Evaluating quality in acute care using patient reported outcome measures: a scoping review

EM Mols, MGAM van der Velde, PWB Nanayakkara, HR Haak & MNT Kremers

Abstract

The aim of this scoping review is to identify patient reported outcome measures (PROMs) in acute care settings, assess their psychometric properties and provide recommendations for their use in daily practice. We performed a search in the PubMed database to identify publications concerning PROMs in an acute care setting. The COSMIN checklist was used to assess the psychometric properties of the reported PROMs. We found 1407 publications and included 14 articles, describing 15 measures. Most publications provided limited information on psychometric properties. Three generic PROMs were deemed of adequate quality for use in acute care. We recommend future development and evaluation of PROMs focussing on acute care to further evaluate and improve the quality of acute care.

Keywords

Patient reported outcome measures, psychometrics, health care quality, acute care, patient-centredness.

Key Findings

- To date, the use of PROMs in acute care settings is limited, even though the introduction of value-based health care created a need for transparency of healthcare quality over the last years.
- PROMs in acute care can be generic, disease specific or symptom specific. Only a couple generic PROMs, have an adequate validity and reliability for the use in acute care settings.
- We recommend future development and validation of PROMs focussing on acute care to further evaluate and improve the quality of acute care.

Introduction

Quality of care in an emergency setting can be assessed in terms of outcomes, such as mortality or readmission rates and process measures, such as treatment time. These outcomes are routinely and periodically measured by most, if not all, emergency departments (EDs). Quality of care from a patient perspective however is not frequently measured in acute care settings.

The Institute of Medicine has identified patient-centred care as one of six elements which is important for quality of healthcare assessment.[1] Patient reported outcomes (PROs) can be used to evaluate patient-centred care and gained attention in the past years. A PRO is directly reported by the patient without interpretation of the patient's response by a clinician or anyone else and pertains to the patient's health, quality of life, or functional status associated with health care or treatment. In order to assess these PROs, patient reported outcomes measures (PROMs) have been developed.[2,3] PROMs can be divided into three categories; generic PROMs, such as the short form 36 (SF-36), which have been developed to assess health status and outcomes of patients. The purpose of these generic PROMs is to measure the well-being of an individual within certain dimensions, generally consisting of measures of physical function, social function and psychological function. Additionally, various disease specific PROMs, such as the PROMIS-Cancer measures have been used in practice as well.[3,4] Lastly, some PROMs focus merely on symptoms patients present themselves with, such as the Functional Assessment of Chronic Illness Therapy (FACIT) – Fatigue Scale.[5]

PROs in acute care are as important as they are for example in cancer care, where disease specific outcomes are integrated in specialised care pathways.[6] In the ED however, patients often come without a diagnosis, but only with signs and symptoms. Many hope to end their ED-visit with a diagnosis, which is seen as an essential step to fulfil other needs, such as an explanation for their symptoms and treatment.[7] Determining PROs for patients in the ED is difficult because patients can suffer from a wide variety of (possible) diagnoses and relevant outcomes can therefore be diverse. Especially in these patients, it is important to assess their perceived quality of care and health related quality of life.

The assessment of the quality of care is necessary in order to improve healthcare so that health care providers can gain insight into their performance and collect information concerning aspects of the care process which need improvement. PROMs

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can be used to provide feedback on the quality of care that is delivered. However, to do so, it is imperative these PROMs are scientifically sound, usable in the appropriate healthcare setting and easy to implement.[8] Especially in an acute care setting, where care is delivered at a high pace and patients with symptoms and illnesses are presenting themselves, there is a need for accurate patient centred outcome measurements. Considering the ED context, validated questionnaires could be used to detect patient groups with a higher risk for possible adverse outcomes, but also to improve the quality of care and therefore minimise this risk.

An evaluation of the methodological quality and clinical utility of PROMs which can be used in an ED- or/acute setting, utilising the COSMIN checklist, has not been reported to date. Therefore, a review concerning the quality of psychometric properties and clinical utility of PROMs used in an acute care setting, can provide useful insights for healthcare professionals interested in quality of care.

The objective of this scoping review is to identify PROMs used in acute care settings. Additionally, we plan to assess the psychometric properties, i.e. validity, reliability and responsiveness, of these PROMs with the ultimate goal of providing elaborate information and recommendations for the use of PROMs in daily practice and therewith improve patient-centred care in the ED.

