Use of nominal group technique methods in the virtual setting: a reflective account and recommendations for practice

Summary

Nominal Group Technique (NGT) methods involve the use of structured activities within groups comprised of purposefully selected stakeholders (nominal groups), with the broad aim of achieving a level of consensus and prioritising information. In this paper, we will report how we facilitated nominal groups, using Microsoft Teams, to prioritise content for a theory-based behaviour change intervention. Our methods are described and underpinned with relevant literature. Practical suggestions are offered based on our experience of using this method.

Keywords:

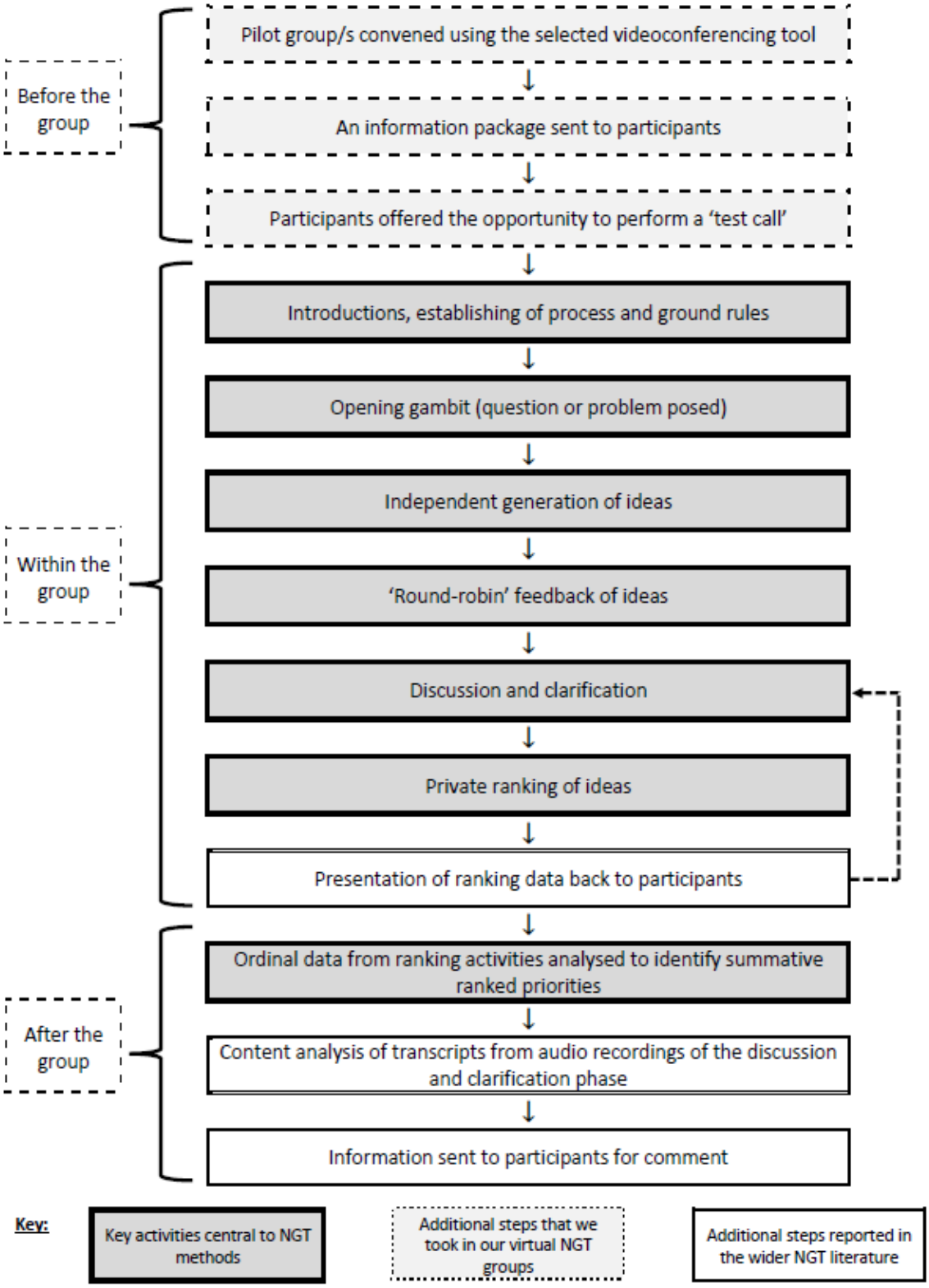
- Research design
- Behavioural Research
- Group processes
- Consensus
- Nominal Group Technique
- Nursing

