Research in Social and Administrative Pharmacy xxx (xxxx) xxx

Contents lists available at ScienceDirect

Research in Social and Administrative Pharmacy

journal homepage: www.elsevier.com/locate/rsap

Stepwise development of a quality assessment instrument for the medicines' pathway in nursing homes

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ARTICLE INFO

Keywords:
Quality of care
Quality assessment
Systems approach
Medicines' pathway
Medication errors
Nursing homes

ABSTRACT

Background: Quality of care in nursing homes (NHs), and especially the quality of the medicines' pathway, remains a concern.
Objectives: To develop a quality assessment instrument to support NHs to evaluate the quality of their medicines' pathway, and to formulate recommendations for its implementation.
Methods: A stepwise approach was used. First, a performance questionnaire for coordinating physicians, pharmacists and head nurses was developed, alongside a set of quality indicators (QIs). Next, a feasibility study regarding the QIs was performed in 4 NHs, followed by two pilot studies to optimize the instrument (in 14 and 9 NHs, respectively). Focus groups were held to formulate recommendations for instrument implementation.
Results: The QI feasibility and first pilot study showed that the clarity and feasibility of QIs was insufficient. All QIs were therefore integrated in the performance questionnaire. The first pilot study also showed low response rates for certain questions in the performance questionnaire and resulted in a revision of questions with the aim to target the right type of healthcare professional, including quality coordinators and general practitioners. The final instrument targets all involved healthcare professionals (i.e. coordinating physicians, pharmacists, head nurses, general practitioners, and quality coordinators), and applies a sequential approach: a quick scan to set priorities, followed by a detailed scan to detect specific working points. The second pilot study showed appreciation for this approach. Last, five recommendations were made to promote the instrument's implementation.
Conclusions: A series of feasibility and pilot studies allowed the stepwise optimization of a quality assessment instrument for the medicines' pathway in NHs and resulted in modifications to improve its clarity and feasibility. Participants' recommendations will promote the successful implementation of the quality assessment instrument.

1. Introduction

Quality of care in nursing homes (NHs) remains a concern. An important contributor to the quality of care in NHs is the quality of the medicines' pathway,[1] a complex set of processes from prescribing over administration to monitoring of the drug therapy. Medication errors, of which the prevalence in NHs is high,[2,3] can occur in each of these processes. In turn, a substantial amount of these medication errors can cause adverse drug events (ADEs) and result in harm to the resident.[2] In particular errors made during the prescribing and monitoring processes of the medicines' pathway contain a high risk of harm for the individual.[2]

Several staff-related and organizational factors increase the medicines' pathway's vulnerability for medication errors. Accorng to NH staff, shortages of appropriately qualified staff, high workload, poor or insufficient medication-related knowledge and frequent interruptions during medication administration rounds have an impact on the occurrence of medication errors.[3–6] The involvement of different types of healthcare professionals (HCPs), including nurses, general practitioners (GPs), and pharmacists, further complicates the pathway.[7] As such, the high prevalence of medication errors in NHs might be the result of an error-prone system.[2,8] Hence, a system-wide and process-oriented approach as a means to prevent medication errors in NHs could be promising.[2,3]

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https://doi.org/10.1016/j.sapharm.2023.07.008
Received 13 April 2023; Received in revised form 28 June 2023; Accepted 18 July 2023
Available online 20 July 2023

As part of the Come-On (Collaborative approach to Optimize MEdication use for Older people in Nursing homes) study (2016), an in-depth exploration of the medicines' pathway in Belgian NHs was performed with the aim to develop a framework of processes, key activities (KAs) and best practices (BPs) that could serve as a basis for quality improvement initiatives. The resulting framework describes the pathway as an entirety of eight processes, going from (re-)admission of the resident over medication prescribing to medication administration and monitoring of medication (side-)effects. Processes are then further divided into KAs (N = 27) and BPs (N = 137).[9]

How this framework should be applied as a means to assess the quality of the medicines' pathway was not yet specified, nor investigated. Therefore, the aim of the current study was two-fold: 1) to develop, based on the framework, a quality assessment instrument for NHs to evaluate the quality of their medicines' pathway, and 2) to formulate recommendations for long-term implementation of the quality assessment instrument in daily NH practice.