Methods

Study design

We performed a scoping review on PROMs in acute care settings. The review was conducted according to Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines and the COSMIN methodology for systematic reviews of Patient-Reported Outcomes Measures.[9]

Eligibility criteria

The search was restricted to studies including PROMs and Patient Reported Experience Measures (PREMs) in acute medical care, i.e. including the specialties internal medicine, neurology, pulmonology, rheumatology, gastro-enterology and cardiology. PREMs were initially included to ensure completeness, while hypothesising that an overview of only PROMs might be limited. Studies concerning PROMs in acute paediatric-, trauma-, psychiatric- or obstetric care were excluded. This was done to minimise the heterogeneity and provide an overview of PROMs, primarily of use for acute physicians. Additionally, the article needed to meet the following criteria: 1) a description of psychometric properties of the PROMs, such as validity and reliability 2) the PROM was used or tested in Emergency Services, Emergency Department or Acute Medical Unit settings. In case of an author publishing more than one article on the same PROM, the article describing the PROM and its psychometric properties best, was included. Only articles written in English or Dutch with full-text availability were included.

In addition, bibliographies of relevant systematic reviews or overview articles identified during the search were also reviewed to identify additional relevant studies.

Information sources and search

The PubMed® (Medline Ovid) database was searched and the latest comprehensive search was conducted on the 19th of August 2020.

The search terms used for searching the database were 'Patient Reported Outcome Measures', 'Emergency Department', 'Emergency Services', 'Acute Medical Unit', 'psychometrics' and related synonyms. The search strategy and queries were developed by a biomedical information specialist for the PubMed® database. (See Appendix 1 for the complete syntaxes)

Study selection

Duplicates of articles were removed using EndNote for Windows (Thomas Reuters, version X9). Two investigators (EM and MV) independently screened all identified studies for inclusion based on title and abstract, making use of Rayyan QCRI.[10] Of the selected studies, the full-text was assessed by the same investigators. Any contrasting results in the selection process were discussed and solved by a third investigator (MK).

Data collection process and data items

The following data were extracted from each included article (if available): authors, year and journal of publication, country in which the study was performed, inclusion and exclusion criteria for the patient population, patient characteristics (e.g. sex, mean age), construct of the PROM, type of PROM (i.e. generic, symptom specific, disease specific), objective of the study, study setting. Data were extracted by two researchers (EM, MV).

Risk of bias in individual studies

The quality of the included PROMs was assessed according to the COSMIN methodology, using the Risk of Bias checklist.[9] This is a guideline that helps to provide a comprehensive overview of the quality (i.e. measurement properties) of instruments. Two researchers (EM, MV) independently assessed and scored the quality of all included PROMs. When data on measurement properties were not presented in the included study, an additional search (using

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the COSMIN database or Medline) on relevant validation studies was performed with the aim to minimise missings. Results based on prior validation studies are marked in the table presenting study quality. If any of these data was still missing, it was reported as not specified (NS). The risk of bias was assessed on the domains of study design, structural validity, internal consistency, cross-cultural validity, reliability, measurement error, criterion validity, construct validity and responsiveness. In case of incongruent results, deliberation with a third researcher (MK) took place and consensus was reached. A cross-check on the quality of the studies was performed by a third researcher (MK).

Data analysis

The primary outcome was to provide an overview of used PROMs in acute care settings. PROMs were categorised based on setting of use, type of PROM, study population and purpose (i.e. evaluation, discrimination or prediction). Additionally, evaluation of psychometric properties was presented with the aim of providing insight in the quality of the PROM.

Results

Study selection

The initial search provided 1407 articles, of which 336 were duplicates. The screening of 1071 abstracts led to the selection of 51 articles concerning patient reported measures which were used in an acute care setting. Following further screening of these articles, 23 articles were excluded because they concerned only patient reported experience measures (PREMs) instead of PROMs. Additionally, fourteen articles were excluded because these studies were not performed in an acute setting, or there was no PROM involved, or the article was not in English or Dutch, or because the article was describing a treatment validation study or the article was a review. Through snowballing of the reviews, two additional articles concerning PROMs were reviewed. Furthermore, two articles were excluded because full-text was not accessible. Eventually, 14 articles concerning various PROMs used in an acute care setting were included in the scoping review based on the predetermined inclusion criteria (Figure 1).

The included measures were the Adult Sickle Cell Quality of Life Measurement (ASQ-Me QOC),[11] Short-form Chronic Respiratory Disease Questionnaire (SF-CRQ),[12] Patient Health Questionnaire Somatic Symptom Severity Scale (PHQ-15),[13] Short Form Health Survey (SF-36), EQ-5D,[14] Verbal Dyspnoea rating scale (VDRS),[15] Acute Asthma Quality of Life Questionnaire (AQLQ),[16] visual analog scale (VAS),[17] Migraine Disability Assessment (MIDAS) questionnaire,[18] Nausea Profile,[19] Uncertainty Scale (U-scale),[20] Patient-reported Outcome Measurement at the Emergency Department (PROM-ED),[21] Roland-Morris Disability Questionnaire (RMDQ),[22] Poverty related quality of life (PQoL-17)[23] and the Dyspnoea Descriptor Questionnaire (DDQ).[24]