1. Introduction

To obtain the views of different stakeholders, and to prioritise information for research purposes, structured consensus methods may be used (1). In healthcare research, the importance of these methods is underscored by an increasing emphasis on the benefits of engaging recipients in the design of studies, in the collection and analysis of data, and in the compiling of research outputs (2–4). One consensus approach, where highly structured group activities are delivered through a democratic process (i.e. where all participants make equal contributions), is Nominal Group Technique (NGT) (5,6). Broadly, the NGT process includes separate creative and evaluate phases where ideas are generated and then ranked in response to the research question/s (1). More specific

'key activities' central to the NGT process, as described by the originators of the method, are *independent generation of ideas, 'round-robin' sharing of ideas, discussion and clarification of ideas, and voting (ranking of ideas)* (7). Each of these key activities occur in sequence, with the output of each stage informing the next, and opportunity for repetition of selected activities where necessary. The flexible nature of NGT permits researchers to adjust the delivery of these key activities according to the characteristics of the participants and/or the research question driving the inquiry (8). From the literature, examples were found where NGT methods had been used to prioritise aspects of clinical care valued most by specific groups of service users including older people (9) and patients receiving end of life care (10,11). The methods have also been used with patients to prioritise the attributes of specific medications for osteoporosis (12) and rheumatoid arthritis (6), as well to achieve consensus on the acceptability of different components of a smoking cessation intervention (13). Further examples were found where NGT methods had been used with groups of health professionals to achieve consensus on how to encourage specific health behaviours (5), to prioritise factors that enable successful delivery of a vaccination programme (14), to prioritise potential educational and professional development activities (15,16), and to agree a minimum dataset for clinical handovers in the Intensive Care Unit setting (17). An overview of the NGT process is summarised in figure 1 (including the key activities and additional steps we undertook elaborated in this paper).

Figure 1: An observers view of Nominal Group Technique process



Conventionally, groups where NGT methods are applied (hereafter referred to as nominal groups) have been carried out face-to-face (18). More recently, interest has grown in the delivery of

research methods in the virtual setting, where participants interact synchronously (i.e. in real time) through sound, video, and text using videoconferencing software such as Zoom, Microsoft ® Teams or Google ® Meet (19). We conducted virtual nominal groups with different stakeholders (healthcare leaders and clinical staff) to explore how precise theoretically informed behaviour change strategies (identified from earlier empirical work) could be operationalised in acute hospital wards, and to prioritise intervention content according to acceptability and feasibility (as perceived by different stakeholders) *(citation removed for peer review).* In this paper, we will refer to a programme of work where our broad aim was to develop a theory-based intervention to improve responses to patients with signs of clinical deterioration *(citation removed for peer review)*. Our specific aim here is to report strategies used to implement NGT methods in our project and offer suggestions of additional approaches for use in virtual group discussions involving different stakeholders. Existing NGT literature will be used to underpin our arguments and, where appropriate, practical points will be illustrated with examples from our own reflections of facilitating virtual nominal groups using Microsoft Teams.

2. Recruitment and sampling

Use of purposive sampling is advocated for nominal groups (virtually and face-to-face) as it enables researchers to select participants who are likely to be most informative in relation to the research question/s and aim/s of the study (20,21). Purposive sampling is a non-probability method where participants are targeted because they meet pre-determined criteria e.g. profession, lived experience, age group (criterion sampling) or because of predicted variation in their views and experiences (maximum variation sampling) (20,21). The use of snowball sampling has also been identified as a potentially useful approach when recruiting for nominal groups. Here, participants are asked to nominate an individual from within their social or professional circle who might participate (5,19,22). When using this recruitment approach, it is likely that participants will identify peers with some overlapping

(presumably desired) characteristics who may not have been accessible without nomination (22).