2. Methods

2.1. Setting

Flanders, the Dutch speaking part of Belgium, has about 800 NHs. Residents of Flemish NHs remain free to choose their GP, often resulting in a large number of GPs visiting a NH. General practitioners have the full responsibility over the resident's medical care, including his/her medication use. Within each NH, one GP is appointed as a coordinating physician (CP), and is held responsible for the therapeutic policy of the NH, including the medicines' pathway. Medicines are routinely supplied by community pharmacies, either in unit-doses or in full packs. The contribution of the pharmacist is mostly limited to medication delivery as activities such as medication review are not (yet) reimbursed in Belgium. Medication administration is performed by nurses and care aids. Both are also involved in the monitoring of residents with regard to their medication. Nurses and care aids are therefore easily accessible points of contact for nursing home residents (NHRs) and informal caregivers for questions and remarks regarding the resident's medication.

Quality coordinators are in control of the effective and efficient organization of processes in the NH, including but not limited to the medicines' pathway. In this regard, they are responsible for regularly assessing the quality of all procedures and for implementing changes when improvement is deemed necessary. Nursing homes are obliged to report twice a year on the performance of a set of quality indicators (QIs) with regard to the care they provide.[10] Furthermore, Health Inspection, instituted by the Flemish Government, regularly performs audits of the care provided and of care processes performed in NHs.[11] Data obtained through both quality assessment strategies (i.e. reported QIs and health inspection reports) are freely accessible for the general public, resulting in questions and concerns about the quality of care, including the medicines' pathway.

2.2. Design

A quality assessment instrument to support NHs to asses and reflect on the quality of their medicines' pathway was developed by means of a stepwise approach. First, the framework developed by Strauven et al.[9] was translated by the research team in a two-part quality assessment instrument, containing a set of QIs on the one hand and a self-reporting performance questionnaire on the other hand. Subsequently, a feasibility study was performed regarding the measurement of QIs, followed by two pilot studies to optimize the instrument. As defined by the National Institute for Health Research (UK), a feasibility study is conducted prior to a main study and tends to answer the question 'Can this be done?'.[12] In this particular case, the feasibility study evaluated whether NH staff perceived the developed QIs as measurable and evaluated how difficult it is for them to collect the data (i.e. numbers) necessary to calculate them. A pilot study, on the other hand, is a smaller version of a main study (and thus collects actual data by means of the developed intervention or approach) to test if the components of the main study can work together.[13] Hence, the pilot studies provided insight in the feasibility of the quality assessment instrument as a whole and the meaningfulness of the results it delivered. To end, a generic qualitative study using focus groups was performed with the objective to formulate a set of recommendations for the implementation of the quality assessment instrument in daily NH practice.

All studies took place between February 2017 and March 2022. The feasibility and first pilot study did not require ethical approval since no personal data of participants were collected. The second pilot study and the focus group study were independently approved by the Ethics Committee Research UZ/KU Leuven (MP 015777 and MP017839, respectively).

2.3. Development of assessment instrument by research team

The research team drafted a two-part quality assessment instrument based on the BPs of the medicines' pathway: a set of QIs and a self-reporting performance questionnaire. Best practices deemed quantifiable by the research team were translated into QIs, consisting of a numerator and a denominator, and expressed in percentages. Best practices deemed unquantifiable were integrated into a self-reporting performance questionnaire with response options 'Always', 'Often', 'Sometimes', 'Rarely' and 'Never' (i.e. a 5-point Likert scale). The response option 'Inapplicable' was also available.

