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Clinical indicator prioritisation for the ACTMed trial: a modified nominal group technique approach for primary care research in the electronic age

Andrew Donald[A,*], Nicolette Ellis[B], Esa Chen[C], Richard Violette[D], Lisa Nissen[E] and Jean Spinks[D]

For full list of author affiliations and declarations see end of paper

***Correspondence to:**
Andrew Donald
Department of General Practice and Primary Care, University of Melbourne, Melbourne, Vic 3010, Australia
Email: andrew.donald@unimelb.edu.au

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ABSTRACT

Background. The nominal group technique has been shown to be an effective method for reaching consensus among a group of healthcare experts when selecting clinical indicators for application in primary care research, especially where there are competing prioritisation criteria being considered. In the context of manifest barriers to traditional face-to-face meetings, and with the advent of evolving and improved digital tools, alternative approaches are being more commonly utilised to overcome these challenges. In this study, we sought to prioritise a set of existing, validated clinical indicators proposed for inclusion in ACTMed (ACTivating primary care for MEDicine safety), a clinical trial aiming to reduce medicine-related harm in primary care. **Methods.** A modified nominal group technique, using a fully online approach, was employed to facilitate consensus among a group of pharmacists and general practitioners. Quantitative data were obtained using an online survey platform both prior to the structured virtual forum and again following group discussion. Qualitative material was gathered from written feedback included in the pre-forum questionnaire and through verbal contributions made during the online forum. **Results.** The highest priority indicators determined by the two-staged survey process were for myocardial ischaemia, cerebrovascular ischaemia related to atrial fibrillation, heart failure, asthma/chronic obstructive pulmonary disease and falls with fracture. Qualitative reasoning behind the participants' evaluation of the clinical indicators included value for money, impact of the intervention, consequences of clinical outcomes and ability to implement the intervention in practice. **Conclusions.** In this study, the interactive component of the nominal group technique process had little impact on the final prioritisation of the clinical indicators. Potential explanations for this might include previously established strong participant views and preferences or relative group homogeneity based on similar learning, research or clinical experience.

Keywords: clinical indicators, co-design, electronic, medication-related problems, nominal group technique, pharmacy, primary care, prioritisation, quality improvement.

Introduction

The most common intervention undertaken by general practitioners (GPs) in clinical practice is medication prescribing (Britt *et al.* 2010), which, when undertaken appropriately and safely, generally provides benefit to patient health. Adverse events and errors associated with GP prescribing can result in serious negative health outcomes including potentially preventable hospitalisations (Roughead *et al.* 2013). Factors that have been identified as contributing to these medication-related problems include missing information, inconsistencies and errors in electronic medical records (EMRs), complex co-morbidities and medication regimens, barriers to sharing of prescribing information, involvement of multiple prescribers or dispensers by patients and medication non-adherence (Elliott and C. Booth 2014; Spinks *et al.* 2023). Medicine safety and quality use of medicines (QUM) has been established as the 10th National Health Priority Area by

the Council of Australian Governments (COAG) in recognition of the need to promote measures to reduce medicine-related harms (Pearson *et al.* 2021).

The ACTMed (ACTivating primary care for MEDicine safety) trial involves an innovative approach that seeks to improve medicine safety in primary care through expanded collaboration and facilitated team-based interactions between patients attending general practice, pharmacists, GPs and other health practitioners (Spinks *et al.* 2023). The ACTMed study aims to reduce risks of medicine-related harm for the purpose of improving health outcomes for patients while also lessening healthcare system costs. ACTMed seeks to enhance patient-centred care while streamlining workflows for practitioners by using an interactive real-time electronic dashboard, along with financial incentives, to facilitate participation of pharmacists within both mainstream practices as well as Aboriginal and Torres Strait Islander Community Controlled Organisations (ACCHOs). Pharmacists will operate within these primary care settings using a practice-based protocol that detects and enables the triage of at-risk patients identified by clinical indicator algorithms applied by the novel Future Health Today (FHT) software platform. FHT is a clinical decision support system (CDSS) that sits alongside the EMR system within the primary care setting and supports the identification and management of a range of chronic medical conditions (Hunter *et al.* 2023).