The minimisation of power imbalance between participants is arguably one of the greatest strengths of the NGT method and means that participants with different experiences, and levels of power and influence, can be part of the same nominal group (23). In our research *(citation removed for peer review)*, we recruited senior healthcare leaders, nurse educators, patient safety managers, as well as Registered Nurses (RNs) and (un-registered) Healthcare Assistants (HCAs) from ward areas. We chose to separate the ward nursing staff from the other participants and facilitate two nominal groups (labelled as the 'clinical group' and the 'leadership group'). It was our assertion that participants occupying the most junior clinical roles (e.g. HCAs and junior RNs) might have felt intimidated if they had been grouped with a senior leader (e.g. a director of nursing) irrespective of the highly structured NGT process that aims to minimise social influence. Whilst this is not conventional for NGT methods, there are other similar reports of participants being separated into different nominal groups based on certain characteristics (e.g. separating service users and healthcare practitioners of different disciplines) (9,11). We believe that our decision was justified in context but acknowledge that it was driven by pragmatic judgements from the research team rather than any specific evidence.

There is a lack of agreement about the ideal sample size for a nominal group with reports of between 2 and 14 participants in the literature (8). It has been argued that two nominal groups is adequate for achieving a 'full array' of responses and a degree of 'idea saturation' (5). In our study, we held 2 nominal groups with 12 and 7 participants respectively. We were cognisant that one or more participants might withdraw at the last minute and overrecruited to accommodate this (originally recruiting 31 participants in total, dropout = 39%). Across both of our nominal groups, 6 participants notified us of their intention to withdraw hours before the groups convened (typically citing work-related pressures as the reason for withdrawal), and 6 did not attend with no prior

communication. Our experience highlights the potential for attrition when delivering nominal groups even when initial recruitment activities appear fruitful. On this basis, we would echo suggestions from other researchers (24), that overrecruiting is advisable to ensure the groups can proceed as planned. Within our clinical group we had more RN participants than HCA participants, meaning that HCAs were under-represented (*citation removed for peer review*). This was likely the consequence of disproportionate over-recruiting of RNs compared to HCAs. On reflection, we would recommend recruiting (and over-recruiting) different key stakeholders in proportion to ensure balanced representation in the nominal groups.

3. Developing and piloting the research materials

Preparation for delivery of an online nominal group may include developing research materials and testing their application through piloting. Based on our experience, we recommend developing a facilitator's guide that clarifies the role of each facilitator and details the content and timing of each activity. Running pilot groups enables researchers to test a facilitator topic guide, using the selected videoconferencing tool, and to identify technical challenges prior to the formal groups convening (23,25). We also suggest offering participants the opportunity the perform a 'test call' ahead of the groups, so that any (participant- related) technical difficulties can be identified and addressed. This may be particularly useful for participants less familiar with technology or who lack confidence in its use (24).

Where the subject under discussion is particularly complex and/or unfamiliar to participants, it may be useful to provide key information about the topic in advance to ensure time within the group is used effectively (3,26). During our nominal groups, participants reviewed our proposed intervention strategies and suggested approaches for operationalising them in hospital wards. The labels and definitions of these intervention strategies were drawn from the behaviour change

literature, and their selection informed by earlier empirical work *(citations removed for peer review)*. We considered it likely that our participants would be unfamiliar with behaviour change processes and terminology. To address this, we developed an 'information package' which was emailed to participants ahead of the groups. In this information package we provided practical information (in written and diagrammatic form) including guidance on how to access the group using Microsoft Teams, how to contribute to the discussion using the 'raise hand' function, how to activate and deactivate the microphone and camera, and how to access the link to the online survey for ranking activities. Participants of an online nominal group require a reasonably well-developed set of Information Technology (IT) skills. To address variance in computer literacy between participants, we would argue that providing clear instructions before an online nominal group is important to ensure all participants can access the meeting and engage in subsequent activities. In addition to IT-related guidance, the information package we developed included a summary of ground rules for the meeting, an overview of the NGT process, a table populated with the different intervention strategies and plain-English definitions, and examples of how the different strategies could be delivered in practice. Whilst providing this level of information ahead of a nominal group is unconventional, there are examples where a similar approach has been used (26).

Prior to running our nominal groups, we identified the possibility that one or more participants might share a device (i.e. login to the group using the same desktop computer or laptop) or that they might access the group from the same location (e.g. a shared office space). We also recognised that this might be difficult to identify (as participants may have cameras and microphones switched off) and difficult to challenge once the nominal groups were in progress. Arguably, this is a potential limitation of conducting the groups in the virtual setting as these actions could result in social influence between participants, and therefore undermine aspects of the NGT process (specifically, the independent activities). To reduce the likelihood of this, we included a

statement in our information package asking participants to join from their own device (at home or at work) in a quiet and private space where they were unlikely to be disturbed.