Study characteristics of acute care PROMs

The study characteristics regarding the included PROMs are shown in Table 1. The various PROMs are quite evenly distributed among three categories; six PROMs are generic (PHQ-15, SF-36, EQ-5D, PROM-ED, PQoL-17, U-scale), five PROMs are disease specific (ASQ-Me QOC, SF-CRQ, AQLQ, MIDAS, RMDQ), and four PROMs are symptom-

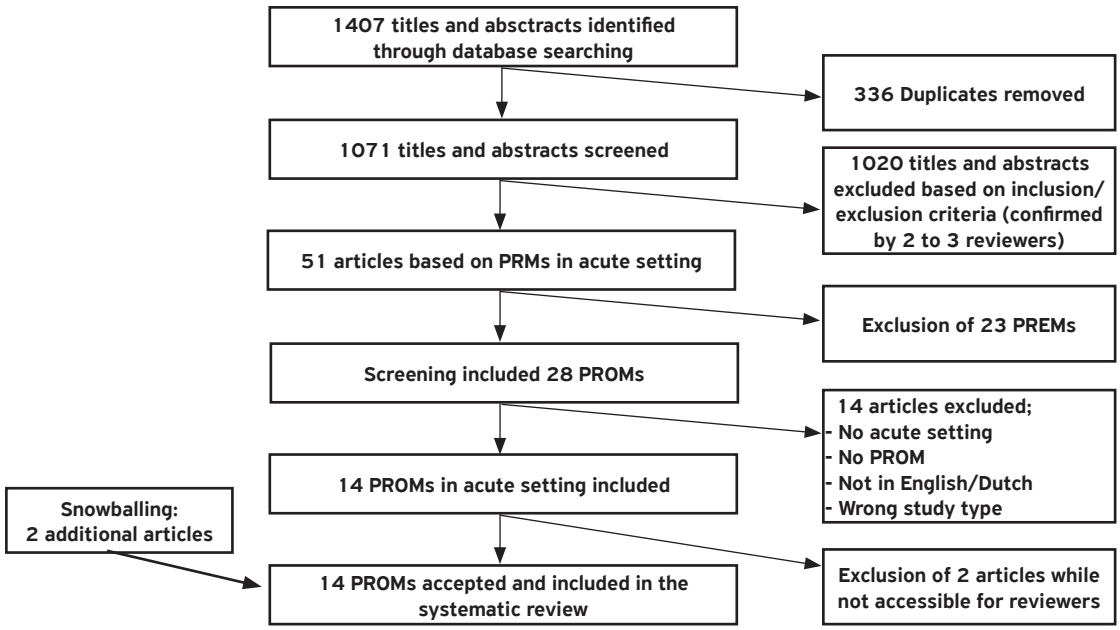


Figure 1. Flow diagram for the included PROMs in an acute setting

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Table 1. Description and characteristics of PROMs evaluated