For the ACTMed trial, selection of a limited and pragmatic suite of prioritised clinical indicators from a much larger set of established, validated clinical indicators proposed for inclusion was required. Prioritising relevant and meaningful indicators for quality improvement (QI) purposes in primary care can be challenging. Evidence of practice-level QI benefit has been demonstrated for a variety of healthcare interventions in primary care, including for measures of prescribing, computerised advice and point-of-care reminders (Irwin *et al.* 2015). Participation in the development of relevant QI activities has been included in the ACTMed trial as a method for promoting better GP engagement by employing their expertise in a co-design process to assist with prioritisation of targets for medication safety improvement activities. This provides an opportunity for participating GPs to help shape the QI agenda by considering the topics of medicine safety that they consider to be most important and relevant to their practice, with the aim of enhancing commitment to QI processes. To engage GPs in this QI process, barriers to participation need to be acknowledged and addressed. Such barriers may include concerns about lack of available time, interruption to workflow, limited access to appropriate information technology tools, insufficient commitment to cultural change, absence of incentives and additional costs associated with QI involvement (Dawda *et al.* 2010; Biezen *et al.* 2021). The demands created by the limited time and resources available to GPs, especially those related to work away from direct patient care (Brown *et al.* 2021), suggest the need for careful consideration as to where these resources are likely to prove most effective. This should involve choosing targets that not only improve health outcomes, but that also appeal to the intrinsic motivation of GPs, as it will require more effort than 'everyday work'. It is therefore important to capture the attention of GPs by identifying clinical indicators that can be viewed as having the capacity to create the most substantial benefits to patient care.

Clinical indicators have been described as 'explicitly defined and measurable items referring to the structures, processes or outcomes of care' (Campbell *et al.* 2003). They are often used to guide healthcare processes that are assumed to be on pathways related to health outcomes and act as vital components for QI practices (The Royal Australian College of General Practitioners 2015). Indicators need to be evidence-based, either derived from scientific literature or, where this is not available, determined through consensus by an expert panel based on their knowledge and experience (Mainz 2003). When combining evidence and expert opinion, systematic or non-systematic approaches can be employed to accomplish the development of such indicators (Campbell *et al.* 2003). There are a variety of systematic methods that can be applied in these circumstances, including 'brainstorming' groups (Stewart and Shamdasani 2014), focus groups (Stewart and Shamdasani 2014), consensus development conferences (McGlynn *et al.* 1990), iterative consensus rating procedures (Campbell *et al.* 2003), Delphi technique (Boulkedid *et al.* 2011), RAND appropriateness method (Fitch *et al.* 2000) and the Nominal Group Technique (NGT) (Van de Ven and Delbecq 1972). These methods are frequently applied to the investigation of healthcare related priorities in primary care settings from both consumer and professional perspectives (Gallagher *et al.* 1993; Edwards *et al.* 2019).

The NGT is a widely accepted decision-making approach for reaching consensus within a group of experts using a highly structured, facilitator-led discussion for the generation of ideas and rating of group judgements (Van de Ven and Delbecq 1972). It was originally developed by business academics as a method to allow equal opportunity for participation and discussion and to avoid undue influence from dominant individuals. The NGT approach has subsequently been applied for use in determining research priorities, QI and clinical guidelines in primary care (Gallagher *et al.* 1993; Campbell *et al.* 2003; Sarre and Cooke 2009; Søndergaard *et al.* 2018; Edwards *et al.* 2019). Advantages of the NGT as a consensus method in primary care include its flexibility and capacity for modification, along with a structured supportive format that assists in facilitating a familiar collegial approach that is particularly suited to general practice and is inclined to produce results that are practice-based and readily applicable (Gallagher *et al.* 1993; Gill *et al.* 2012; Søndergaard *et al.* 2018). The NGT process provides both qualitative and quantitative data for analysis. Although the NGT is primarily a qualitative research

technique, the rating process also allows for a mathematical exploration of the numerical outcomes provided by the participants in the pre-forum NGT ranking survey as well as the final scoring survey.

Ultimately, a modified NGT approach involving a composite of GPs and pharmacists was chosen as the preferred method to finalise the required set of prioritised clinical indicators for the ACTMed trial. This method was selected by the ACTMed trial researchers based mainly on time constraints, the approach's flexibility for modification and its suitability as a format for involving practitioners separated by substantial geographical distances.

The aim of this current research was to prioritise a list of QI clinical indicators for application in a clinical trial involving medicine safety with a secondary aim of evaluating an entirely online NGT process by which pharmacists and GPs came to reach consensus.