4. The structure and content of an online nominal group meeting

There is a lack of consensus regarding how many discrete stages are optimal in the NGT process. Examples were found where the process for delivering NGT has been reported as a three (18); four (8,16,27); five (10,28,29), and six (30) stage procedure. Notwithstanding the inconsistencies in how the process has been characterised within the literature, we opted to structure our groups in three discreet stages incorporating the key activities listed in the introduction and elaborated below.

Stage 1 – individual responses

First, an 'opening gambit' was posed to the group which acted as a stimulus for independent thinking and ideas generation (26). Broadly, the opening gambit may be a question derived from empirical work, a question derived from a systematic review, or an organisational problem requiring a solution. Then, participants were invited to withdraw from the virtual group, consider the opening gambit, and to generate responses to it (31). Ensuring that this activity occurs without discussion helps to reduce the possibility of social influence between participants and potentially maximises the range of ideas proposed (18). Practically, we found the use of Microsoft Teams particularly useful as participants could temporarily deactivate their cameras and microphones ensuring complete privacy (22). Videoconferencing also permitted us to display our question on a pre-prepared Microsoft PowerPoint slide which was made visible to participants throughout this stage. We hoped that doing this would reduce participant's anxiety about forgetting or misunderstanding the question.

Participants were brought back into the main meeting room (i.e. requested to switch on their cameras and microphones) and asked, in turn, to feedback in a 'round robin' format; that is, each participant shared a single idea without comment from others before the cycle repeated (8). This approach has been recommended as a means of achieving equity in relation to participants' contributions (16). Whilst participants were asked not to repeat an idea already proposed, they were encouraged to share thoughts that represented variations or elaborations of existing suggestions (11). Responses were written on a shared screen so that they were visible to all participants and numbered for ease of reference in subsequent activities (18). Practically, we displayed participants' ideas using a blank Microsoft Word document in landscape orientation and added points onto the document using textboxes (to permit the points to be moved around the document with relative ease). The document was made visible to participants using the 'share screen' function in Microsoft Teams.

Within the NGT literature, it has been advocated that ideas sharing continue until all suggestions have been exhausted (1,8,11,32). As our stakeholders were all healthcare staff with limited time and/or competing commitments, we made the decision to run both nominal groups for a period of 2 hours to minimise inconvenience for our participants. Whilst we hoped that this would provide adequate time for all ideas to be shared, we had no way of knowing exactly how many ideas would be generated or how long the sharing process would take. Consequently, we made the decision to cycle around all participants as many times as possible within the time allocated, at which point we moved onto the next stage of the process. We acknowledge that by limiting time for this specific exercise, we may have missed useful suggestions. However, adopting this more restrictive approach ensured that we completed all activities within the allotted time and did not overrun. Whether a meeting with longer duration would result in some participants leaving due to competing priorities is unknown from our experience.

Stage 2 – clarification and consolidation of responses

To ensure that participants understood the meaning of each suggestion, participants were then invited to seek clarification from other nominal group members (26). According to the NGT literature, during this stage of the process, suggestions that appear very similar can be merged (18,33). However, researchers are cautioned not to view this as an opportunity to create higher order categories, as one might when applying content analysis to qualitative data (34), as this could result in the information loosing originality and/or detail (16). If two or more suggestions that appear very similar are merged, it is useful to label the new item (i.e. the product of the merger) with an unallocated number so it is recognised to be new content (18). As the least structured task within the process, we found the 'hand raising' facility on the Microsoft Teams particularly useful in managing the discussion by enabling participants to signal when they wished to confer with the group.

Stage 3 - voting (ranking activities)

The broad objective of this stage was for participants to prioritise the ideas generated and discussed in the preceding activities (26,33). We argue that participants should be given clear guidance about the criteria that they should apply when prioritising the information. These criteria may be informed by the overarching aim/s of the project. For example, in our work *(citation removed for peer review)*, the aim of the NGT process was to identify which approaches (derived from our information package and suggested by NGT participants during the group) for delivering behaviour change strategies in practice would be most acceptable to nursing staff and which would be most feasible for delivery in an acute hospital ward environment. We asked participants to prioritise ideas from the ideas generated in advance by the research team plus additional suggestions from participants, in two rounds of independent voting: firstly, in relation to the acceptability of the suggestions, and secondly in relation to the feasibility of the suggestions. During

each round, participants indicated their preferred five suggestions and ranked these from 1 (most acceptable/ feasible) to 5 (least acceptable/ feasible). There is variation regarding the number of top ideas that should be identified and ranked with reports of five (6,9,10,23,27,35), eight (36), and ten or more (12,25) items found in the literature. With little clarity about the optimum number of items to prioritise in ranking tasks, we opted to use 5 as we found this to be a common approach. Our decision was also driven by anecdotal reports of NGT pilot group participants finding 10 items unmanageable suggesting that a smaller number may be preferable (26).