Measure	Study	Population/Description	Purpose	Country
Generic				
Poverty related quality of life (PQoL-17)	Boyer, 2014	*Population:* 619 patients, mean age 38.3 years old. A 17 item questionnaire used for detecting vulnerable patients, describing seven dimensions of poverty related quality of life (QOL); self-esteem/ vitality, psychological well-being, relationships with family, relationships with friends, autonomy, physical well-being/access to care, future perception). All items are rated on a 5 point Likert scale with higher scores indicating a better perceived health-related QOL.	Predictive	France
Patient Health Questionnaire (PHQ-15)	Hyphantis, 2014	*Population:* 303 patients, age ranged from 18 to 92 years old with an median age of 73 yearsold. A 15-item questionnaire designed to assess somatic symptom severity. The PHQ-15 inquires about 15 somatic symptoms or symptom clusters that account for more than 90% of the physical complaints (other than upper respiratory) reported in the outpatient setting. Symptoms are rated on a 0-2 Likert Scale, so total score ranges from 0 to 30. Higher scores indicate higher levels of somatisation.	Evaluative	Greece
Short Form Health Survey (SF-36) & EuroQol-5D (EQ-5D)	Tsounis, 2013	*Population:* 108 patients, mean age 65.4 years old SF-36: A 36-item health related quality of life (HRQOL) measure with 8 scales; physical and social functioning, physical and emotional role, bodily pain, general and mental health, and vitality. Items are rated on Likert scales and raw scores are linearly transformed into 0 to 100 scales with higher transformed scores indicating better HRQOL. ED-Q5: A two-part descriptive, generic instrument. The first part consists of five dimensions of health: mobility, self-care, usual activities, pain/discomfort and anxiety/depression, rated on a 3 point Likert-scale. The second part consist of a visual analogue scale, where patients rate themselves in order to capture variations in health status. Scores can be converted by an algorithm, with higher scores indicating a higher level of self-reported well-being.	Evaluative Evaluative	Greece
Patient-reported Outcome Measurement at the Emergeny Department (PROM-ED)	Vaillancourt, 2020	*Population:* 444 patients, mean age 60.4 years old. A 22-item questionnaire measuring patient-centred outcomes of importance to patients receiving care in the ED, covering four domains (symptom relief, understanding, reassurance and having a plan). It allows patients to report on outcomes that are important to them. Patients score on 4 or 5 Likert-scales, with higher scores indicating a higher satisfaction/better experience on these specific domains.	Evaluative	Canada
Uncertainty Scale (U-scale)	Rising, 2018	*Population:* 156 patients, aged between 18 and 29 years old. A 30-item questionnaire to measure uncertainty in patients that may result in individuals' decision to seek care. It covers seven domains: diagnosis and severity, self-treatment for symptoms, psychosocial concerns, trust, treatment quality, care accessibility and finances. Questions are rated on a 5-point Likert-scale, with higher scores indicating a higher level of uncertainty.	Evaluative	USA
Disease specific				
Adult Sickle Cell Quality of Life Measurement (ASQ-Me QOC)	Evensen, 2016	*Population:* 556 patients, most were between ages of 18 and 34 years old. 18% aged 45 years and older, no maximum age defined. A 27-item questionnaire measuring patient self-reported experiences of quality of care (across care-settings and over time), covering four domains (Access to care, provider communication, ED-care, ED pain treatment). Higher scores indicate better outcomes)	Evaluative	USA
Roland-Morris Disability Questionnaire (RMDQ)	Friedman, 2015	*Population:* 322 patients, mean age 38 years old. A 24-item health status questionnaire, covering aspects of physical and mental function who are likely to be affected by low back pain. Patients check yes/no at each item, items are not weighted. Scores range from 0 to 24 with higher scores indicate a higher disability due to lower back pain.	Evaluative	USA

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Measure	Study	Population/Description	Purpose	Country
Disease specific				
Acute Asthma Quality of Life Questionnaire (AQLQ)	Juniper, 2003	*Population:* 88 patients, median age 44 years old. An 11-item questionnaire measuring self-reported functional items in patients who are presenting with an acute asthma exacerbation, consisting of two domains; symptoms and emotions. It is interview administered wherein patients are asked about how they have felt during the previous half hour, scoring a 0-7 Likert scale at each question. Lower scores indicate a higher level of distress. It can be used to evaluate the effectiveness of interventions.	Evaluative	Canada
Verbal Dyspnoea Rating Scale (VDRS)	Saracino, 2008	*Population:* 253 patients, mean age 60.6 years old. A measure of the severity of shortness of breath (SOB) in patients presenting at the ED, by asking one verbal question 'On a scale from 0 to 10 how bad is your SOB?' With zero being no SOB and 10 the worst SOB they could ever imagine.	Evaluative	Australia
Short-form Chronic Respiratory Disease Questionnaire (SF-CRQ)	Tsai, 2007	*Population:* 301 patients, median age 69 years old An 8-item questionnaire to measure short term quality of life (QOL) changes in patients with COPD exacerbations, consisting of multiple domains: dyspnoea, fatigue, emotional function and mastery. Symptoms are rated on a 7 point Likert-scale with lower scores indicating a lower health-related QOL and sense of well-being.	Evaluative	USA & Canada
Symptom specific				
Migraine Disability Assesment (MIDAS) questionnaire	Aliprandi, 2004	*Population:* 45 patients, mean age 38 years old. A 5-item questionnaire in which patients score the days they had headache-associated complaints. Higher scores correlate with a higher burden of symptoms.[44]	Evaluative	Italy
Nausea Profile	Cloutier, 2010	*Population:* total of 536 patients of the two descripted phases, mean age 39 years old A 10-item multifactorial nausea scale, in which both physical and psychological symptoms are measured. The physical scale is a direct measure of physical symptoms of nausea, and on the other hand the psychological scale measures other aspects of the nausea experience. These scales are independent and can be used together or separately. Patients score each item on Likert scales ranging from 0-10, with higher scores indicating a higher level of nausea-experience. It can be used to evaluate the effects of therapy.	Evaluative	USA
Visual analog scale (VAS)	Gallagher, 2001	*Population:* 101 patients, mean age 40 years old A visual analog scale indicating pain severity on a 100mm scale to measure the intensity of acute abdominal pain. Patients are asked to rate their pain severity by placing a vertical mark on the horizontal VAS.	Evaluative	USA
Dyspnoea descriptor questionnaire (DDQ)	Parshall, 2001	*Population:* 34 patients, mean age 64 years old. A 13-item questionnaire consisting of dyspnoea descriptors, subjective items of which the patient is asked to endorse. Symptoms are rated on a 10 point Likert-scale, with higher scores indicating a more severe sensation of dyspnoea.	Evaluative	USA