Methods

An initial shortlist of 35 potential clinical indicators for consideration in the ACTMed trial was selected from previous studies investigating the prevalence of potentially preventable medication-related hospitalisations (PPMRHs) among elderly Australian veterans and Aboriginal and Torres Strait Islander peoples (Kalisch *et al.* 2012; Caughey *et al.* 2014; Spinks *et al.* 2019). After consultation with the ACTMed project steering committee, two additional indicators were included, and seven were removed from the list, leaving a total of 30 clinical indicators for further consideration. This shortlist is presented in Supplementary Appendix S1. For application in the proposed ACTMed stepped wedge randomised controlled trial, refinement of the proposed clinical indicators to a final five for deployment in the electronic dashboard was required. After review and deliberation by the research team, 12 indicators were selected for presentation to an expert panel comprising GPs and pharmacists, with the aim of finding consensus around the indicators for inclusion in the trial. These 12 indicators are presented in Table 1.

NGT format modification

The NGT format has traditionally involved structured face-to-face meetings lasting between 1 and 2 hours and generally comprising groups of 2–14 participants (McMillan *et al.* 2016). These meetings have consisted of six key phases: silent generation of ideas in writing; round-robin recording of ideas; discussion and clarification of ideas; ranking of ideas; discussion of the vote; and re-ranking and rating of the top ideas (Van de Ven and Delbecq 1972; Gallagher *et al.* 1993).

Now, in the current climate of an electronic age and the advent of the COVID-19 pandemic, adaptation of the traditional NGT process was necessary. In this study, a modified form of NGT was employed to help overcome barriers of distance, COVID-19 pandemic impacts and the timely availability of practitioners. A fully electronic process was utilised in this study, commencing with emailed invitations and a Doodle™ poll link for determining participant availability, followed by electronic distribution of NGT consent forms, clinical indicator background information and a hyperlink to a SurveyManager© online pre-forum NGT ranking questionnaire. The NGT forum itself was hosted virtually on Microsoft Teams© and a second online rating questionnaire was employed towards the final stages of the NGT forum using the same SurveyManager© online platform. Real-time processing of quantitative rating data was undertaken using Microft Excel©. Honorarium payments were provided to participants using electronic gift cards. Qualitative thematic analysis was performed using NVivo© software.

Recruitment

Twenty-eight primary healthcare practitioners, comprising five pharmacists and 23 GPs, were invited via email to participate in the NGT forum. These invitees were purposively sampled (Smith *et al.* 2024) from members of a university department primary care advisory group and from professional networks already connected with practitioner researchers involved in the ACTMed trial. Thirteen respondents expressed their interest in participating in the forum by completing the online Doodle™ availability poll. One pharmacist who works with remote communities in a Queensland ACCHO was recruited purposively by the research team. The forum was co-facilitated by a pharmacist and a GP in keeping with the collaborative nature of the trial and to support continuity of the NGT process while data collection and calculations were being managed in real-time. Under the usual NGT format, face-to-face time would be available for 'the silent generation of ideas', but under the modified approach used on this occasion, an introductory background document containing information on the ACTMed trial and the 12 clinical indicators for prioritisation was distributed one week prior to the forum. This allowed participants time to consider the indicators along with some accompanying prevalence, hospitalisation and risk population data. Participants were also provided with epidemiological estimates of average patient numbers that might be expected to be encountered in a typical Australian general practice for each of the indicators based on de-identified aggregated data provided from the Primary Care Audit, Teaching and Research Open Network (Patron) data repository (Manski-Nankervis *et al.* 2024). Some examples of the types of criteria that participants might consider in their deliberations were presented to the participants as part of the provided pre-reading for the NGT. These were limited to the following: clinical significance of the potential outcome, likelihood of encountering the scenario in their usual practice, feasibility of resolving the potential risk and the complexity of managing the indicator in practice.

Table 1. The 12 clinical indicators selected for consideration at the Nominal Group Technique forum.