Practically, it is recommended that voting occur privately to allow participants to determine their own priorities (10). We encouraged participants to deactivate their cameras and microphones whilst voting and suggested that they switched them back on once they had finished (this provided a useful signal that they had completed the exercise). Based on our experiences, we recommend the use of an online polling tool (e.g. Qualtrics ® or SurveyMonkey ®) for voting activities. Once a facilitator has populated the polling tool with ideas from the group (which can be done in real time by a nominated facilitator during earlier stages of the process), participants can be granted access in preparation for the voting task/s. We used several mechanisms to enable our participants access to Qualtrics (our chosen polling tool) including copying and pasting a hyperlink into the 'chat space' of Microsoft Teams, emailing the hyperlink directly to a participant, and by displaying a quick response (QR) code on the screen so that participants could access Qualtrics using QR code readers on their smartphone or tablet. Settings within polling tools can often be adjusted so that participants are permitted to rank ideas by typing a number (e.g. 1 to 5) next to an item. In some tools, settings can be manipulated to prevent participants submitting responses that are not in-keeping with the exercise. For example, we were able to adjust the settings in Qualtrics so that participants were prevented from ranking more than one item at the same level or ranking more or less than 5 items.

5. The role of the facilitators

Broadly, the role of the facilitator is to ensure that the NGT structure is maintained and that the key activities are delivered effectively (23,35). The use of multiple facilitators is advocated within the literature (16,23), particularly when facilitating research activities online which can present unique challenges due to the fallibility of technology (19). It has been argued that the nominal group facilitator should remain neutral to ideas from the group and avoid adding personal insights or evaluative comments (29,37). However, it has also been suggested that a facilitator may need to help participants interpret and summarise complex information (16). Based on our experience, we suggest that both roles are important but argue that it might be challenging for a single facilitator to adopt both positions. To overcome this challenge, our nominal groups were facilitated by four researchers who were assigned specific functions. Within our team, one facilitator had co-facilitated face-to-face nominal groups in the past, but we had no prior experience of delivering NGT methods in an online environment. During our nominal groups, we asked participants to suggest new ways for operationalising behaviour change strategies. Whilst the emphasis was on the practicalities of delivering these strategies, participants required a working knowledge of the behaviour change strategies to inform their independent thinking and their discussions. As our participants were mostly inexperienced in behaviour change research, two facilitators with expertise in health psychology were available to answer technical questions (i.e. those related specifically to the behaviour change strategies or the underpinning theory). With this 'technical support' in place, the lead facilitator was able to focus on overseeing the process and managing time; leaving a fourth facilitator free to record information, including typing participants' suggestions onto the shared Microsoft Word document (visible to participants during stages 1 and 2), and populating the polling tool with new content (suggested by participants) prior to ranking activities. Based on our experience, we suggest that having a lead facilitator and a separate documenter are essential roles when facilitating nominal groups virtually. The need for additional subject experts to provide technical support, will likely be determined by the complexity of the subject matter and participants' familiarity with the topic.

6. Data analysis

Data from nominal groups (both virtual and face-to-face) may be analysed quantitatively, qualitatively or using mixed methods depending on the research question driving the work and the required outputs (33). Quantitative analysis is usually descriptive and centres on participants' ranking data. In our research, we wanted to understand which approaches to operationalising behaviour change strategies were viewed most favourably (i.e. most acceptable and feasible) by healthcare leaders and clinical nursing staff *(citation removed for peer review)*. To do this, we generated an aggregate score for each idea using the following procedure (illustrated in table 1), informed by the NGT literature (10,11):

1. Scores were calculated for all ideas based on where each item was ranked by the nominal group participants during the voting tasks. Each time an idea was ranked first by a participant (the most favourable response) a score of 5 was assigned; ranked second, a score of 4 was assigned; ranked third, a score of 3 was assigned; ranked fourth, a score of 2 was assigned; ranked fifth, a score of 1 was assigned. Ideas that were not ranked (i.e. not identified as a 'top 5 idea' by a participant) scored 0.
2. This scoring process was repeated using ranking data from both voting tasks (i.e. acceptability and feasibility).
3. The aggregate score for each idea was generated by summing the scores from each participant for both ranking tasks. Higher aggregate scores suggested that the idea was viewed more favourably by participants. In table 1, we offer an example (using hypothetical data) to illustrate how we used this procedure to generate an aggregate score for each idea.