2.4. Feasibility study, focusing on the QI (2017)

A feasibility study, focusing on the QIs developed by the research team, was performed with quality coordinators from participating NHs. Nursing homes were recruited from the intervention group of the Come-On study, through e-mail and follow-up phone calls. For participation in Come-On, NHs with at least 35 residents were eligible. No other inclusion or exclusion criteria were applied.[14] During an individual interview with a member of the research team, quality coordinators were asked to score the feasibility of measuring each proposed QI by means of a Likert scale: 'Always measurable', 'Measurable with little effort', 'Measurable with big effort', and 'Not measurable'. To do so, quality coordinators were given a summary on paper, describing a specific KA, the related BP, the QI defined as numerator and denominator, and instructions on how to measure the QI in the NH. Quality coordinators were asked to expand on their answer regarding the QI's feasibility and the potential sources for the information needed to calculate the QI, and to provide extra comments or suggestions. An example of such summary used during interviews is provided in Supplementary file 1 'Example of a QI Summary'. To optimize the feasibility of each QI, the research team held meetings to discuss the results of the interviews, and subsequently modified the description of the QIs and the related instructions where deemed necessary. The research team (SB, JD, AG, VF, JG, GS) included members who were inexperienced regarding the medicines' pathway in NHs and others who were very familiar with it, and consisted of both female and male researchers with backgrounds in pharmacy and medicine.

2.5. Pilot study 1: applying the two-part instrument consisting of a BP-based performance questionnaire and a set of QIs (2019–2020)

Following feasibility testing, the resulting quality assessment instrument, consisting of a BP-based performance questionnaire and a set of QIs, was pilot tested. Nursing homes in Flanders that were included in the Come-On study were invited to participate by mail and subsequently by phone when no respone was received.[14]

To assist in the measurement of QIs, a working document was

constructed in Excel®. In this working document, the requested numbers could be entered, which then resulted in the automatic calculation of the corresponding QI. A manual with instructions on how to collect the requested numbers and calculate the QIs was also developed. Both documents were sent to the quality coordinator of each participating NH, who was then in charge of the necessary data collection and was requested to return the Excel® file to the research team once completed.

The performance questionnaire was operationalized in Limesurvey®, an online survey platform, and subsequently sent to the quality coordinator of each participating NH. Quality coordinators were invited to complete the questionnaire themselves and to further distribute the questionnaire to the CP, head nurses and pharmacist of the NH and to ensure that all NH staff involved in the medicines' pathway independently completed the questionnaire.

Both data collection methods (i.e. the Excel® file and questionnaire) included free-text fields that allowed respondents to make suggestions or remarks with regard to the quality assessment instrument. Descriptive statistics were applied to describe response rates and the results of the quality assessment.

2.6. Pilot study 2: applying a quick scan, followed by a detailed scan (2020–2021)

Following the results of the first pilot study, an additional self-report instrument was developed, called the quick scan. This was done to identify the KAs with the highest priority, which could then form the starting point for the more detailed BP-based performance scan, from now on called the detailed scan. Letting a quick scan precede, allows to limit the detailed scan to the BPs associated to the priority KAs. A method that has been successfully used in healthcare to identify quality aspects with the highest priority is the importance-performance analysis (IPA), in which respondents are asked to score both the importance and current performance of items under assessment (i.e. KAs).[15,16] The results of this analysis can be visualized on an IPA-graph that plots performance on the x-axis and importance on the y-axis. Four quadrants are formed in this process: "Concentrate Here" (high importance, low performance), "Keep up the Good Work" (high importance, high performance), "Low Priority" (low importance, low performance), and "Possible Overkill"(low importance, high performance).[17]

As the IPA was meant to be a quick (and broad) scan, the only criterion applied with regard to respondents in this second pilot study, was that they needed to be involved in the medicines' pathway of the NH. Respondents were asked to score the importance of each KA (i.e. How important is it that the KA is performed as described?) by means of a 4-point Likert scale, including response options 'Very important', 'Rather important', 'Rather not important', and 'Not important'. Likewise, respondents were invited to score the performance of each KA (i.e. To what degree is the KA performed as described?) using a 5-point Likert scale with response options 'Absolutely so', 'Rather so', 'A little', 'Rather not', 'Absolutely not'. Once again, Flemish NHs that took part in the Come-On study were invited to participate by mail and telephone, independent of their participation in the first pilot study.[14] Questionnaires were made available in Qualtrics®, an online survey platform, and were sent to the quality coordinators of participating NHs. Quality coordinators were invited to complete the questionnaires themselves and to further distribute the quick scan to NH staff they considered relevant (CP, GPs, head nurses, and pharmacist).