Clinical indicator identifiers	Potentially preventable outcome	Clinical care scenario
Clinical Indicator 1: NSAID – GI complication	Gastritis, gastrointestinal ulcer or gastrointestinal bleed	Previous diagnosis of GI bleed or GI ulcer AND use of NSAID (including aspirin) for >1 month without a PPI or H2 antagonist
Clinical Indicator 2: Bowel impaction	Bowel impaction	Persons using two or more medications known to retard gastrointestinal motility (including anticholinergic agents, calcium channel blockers, antacids and iron preparations) OR use of a highly anticholinergic agent OR use of an opioid analgesic without concurrent use of a laxative
Clinical Indicator 3: Heart failure	Congestive cardiac failure	Previous diagnosis of heart failure AND no current use of ACEI, ARB or ARNi
Clinical Indicator 4: AF – cerebral ischaemia	Thromboembolic cerebrovascular event	No current use of anticoagulant AND current diagnosis of AF AND CHA_2DS_2VASc score ≥ 2
Clinical Indicator 5: Myocardial ischaemia	Acute myocardial ischaemia	Previous diagnosis of myocardial ischaemia AND diagnosis of diabetes mellitus AND no current use of antiplatelet agent AND/OR lipid lowering therapy
Clinical Indicator 6: Electrolyte imbalance	Electrolyte imbalance	Use of diuretic AND/OR ACEI/ARB AND/OR spironolactone AND/OR potassium AND/OR calcium supplements AND no electrolyte test in last 12 months AND no renal function test in last 12 months
Clinical Indicator 7: Hypoglycaemia	Hypoglycaemia	Use of insulin OR use of long-acting sulfonylurea AND inadequate glucose management (as measured by no HbA1c level done in the previous 6 months) OR reduced adherence to diabetes treatment plan (as measured by HbA1c ≥8% at last measurement)
Clinical Indicator 8: Thyroid dysfunction	Hypothyroidism or thyrotoxicosis	Use of amiodarone OR use of lithium AND no thyroid function test in the 6 months prior to admission
Clinical Indicator 9: Falls with fracture	Hip fracture or another fracture	Prolonged use of corticosteroid (>3 months cumulative prednisolone or equivalent at ≥7.5 mg per day) AND aged 65 years or older AND use of sedating psychotropic drug/s AND/OR use of cardiovascular drugs with high potential for cause postural hypotension
Clinical Indicator 10: AKI – 'Triple whammy'[A]	Acute kidney injury/renal impairment	Concurrent use of NSAID AND ACEI/ARB AND diuretic ('triple whammy'[A]) for >1 month AND no electrolyte or renal function test in 1 month prior to admission
Clinical Indicator 11: Asthma/COPD	Asthma/COPD	Previous diagnosis of asthma or COPD using prescribed SABA or SAMA AND frequent use of SABA or SAMA AND 1. Asthma: No or inadequate use of maintenance therapy (ICS ± LABA/LAMA) OR 2. COPD: No or inadequate use of maintenance therapy (LAMA/LABA ± ICS)
Clinical Indicator 12: Anticholinergic/ Sedative burden	Various potentially preventable outcomes due to a combination of anticholinergic and/or sedative medicines including: 1. Falls, 2. Hip or other fractures, 3. Acute confusion, 4. Impaired cognition, 5. Bowel impaction, 6. Urinary retention	Combined burden of >2 medications with anticholinergic and sedative effects AND aged 65 years or older.

CHA_2DS_2VASc indicates patients with congestive cardiac failure, hypertension, age 75 years (doubled), diabetes mellitus, age 65–74 years, prior stroke/transient ischaemic attack/systemic embolism (doubled), vascular disease, and gender category (women). CHA2DS2-VASc score ranges from 0 to 9 (higher scores indicate a higher risk for stroke).

NSAID, non-steroidal anti-inflammatory drug; GI, gastrointestinal; PPI, proton pump inhibitor; H2, histamine type-2 receptor; ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; ARNi, angiotensin receptor–neprilysin inhibitor; AF, atrial fibrillation; HbA1c, glycated haemoglobin; AKI, acute kidney injury; COPD, chronic obstructive pulmonary disease; LAMA, long-acting muscarinic antagonist; LABA, long-acting beta-agonist; ICS, inhaled corticosteroid; SABA, short-acting beta agonist; SAMA, short-acting muscarinic antagonist.

[A]'Triple Whammy' refers to circumstances where the combination of diuretics, NSAIDs and angiotensin converting enzyme inhibitors (ACEI) and/or angiotensin receptor blockers (ARB) may impair renal function (Loboz and Shenfield 2005).

Analysis

In the pre-forum NGT questionnaire, participants were asked to rank the 12 clinical indicators from highest to lowest priority (1–12) based on their personal ideas about which criteria they believed were important in evaluating the merits of the proposed indicators for inclusion in the trial. These initial rating scores were averaged for each of the indicators across all the participants, with lower scores reflecting a higher priority indicator, using simple mathematical functions in Microsoft Excel©.