Table 1 – an example to illustrate how we tabulated ranking information and scores (derived from ranking data) to generate an aggregate score for each idea voted upon (date included in this table are hypothetical).

		Participant 1		**Participant 2**		**Participant 3**		**Participant 4**		Aggregate score for each idea (denominator = 40)
		A	***F***	***A***	***F***	***A***	***F***	***A***	***F***	
Idea A	Ranking (1-5) from participant voting	1	1	3	2	1	1	3	4	
	Score assigned (0-5)	5	5	3	4	5	5	3	2	**32**
Idea B	Ranking (1-5) from participant voting	2	3	1	5	3	2	1	1	
	Score assigned (0-5)	4	3	5	1	3	4	5	5	**30**
Idea C	Ranking (1-5) from participant voting	-	-	5	3	4	5	2	5	
	Score assigned (0-5)	0	0	1	3	2	1	4	1	**12**
Idea D	Ranking (1-5) from participant voting	3	4	-	-	5	3	5	2	
	Score assigned (0-5)	3	2	0	0	1	3	1	4	**14**
Idea E	Ranking (1-5) from participant voting	4	2	2	1	2	-	4	3	
	Score assigned (0-5)	2	4	4	5	4	0	2	3	**24**
Idea F	R Ranking (1-5) from participant voting	5	5	4	4	-	4	-	-	
	Score assigned (0-5)	1	1	2	2	0	2	0	0	**8**
Key: ***A*** – acceptability; ***F*** – feasibility; - idea not ranked 1-5 by the participant										

In our work, data analysis was limited to calculating summative ranked priorities for each item. Consequently, audio-recording and transcription of the group discussions were not required. However, if a more nuanced understanding is required of, for example, the

process of arriving at an idea or why some ideas were considered more favourable than others, there is precedent within the wider NGT literature for audio recording the groups and generating verbatim transcripts for the purpose of content analysis (34). Coding the qualitative data generated during discussion and clarification stage in this way may provide insights into *why* participants voted as they did (10,16,26). Practically, recording the nominal groups may be simpler in the virtual setting, as audio-visual recording is often built into videoconferencing tools.

After the meeting, participants may be sent a summary of the data and offered the opportunity to comment. Whilst this 'member checking' approach has been advocated when using NGT methods (18), in the wider methodological literature there is some debate regarding the usefulness of this method for ensuring trustworthiness of the data. In particular, it has been suggested that participants may not recognise their individual response within the broader summary data and, as a result, may challenge the findings (38). On this basis, there may be benefit in sending information with the caveat that the data represents the broader picture of participant responses and should be interpreted accordingly.

7. Summary

Nominal group technique is a structured consensus method that enables participants to generate ideas in response to a question or problem, and to prioritise information through independent voting tasks. Whilst traditionally held face-to-face, NGT groups can be convened virtually which allows participation from geographically dispersed or harder to reach stakeholders (e.g. shift workers). This advantage notwithstanding, access and participation may be constrained by disparities in access to hardware and/or by a lack of IT skills which may discourage participation. Providing clear guidance in advance and offering participants opportunities to perform 'test calls' with researchers before the groups may help to mitigate some of these barriers. Ordinal data from ranking tasks can be used to establish priorities in response to the question posed. Where necessary,

groups may be audio recorded and transcribed permitting content analysis and deeper insight into why participants voted as they did. Findings from the NGT process may be used to drive further empirical inquiry or to inform how research findings are translated into practice. In our research, we used ranking data from nominal groups to decide which specific techniques should be included in a behaviour change intervention and to inform how intervention content should be operationalised in clinical practice (*citation removed for peer review*). In this context, nominal group technique provided an effective and expedient method for groups of healthcare leaders and clinicians to generate ideas and prioritise information.

8. References

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