-FINAL-D14-39602.pdf

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