specific (VDRS, VAS, Nausea profile, DDQ). Generic PROMs measure the functional health and well-being of patients within certain domains, such as physical, psychological and social functioning, general health and vitality. The SF-36 is the most comprehensive generic PROM, additionally the EQ-5D and the PQoL-17 cover various areas important for health-related quality of life. The PQoL-17 differs from the SF-36 and the EQ-5D because its objective is to identify poverty and adapt patient care accordingly. Therefore, the PQoL-17 is a screening tool and not evaluative as the other generic PROMs. Furthermore, the PHQ-15 and the U-scale are also generic PROMs, but instead of evaluating quality of life in general, the purpose of these measures is more narrowed. The U-scale measures the inability of patients to determine the meaning of illness-related events. The PHQ-15 inquires about 15

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somatic symptoms or symptom clusters that account for more than 90% of the physical complaints reported in the outpatient setting. Another generic PROM, but especially developed for an ED-setting is the PROM-ED. It measures outcomes within four domains, determined as important for patients presenting in the ED. The disease specific PROMs are focused on sickle-cell disease (ASQ-Me QOC), chronic obstructive pulmonary disease (SF-CRQ), asthma (AQLQ), migraine (MIDAS) and lower back pain (RMDQ). The ASQ-Me QOC assesses the access and quality of adult sickle cell care. In contrast, the SF-CRQ, the MIDAS and the RMDQ all evaluate the grade of disability patients experience due to their disease. Additionally, the SF-CRQ evaluates the amount of distress patients experience due to an acute asthma exacerbation. When we assess the symptom specific PROMs, they are focused on nausea (Nausea profile), dyspnoea (DDQ and VDRS) and acute abdominal pain (VAS). All these PROMs aim to evaluate the severity of the symptoms patients experience.

Furthermore, the number of items on each PROM ranged from 1 (VDRS, VAS) to 36 (SF-36), with various subscales and possibilities to rate or answer these items. Most of the PROMs use a Likert scale, sometimes combined with open-ended questions or yes/no answer possibilities. In addition, some PROMs used a thermometer scale (VAS, MIDAS, EDQ-5D). These various response scales have been widely accepted for their use in PROMs.[25,26]

Quality assessment – psychometric properties

The results of the quality assessment of the evaluated PROMs based on the COSMIN criteria are demonstrated in Table 2. A brief explanation concerning the concepts in evaluating quality of PROMs, based on content validity, construct validity, structural validity, reliability, internal consistency and responsiveness, is presented in Table 3. Out of the 14 reviewed articles, three PROMs were found to be adequate to good on all domains. These publications concerned the SF-36, the EQ-5D and the PROM-ED. Of the remaining 11 studies, we found inadequacies in one or more domains. The structural validity was not described for five PROMs (VRDS, VAS, AQLQ, MIDAS, RMDQ) and the internal validity was not described for four PROMs (VRDS, VAS, AQLQ, MIDAS). It is important to mention that the VRDS and VAS are unidimensional measurement tools. Therefore, their structural validity and internal consistency cannot be assessed.

The construct validity and responsiveness were deemed adequate to good in most reviewed

Table 2. Evaluation of psychometric properties according to the COSMIN criteria of PROMs

Measure	Study	Structural/ Unidimen-sional	COSMIN General design	COSMIN content validity	COSMIN structural validity	COSMIN internal consistency	COSMIN Reliability	COSMIN responsive-ness	COSMIN Construct validity
Generic									
Poverty related quality of life (PQoL-17)	Boyer, 2014	Structural	+/-	+/-	+	++	NS	++	++
Patient Health Questionnaire (PHQ-15)	Hyphantis, 2014	Structural	+/-	NS	+	+	+	++	+
Short Form Health Survey (SF-36) & EQ-5D	Tsounis, 2013	Structural	+	NS	+	+	NS	+	+
Patient-reported Outcome Measurement at the Emergeny Department (PROM-ED)	Vaillancourt, 2020	Structural	+	NS	++	++	+	+	NS
Uncertainty Scale (U-scale)	Rising, 2018	Structural	+/-	+/-	+	++	NS	+	+