For the final rating survey, undertaken following the group discussion, the NGT scoring system allows the participants an opportunity for a more flexible comparison of the relative merits of each of the different clinical indicators. Here, the participants are asked to give a score of 100 to their highest priority clinical indicator and then score each of the other indicators on a scale of 0–100 relative to their highest priority. However, this scoring system lends itself to the possibility of skewed outcomes between participants due to differing total scores. To account for these differences, a standardisation process described in previous NGT research was employed (Gallagher *et al.* 1993). For each participant, clinical indicator scores were individually converted to a percentage by dividing each score by the sum of all 12 indicator scores provided. These standardised percentages were again calculated using Microsoft Excel© and then totalled across all the participants, this time with higher scores reflecting a higher priority indicator.

A thematic analysis of the qualitative data using inductive coding was applied to examine the reasoning behind prioritisation processes and criteria employed by participants in their decision making.

Ethics approval

Ethics approval was granted by the University of Queensland Human Research Ethics Committee (Ethics ID: 2022/HE001333) and registered with the University of Melbourne Human Ethics Sub-Committee (Ethics ID: 2022-25087-31657-2). The research was undertaken with the appropriate informed consent of participants.

Results

To maximise attendance, based on responses collected from the online Doodle™ poll, the NGT was convened on an evening in September 2022 with a scheduled duration of 1 h. The final NGT panel comprised eight participants: four GPs and four pharmacists enlisted from two Australian states (Queensland and Victoria). Five of the participants were female and three were male. All four pharmacists were based in Queensland and the four GPs were all practicing in Victoria. All participants had more than 10 years of clinical experience and seven of the participants also had at least some degree of research experience. All four of the pharmacists reported having worked within a general practice environment. These characteristics have been summarised in Table 2.

Table 2. Summary of participant characteristics.

Characteristic	All ($n = 8$)	Pharmacists ($n = 4$)	GPs ($n = 4$)
Female (%)	5 (62.5)	4 (100)	1 (25)
State of practice			
Queensland (%)	4 (50)	4 (100)	0 (0)
Victoria (%)	4 (50)	0 (0)	4 (100)
Worked within a general practice setting (%)	8 (100)	4 (100)	4 (100)
At least 10 years of clinical experience (%)	8 (100)	4 (100)	4 (100)
Research experience (%)	7 (87.5)	4 (100)	3 (75)

GPs, general practitioners.

Quantitative results

The ranking results of the pre-forum NGT questionnaire are presented in Table 3. All three cardiovascular disease indicators (thromboembolic cerebrovascular event with atrial fibrillation; acute myocardial ischaemia and heart failure) made the top five overall priorities along with asthma/COPD and falls with fracture. A distinguishable gap in the average rankings between the top five and bottom seven clinical indicators was apparent in these preliminary ratings. This gap suggests there was a distinct preference across the NGT forum participant group for those top five indicators compared with the other seven indicators.

The results of the final NGT survey are presented in Table 4. It is noted that, in this case, the rating results for both the raw and standardised scores resulted in the same prioritisation order. This prioritisation order was also similar to that derived from the pre-forum NGT questionnaire, again with a discernible gap between the top five and bottom seven clinical indicators. An exploration of potential rating differences between pharmacists and GPs was not possible due to de-identification of the recorded ranking and scoring results.

Qualitative results

In addition to ranking the clinical indicators in the pre-forum NGT survey, participants were asked to write down their ideas around which criteria they believed were important in evaluating the merits of each of the proposed indicators. Qualitative input was then also collected from verbal contributions conveyed during the online forum group discussion. The following themes were identified from the data analysis:

Value for money

Indicators that could potentially bring about the greatest benefits to patient health and the health system overall for resource investment were explored. Resources were described as not being limited to monetary funding but also with respect to practitioner and practice input capacity.

> Firstly, I used the 'biggest bang for your buck' as this will be the best way to 'sell' this for full implementation post-trial to the Federal Government funders. (P-3)

> I aimed to look at the data for the largest number of potentially preventable hospitalisations. (P-4)

Table 3. Ranking results from the ACTMed trial clinical indicator nominal group technique pre-forum questionnaire.