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Measure	Study	Structural/ Unidimen-sional	COSMIN General design	COSMIN content validity	COSMIN structural validity	COSMIN internal consistency	COSMIN Reliability	COSMIN responsive-ness	COSMIN Construct validity
Disease-specific									
Adult Sickle Cell Quality of Life Measurement (ASQ-Me QOC)	Evensen, 2016	Structural	+/-	+/-	++	++	NS	NS	NS
Roland-Morris Disability Questionnaire (RMDQ)	Friedman, 2015	Structural	+/-	-	NS	+	+	+	++
Acute Asthma Quality of Life Questionnaire (AQLQ)	Juniper, 2003	Structural	+/-	NS	NS	++	-	++	++
Verbal Dyspnoea Rating Scale (VDRS)	Saracino, 2008	Unidimensional	+	NS	NA	NS	+/-	++	++
Short-form Chronic Respiratory Disease Questionnaire (SF-CRQ)	Tsai, 2007	Structural	+/-	NS	+/-	++	+/-	++	+
Symptom-specific									
Migraine Disability Assesment (MIDAS) questionnaire	Aliprandi, 2004	Structural	+/-	NS	NS	NS	-	+	+
Nausea Profile	Cloutier, 2010	Structural	+/-	NS	++	+	NS	NS	NS
Visual analog scale (VAS)	Gallagher, 2001	Unidimensional	+	NS	NA	NS	+	NS	NS
Dyspnoea descriptor questionnaire (DDQ)	Parshall, 2001	Structural	+/-	+/-	+/-	+	-	NS	NS

Quality graded as follows; inadequate; -, doubtful; +/-, adequate; +, good; ++. NA; not applicable, NS; not specified.

Table 3. Explanation of concepts regarding quality of PROMs

Concept	Meaning
Content validity	The degree to which the content of a PROM is an adequate reflection of the construct to be measured
Construct validity	The degree to which a PROM measures the construct(s) it purports to measure
Internal consistency	The degree of the interrelatedness among the items
Structural validity	The degree to which the scores of a PROM are an adequate reflection of the dimensionality of the construct to be measured
Reliability	The proportion of the total variance in the measurements which is due to 'true' differences between patients
Responsiveness	The ability of a PROM to detect change over time in the construct to be measured

From: COSMIN manual for systematic reviews of PROMs[9]

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PROMs. However, five and four PROMs could not be evaluated within these domains respectively, while no description was provided concerning the construct validity and responsiveness.[11,17,19,21,24]

Content validity was inadequate in one study (RMDQ) as the content was not assessed in an acute care setting. In four PROMs (U-scale, PQoL-17, DDQ, ASQ-Me QOC) the content validity was deemed doubtful and not described in the other nine articles.[12-19,21] The AQLQ, the MIDAS and the DDQ have an inadequate reliability, while no repeated measurements were carried out or patients were unstable in the interim period of the measurements.

Furthermore, the study population is also of importance for the quality of the study and therefore the validity of the PROM. Most of the studies have a suitable patient population to assess the measurement tool in an acute setting. However, two studies appear to have a small study population with the inclusion of respectively 45 patients (MIDAS) and 34 patients (DDQ). While the difference in study population size might stand out, it is important to address whether this has any consequences for the validity of the study. The evaluation of the descriptors of the dyspnoea descriptor questionnaire has been done qualitatively, therefore a study population of 34 patients is good. The MIDAS study has enrolled 45 patients for a quantitative study which is deemed low. Furthermore, the gender of the study populations of the PROMs was evenly distributed with a slight proclivity to the female gender. Lastly, the mean age of eight of the PROMs is below 45 years of age, the other six PROMs have been evaluated in a study population with a mean age of 60 years and above.

Discussion

This is the first scoping review to assess PROMs in an acute care setting utilising the COSMIN checklist. The use of PROMs in an acute setting is limited, even though the introduction of value-based healthcare created a need for transparency of healthcare quality aiming to increase value for patients. Value should always be defined around the customer in a well-functioning health care system, therefore value in health care is measured by the outcomes achieved, relevant for patients [27]. Especially in an acute care setting, where an ED visit can be considered as a stressful life event and is associated with adverse effects on the patient's mental and emotional state, is it important to understand the patients views on the outcomes of received care and perceived health-related quality of life [28]. In addition, there is evidence that the use of PROMs in clinical practice could enhance communication between patients and their clinicians.[29,30]

PROMs are multidimensional measurement tools and can be used to measure a great variety of concepts, which consist of several domains. Response scales (VAS, VRDS) also provide insight on the patients' well-being, yet are strictly not PROMs but unidimensional measurement tools that can be used to indicate a specific aspect or dimension within a PROM. A PROM can be used as an evaluative, descriptive or predictive measure, depending on the setting and the outcome of interest. In daily practice, clinicians need to consider which PROM is most applicable based on the category and objective of the PROM and its validity. However, the importance of suitability of the target population and patient acceptability of the PROM must not be overlooked. A PROM needs to be a relevant, comprehensive and comprehensible tool for patients in the setting in which it will be used to optimise content validity. Therefore, it is advised to involve patients in the development and selection of PROMs used in daily practice or research.[31]