CI ID	Clinical indicator	Total score	Expert A	Expert B	Expert C	Expert D	Expert E	Expert F	Expert G	Expert H	Av. rating	Top 5
4	AF – cerebral ischaemia	30	4	6	2	1	3	12	1	1	3.75	1
5	Myocardial ischaemia	34	9	2	3	2	5	3	2	8	4.25	2
9	Falls with fracture	35	1	7	6	5	8	2	4	2	4.375	3
11	Asthma/COPD	36	6	3	1	4	11	1	3	7	4.5	4
3	Heart failure	38	3	1	8	3	2	4	11	6	4.75	5
10	AKI – 'Triple Whammy'[A]	54	11	9	4	7	6	7	7	3	6.75	
12	Anticholinergic/sedative burden	58	2	5	10	11	1	6	12	11	7.25	
2	Bowel impaction	60	7	4	9	12	4	9	10	5	7.5	
7	Hypoglycaemia	61	8	8	5	9	9	8	5	9	7.625	
6	Electrolyte imbalance	65	10	12	12	6	10	5	6	4	8.125	
1	NSAID – GI complication	72	5	11	7	8	12	10	9	10	9	

AF, atrial fibrillation; AKI, acute kidney injury; Av., average; CI ID, clinical indicator identifier; COPD, chronic obstructive pulmonary disease; GI, gastrointestinal; NSAID, non-steroidal anti-inflammatory drug.

[A]'Triple Whammy' refers to circumstances where the combination of diuretics, NSAIDs and angiotensin converting enzyme inhibitors (ACEI) and/or angiotensin receptor blockers (ARB) may impair renal function (Loboz and Shenfield 2005).

Impact of intervention

Consideration was given as to which indicators could have the potential to bring about the most substantial health improvements. These improvements were described as not only immediate benefits to individual patients but also the possible impacts on quality of life and long-term outcomes.

> The impact on quality of life for the patient in the event of these medication related problems – falls and fractures or a stroke or heart attack may have a longer recovery or be more catastrophic than others e.g. faecal impaction. (P-5)

> Where I think general practice can make the biggest impacts on outcomes and quality of life and can prevent chronic disease if we catch it earlier enough. (P-7)

Consequences of clinical outcomes

The clinical indicators were assessed with respect to their potential to result in clinical outcomes of the greatest severity. These consequences were frequently referenced to risks of mortality or serious morbidity for each of the clinical scenarios. Other sequelae described included carer burden and burden on the health system.

> Some outcomes have catastrophic outcomes for the patient. (P-1)

> I kind of really looked at the morbidity and mortality rate of all of the indicators and ranked them accordingly. (P-6)

Ability to implement intervention

Another factor that was commonly expressed during the forum was around the capacity to effectively implement the intervention in practice for any particular indicator. The complexity of implementing the specified intervention also influenced the prioritisation process for some of the participants. Potential barriers for implementation, such as issues of time constraints for GPs and reliability of EMR data, as well as likely facilitators, such as the benefits of pharmacist expertise being available to provide specialist advice, were also expressed.

> Feasibility in intervening and having accurate information in the record to identify risk along with the complexity of management. (P-8)

> Something that would be reasonably easy to implement. (P-7)

> Rotating GPs through specific times in their chronic disease complex where they wouldn't be interrupted all the time by the cut and thrust of general practice and would give them time to sit down and plan care with their nurses and their physios. (P-6)

> When I am prescribing for such people, I am not always very clear on the interactions between the various medications, and I've always thought that the pharmacists have a much better knowledge of that. (P-2)

Potential limitations

Participants also described their evaluation of the indicators in the context of perceived barriers to accurate data collection. There were questions about the ability to source the required information from the EMRs and the need for data cleaning. There were also concerns about the difficulties of reconciling prescribing data because

Table 4. Scoring results from the ACTMed trial clinical indicator nominal group technique final survey in ranked order.