When evaluating the quality of PROMs based on the COSMIN-checklist, only three PROMs were deemed adequate to good on all domains. By chance, these were only generic PROMs (PROM-ED, SF-36 and EQ-5D). The PROM-ED focusses on assessing specific domains within the heterogeneous ED-population, namely understanding the diagnosis, having a plan, symptom relief and reassurance. The SF-36 and EQ-5D are widely used generic PROMs evaluating health-related quality of life, initially developed in chronic care but appear to be of adequate use in acute care settings. Consequently, methodological issues were present in the majority of the PROMs included in this review. These issues included: missing information on measurement error, a lack of prior described hypotheses and non-reporting on the domains content-validity, reliability and construct validity. Therefore, some generic PROMs (PQoL-17, PHQ-15 and the U-scale), the disease specific PROMs and symptom specific PROMs, need further validation testing in order to address the identified gaps. These issues are in line with other reviews of PROMs for specific health conditions.[32-34]

Regarding reliability testing, we noticed lacking reports on this domain, which may be a consequence of the challenge in executing reliability testing in acute care settings. For example, patients in the DDQ-study were unstable in the interim period of the two measurements. Patients were asked to fill out the DDQ twice at the ED, once based on their recollection of health status one week before the ED visit, once based on how they were feeling at that moment in time. It is probable that patients went to the ED because of a clinical worsening of their symptoms and therefore were not stable between the two measurements. The principle of reliability is that

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applying the PROM in different occasions produces similar results.[35] However, in acute care, health outcomes can change rapidly which may hamper the results of test-retesting as patients are not stable over time. Gallagher *et al*, showed that performing test-retest reliability by asking the same question within 2 minutes time is possible,[17] although, it is questionable if this timeframe can be considered adequate for the purpose of evaluating the reliability of a PROM.

Furthermore, the assessment of content validity for most of the PROMs used in acute care settings could not be performed, while no information concerning the relevance, comprehensiveness and comprehensibility for patients and healthcare professionals was described. Content validity is vital for the development and use of PROMs, while it ensures that the PROM actually measures the concept of interest which it intends to measure. It appears that the minimal focus on content validity is not only apparent in PROMs for acute settings and is often not considered while developing PROMs.[36-39] The lack of PROMs with well described and adequate content validity remains a hurdle in the use of PROMs in acute care, while content validity is one of the most important psychometric properties of a PROM and has great impact on the overall validity.

Limitations

A limitation of this review is that studies in which psychometric properties were not described, were excluded. Therefore, the overview of PROMs evaluated in acute care settings, provided in this scoping review might be incomplete. For example, no studies concerning the use of PROMs in Acute Admission Units described psychometric properties. A feasibility study concerning the use of PROMs in Acute Admission Units was executed with positive results, but this study was not found in our search while no psychometric properties were mentioned [40]. Additionally, submitted articles concerning PROMs in acute care settings were also not included in our search. Hence, the PRMs-Acute Care which is developed based on five relevant PROs and recently tested on validity in an acute care setting, is not included in this scoping review.[41,42]

Recommendations

We believe that the use of PROMs in an acute care setting is important in order to improve patient-centredness and the quality of care. The generic PROMs developed for or assessed in acute care settings, such as the PROM-ED, SF-36 or EQ-5D, can be used in daily practice as these are suitable for patients with various symptoms and diseases. However, the development of generic acute care focused PROMs needs attention while it is still in its infancy. PROMs such as the PROM-ED and the recently developed PRM-acute care, may be promising measures to evaluate the quality of health care and may be suitable for a broader implementation in acute care.

Disease or symptom specific PROMs can be of great value for specific patient groups in acute care settings. Our review shows that the description of the psychometric properties and therefore the validity of these PROMs in an acute setting is inadequate at this moment. Further evaluation of these PROMs in an acute setting is needed to improve their usefulness and implementation. .

When developing PROMs for acute care, the content validity needs to be established as proposed by the COSMIN guidelines. Involving patients in determining relevant PROs and development of PROMs is of major importance, because PROMs focus on outcomes relevant for patients, which cannot be defined by healthcare professionals or researchers.

Conclusion

This review provides a comprehensive summary of the characteristics and quality of various PROMs available in an acute care setting. The identified PROMs are generic, disease specific or symptom specific. At this moment only a few PROMs of adequate quality are available in an acute care setting, all of which are generic. These PROMs have evaluative purposes, which makes them even more applicable to evaluate health-related quality of life or perceived quality of acute care. The implementation of PROMs, when suitable for patient groups in acute care settings, will improve the quality of healthcare as perceived by patients.

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Declaration of interests

The authors declare they have no competing interests.