CI ID	Clinical indicator	Data type	Expert A	Expert B	Expert C	Expert D	Expert E	Expert F	Expert G	Expert H	Total score Raw	Total score Std	Top 5
5	Myocardial ischaemia	Raw	98	95	60	100	99	90	80	70	692		1
4	AF – cerebral ischaemia	Raw	100	100	70	70	100	100	90	60	690		2
3	Heart failure	Raw	96	90	90	85	90	70	50	100	671		3
11	Asthma/COPD	Raw	80	95	90	50	90	90	50	90	635		4
9	Falls with fracture	Raw	80	85	100	65	95	70	50	70	615		5
12	Anticholinergic/sedative burden	Raw	20	80	80	85	70	70	40	60	505		
10	AKI – 'Triple Whammy'[A]	Raw	50	70	10	25	60	50	50	30	345		
6	Electrolyte imbalance	Raw	90	50	15	65	10	30	25	40	325		
7	Hypoglycaemia	Raw	20	40	40	10	50	50	30	20	260		
1	NSAID – GI complication	Raw	20	50	20	30	10	30	20	20	200		
8	Thyroid dysfunction	Raw	50	10	10	5	10	30	25	10	150		
2	Bowel impaction	Raw	20	10	30	35	10	20	15	5	145		
	Total individual raw score		724	775	615	625	694	700	525	575	5233		
5	Myocardial ischaemia	Std[A]	13.54	12.26	9.76	16.00	14.27	12.86	15.24	12.17		106.08	1
4	AF – cerebral ischaemia	Std	13.81	12.90	11.38	11.20	14.41	14.29	17.14	10.43		105.57	2
3	Heart failure	Std	13.26	11.61	14.63	13.60	12.97	10.00	9.52	17.39		102.99	3
11	Asthma/COPD	Std	11.05	12.26	14.63	8.00	12.97	12.86	9.52	15.65		96.94	4
9	Falls with fracture	Std	11.05	10.97	16.26	10.40	13.69	10.00	9.52	12.17		94.06	5
12	Anticholinergic/sedative burden	Std	2.76	10.32	13.01	13.60	10.09	10.00	7.62	10.43		77.83	
10	AKI – 'Triple Whammy'[B]	Std	6.91	9.03	1.63	4.00	8.65	7.14	9.52	5.22		52.09	
6	Electrolyte imbalance	Std	12.43	6.45	2.44	10.40	1.44	4.29	4.76	6.96		49.17	
7	Hypoglycaemia	Std	2.76	5.16	6.50	1.60	7.20	7.14	5.71	3.48		39.57	
1	NSAID – GI complication	Std	2.76	6.45	3.25	4.80	1.44	4.29	3.81	3.48		30.28	
8	Thyroid dysfunction	Std	6.91	1.29	1.63	0.80	1.44	4.29	4.76	1.74		22.85	
2	Bowel impaction	Std	2.76	1.29	4.88	5.60	1.44	2.86	2.86	0.87		22.56	
	Total individual std score		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		800.00	

AF, atrial fibrillation; AKI, acute kidney injury; CI ID, clinical indicator identifier; COPD, chronic obstructive pulmonary disease; GI, gastrointestinal; NSAID, non-steroidal anti-inflammatory drug.

[A]Standardised score (Std) = clinical indicator raw score/total individual raw score × 100.

[B]'Triple Whammy' refers to circumstances where the combination of diuretics, NSAIDs and angiotensin converting enzyme inhibitors (ACEI) and/or angiotensin receptor blockers (ARB) may impair renal function (Loboz and Shenfield 2005).

dispensing records are generally not connected to the EMR. The inability to track over-the-counter (OTC) medications was also perceived as a barrier to implementing certain interventions.

> The other thing I looked at was the ability to source information from GP records and that can sometimes be difficult. (P-3)

> Knowing what over-the-counter drugs that patients are taking, I presume that would be part of the role, to do a best possible medication history and medicine reconciliation. (P-1)

> There is the issue of non-steroidal anti-inflammatory drug use with over-the-counter from supermarkets what have you [sic] that I would imagine would be difficult to ascertain. (P-3)

Other themes that also arose less frequently included consideration of prioritisation based on the likelihood of encountering the particular clinical scenario in practice, prioritisation based on previous clinical experience, how to best utilise the expertise of the pharmacist and possible complexities of dealing with interactions between multiple clinic sites or practices.

Discussion

Here, we have described a modified version of the traditional NGT process to prioritise a list of medicine safety clinical indicators for use in QI. It is perhaps most noteworthy, in this particular consensus forum, that the overall rating order of the clinical indicators was not substantially altered following the group discussion and interactive nature of the NGT process. The same top five indicators were selected in both surveys, although the priority order did change to a minor degree following the group discourse. It is difficult to give definite explanations for this, perhaps unexpected, NGT outcome. It could be postulated that all the participants had firm, well established ideas prior to the forum based on their individual clinical experience and professional learning. An alternative perspective might be that the participants' views were already aligned prior to the forum and that the interactive process only further confirmed their previously shared beliefs. Perhaps this could be further explained by similarities in the training approaches across both these related professional healthcare disciplines. A common understanding of research methods and objectives within this particular group could also potentially explain the comparable prioritisation perspectives.

The reasoning behind prioritisation evaluations made by the participants contained multiple common principles. These principles were well aligned with established guidance for choosing areas for measurement when developing clinical performance measures: 'the importance of the condition, the potential for quality improvement and the degree by which health professionals control the mechanisms for improving care' (McGlynn and Asch 1998). Cost-effectiveness is another recognised criterion used in the assessment of process indicators, and this consideration was found to be prominent in the reasoning of the participants for this NGT. Strength of the scientific evidence as a criterion for selecting indicators in the current NGT was somewhat pre-empted for the participants by the provision of epidemiological and other relevant scientific data for each of the potential indicator candidates within the pre-forum background reading. Despite suggestions from previous research indicating that increased workload might present as a barrier to QI activity participation (Dawda *et al.* 2010; Biezen *et al.* 2021), this NGT group made very few comments regarding workflow interruption or increased time burden as factors that might impact clinical indicator prioritisation in relation to QI in primary care.

The critical limitation of this study was the small number of participants involved in the NGT forum and the selective nature of their recruitment. As such, the generalisability of the study results is likely to be restricted. Despite employing a recommended purposive sampling approach to NGT recruitment, achieving enrolment of a typical number of NGT group participants reported as being between 2 and 14 participants (McMillan *et al.* 2016), and having improved accessibility for participation in this NGT facilitated by the modified, fully electronic methodology employed in the forum process, it still proved very challenging to bring together a large number of primary care professionals for the purpose of priority setting at one time. This is, perhaps, unsurprising in the current context of health workforce shortages and service provision pressures as a reminder of the challenges of undertaking research in primary care.

Additionally, the original shortlist of validated clinical indicators for consideration was limited to a study of elderly Australian veterans and Aboriginal and Torres Strait Islander peoples, even if it was sourced from the totality of Australian evidence to date. As such, this may not comprehensively reflect the pool of possible indicators suitable for application to the general Australian population. However, as clinical buy-in from participating GPs and pharmacists was imperative to the success of the subsequent trial, we believe the results arising from the current study were informative and would recommend a similar process when planning further NGT and clinical indicator prioritisation research. Discussions between the research team and the ACTMed Steering Committee highlighted that, in the absence of the NGT process, it is likely that a different set of clinical indicators would have been chosen, which may not have been as readily accepted by participating clinicians in the subsequent trial.

The findings from this NGT might suggest that, when prioritising previously validated clinical indicators for primary care research, it may be sufficient to base decisions on a standalone ratings survey when there is provision of appropriate background scientific evidence, given the absence of any change in prioritisation following the interactive forum. Although there is certainly value to be gained from the NGT's interactive component, it may be possible to save time and resources by first ensuring that there is the appropriate mix of professionals involved, accompanied by the provision of high-quality pre-reading information. So, rather than expending resources on debating the clinical evidence, more time can be focused on other factors such cost effectiveness, impact, consequences and capacity for implementation, which will ultimately provide the foundation for indicator prioritisation. However, any such conclusion would need to be considered in the context of the main limitation of this NGT, which was the small sample size. Further larger studies or systematic reviews on this topic would assist in assessing the value of using a simpler approach to prioritising clinical indicators for the purpose of primary care research.

Conclusions

The clinical indicators prioritised by the targeted group of participants, who were selected for their familiarity

with community-based medication management, reflected condition areas that are likely to be especially relevant to clinicians working in primary care: commonly encountered cardiovascular and respiratory diseases, together with falls resulting in fracture. In this study, the interactive component of the NGT process had little impact on the final prioritisation of the indicators. Potential explanations for this might include previously established strong participant views and preferences or relative group homogeneity based on similar learning, research or clinical experience. Understanding the factors that health professionals at the 'coalface' find most important for determining the worthiness of clinical indicators for inclusion in quality improvement activities in primary care may prove critical when attempting to engage and foster the commitment of health professionals to improving systemic healthcare outcomes, such as reducing medication-related problems. By aligning the selection of indicators for primary care research with healthcare practitioner priorities utilising a modified NGT consensus approach, it is anticipated that this will ultimately translate into positive engagement of clinicians with the ACTMed trial and other comparable projects.

Supplementary material

Supplementary material is available online.

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Author affiliations

[A]Department of General Practice and Primary Care, University of Melbourne, Melbourne, Vic 3010, Australia.

[B]Primary Health Team, Brisbane South Primary Health Network, Brisbane, Qld 4122, Australia.

[C]Centre for Health Economics, Monash University, Melbourne, Vic 3800, Australia.

[D]Centre for the Business and Economics of Health, University of Queensland, Brisbane, Qld 4072, Australia.

[E]School of Clinical Sciences, Queensland University of Technology, Brisbane, Qld 4001, Australia.