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Appendix 1. Search method

Search	Query
#6	Search: **#4 AND #5**
#5	Search: **psychometrics[MeSH Terms] OR psychometric*[Title/Abstract]**
#4	Search: **#3 NOT ((“Adolescent”[Mesh] OR “Child”[Mesh] OR “Infant”[Mesh] OR adolescen*[tiab] OR child*[tiab] OR schoolchild*[tiab] OR infant*[tiab] OR girl[tiab] OR girls[tiab] OR boy[tiab] OR boys[tiab] OR teen[tiab] OR teens[tiab] OR teenager*[tiab] OR youth*[tiab] OR pediatr*[tiab] OR paediatr*[tiab] OR puber*[tiab]) NOT (“Adult”[Mesh] OR adult*[tiab] OR man[tiab] OR men[tiab] OR woman[tiab] OR women[tiab]))**
#3	Search: **#1 AND #2**
#2	Search: **“Patient Reported Outcome Measures”[Mesh] OR “Quality of Life”[Mesh] OR prom[tiab] OR proms[tiab] OR pro[tiab] OR pros[tiab] OR HRQL[tiab] OR HRQoL[tiab] OR QL[tiab] OR QoL[tiab] OR quality of life[tiab] OR life quality[tiab] OR health index*[tiab] OR health indices[tiab] OR health profile*[tiab] OR health status[tw] OR ((patient[tiab] OR self[tiab] OR child[tiab] OR parent[tiab] OR carer[tiab] OR proxy[tiab]) AND ((report[tiab] OR reported[tiab] OR reporting[tiab]) OR (rated[tiab] OR rating[tiab] OR ratings[tiab]) OR based[tiab] OR (assessed[tiab] OR assessment[tiab] OR assessments[tiab]))) OR ((disability[tiab] OR function[tiab] OR functional[tiab] OR functions[tiab] OR subjective[tiab] OR utility[tiab] OR utilities[tiab] OR wellbeing[tiab] OR well being[tiab]) AND (outcome[tiab] OR outcomes[tiab] OR index[tiab] OR indices[tiab] OR instrument[tiab] OR instruments[tiab] OR measure[tiab] OR measures[tiab] OR questionnaire[tiab] OR questionnaires[tiab] OR profile[tiab] OR profiles[tiab] OR scale[tiab] OR scales[tiab] OR score[tiab] OR scores[tiab] OR status[tiab] OR survey[tiab] OR surveys[tiab]))**
#1	Search: **“Emergency Service, Hospital”[Mesh:NoExp] OR emergenc*[tiab] OR acute medical unit*[tiab] OR acute admission unit*[tiab]**

AND

Search	Query
#5	Filter: validation study
#4	Search: #3 NOT ((“Adolescent”[Mesh] OR “Child”[Mesh] OR “Infant”[Mesh] OR adolescen*[tiab] OR child*[tiab] OR schoolchild*[tiab] OR infant*[tiab] OR girl[tiab] OR girls[tiab] OR boy[tiab] OR boys[tiab] OR teen[tiab] OR teens[tiab] OR teenager*[tiab] OR youth*[tiab] OR pediatr*[tiab] OR paediatr*[tiab] OR puber*[tiab]) NOT (“Adult”[Mesh] OR adult*[tiab] OR man[tiab] OR men[tiab] OR woman[tiab] OR women[tiab]))
#3	Search: #1 AND #2
#2	Search: “Patient Reported Outcome Measures”[Mesh] OR “Quality of Life”[Mesh] OR prom[tiab] OR proms[tiab] OR pro[tiab] OR pros[tiab] OR HRQL[tiab] OR HRQoL[tiab] OR QL[tiab] OR QoL[tiab] OR quality of life[tiab] OR life quality[tiab] OR health index*[tiab] OR health indices[tiab] OR health profile*[tiab] OR health status[tw] OR ((patient[tiab] OR self[tiab] OR child[tiab] OR parent[tiab] OR carer[tiab] OR proxy[tiab]) AND ((report[tiab] OR reported[tiab] OR reporting[tiab]) OR (rated[tiab] OR rating[tiab] OR ratings[tiab]) OR based[tiab] OR (assessed[tiab] OR assessment[tiab] OR assessments[tiab]))) OR ((disability[tiab] OR function[tiab] OR functional[tiab] OR functions[tiab] OR subjective[tiab] OR utility[tiab] OR utilities[tiab] OR wellbeing[tiab] OR well being[tiab]) AND (outcome[tiab] OR outcomes[tiab] OR index[tiab] OR indices[tiab] OR instrument[tiab] OR instruments[tiab] OR measure[tiab] OR measures[tiab] OR questionnaire[tiab] OR questionnaires[tiab] OR profile[tiab] OR profiles[tiab] OR scale[tiab] OR scales[tiab] OR score[tiab] OR scores[tiab] OR status[tiab] OR survey[tiab] OR surveys[tiab]))
#1	Search: “Emergency Service, Hospital”[Mesh:NoExp] OR emergenc*[tiab] OR acute medical unit*[tiab] OR acute admission unit*[tiab]

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