Per NH, importance and performance scores were calculated in SPSS® by determining the proportion of respondents that indicated a KA was 'Very important' or 'Rather important' (i.e. importance score), and performed 'Rather so' and 'Absolutely so' (i.e. performance score). Subsequently, an IPA graph was drafted for each NH using 80% as a cut-off value to determine the quadrants. As such, KAs with importance scores $\geq$80% and performance scores <80% were identified as priority KAs as they situated in the "Concentrate Here" part on the graph.[17] Of these priority KAs, the quality was subsequently investigated by means of the detailed scan. When starting the detailed scan, respondents (i.e. CP, GPs, quality coordinators, head nurses and pharmacists) needed to select the priority KAs that were identified in their NHs by means of the quick scan. To support this, NHs received a report with their results of the quick scan, as well as individualized instructions for the completion of the detailed scan.

Both questionnaires included free-text fields that allowed respondents to make suggestions or remarks with regard to the quality assessment instrument. Throughout this pilot study, two focus groups were performed with quality coordinators of the participating NHs with the aim to further elaborate on the quality assessment instrument's feasibility. Focus groups were audio-taped and subsequently summarized in a narrative manner. Summaries were analyzed inductively.

2.7. Qualitative study: recommendations for the implementation of the quality assessment instrument (2021)

In a final phase of instrument development, a generic qualitative study was performed, allowing to discover and understand the perspectives of people involved.[18] This study aimed to formulate recommendations for the implementation of the newly developed quality assessment instrument. Focus groups were performed with a purposive sample of stakeholders, including participants from earlier pilot studies, members from professional associations, and supplying pharmacists. Each focus group started with an introduction on the quality assessment instrument. Subsequently, participants were asked to make suggestions on the implementation of the instrument in daily practice. The outline of the focus group guide is shown in Supplementary file 2 'Focus group topic guide'. Focus groups were held online via Microsoft Teams, recorded and thereafter transcribed ad verbatim. The Qualitative Analysis Guide of Leuven (QUAGOL) supported the inductive analysis of the transcripts.[19] Analysis was performed by a team of all female researchers with a background in pharmacy, consisting of both inexperienced and highly experienced researchers regarding the quality of the medicines' pathway in NHs as well as the execution of qualitative research (AD, EE, EV).

3. Results

An overview of the stepwise approach, including the main findings from each step, is provided in Fig. 1.

3.1. Development of assessment instrument by research team

The draft quality assessment instrument included a set of 63 QIs and a 84-item BP-based performance questionnaire. Of these items, 33 were aimed to be answered by the CP, 71 by head nurses and 38 by pharmacists. As an example, Table 1 shows one KA of the prescribing process, together with two associated BPs, and the translation of these BPs into either a QI or a question for the performance-based self-report questionnaire.

3.2. Feasibility study, focusing on the QI (2017)

Four quality coordinators from four different NHs participated in the feasibility scoring of the QIs.

Feasibility scores showed that only 9 QIs (14.28%, N = 63) were perceived as 'Always measurable' (see Table 1 in Supplementary file 3 'Additional tables and figures of feasibility study'). These QIs related to the processes of medication prescribing (n = 2), purchase and ordering (n = 1), storage (n = 2), and administration (n = 4) and were retained in a final set of QIs, accompanied by instructions on how to calculate them. Moreover, one QI related to the prescribing process was split in two as it encompassed two separate components: the 'proportion of prescriptions and medication plans signed by the resident's GP' was divided into the

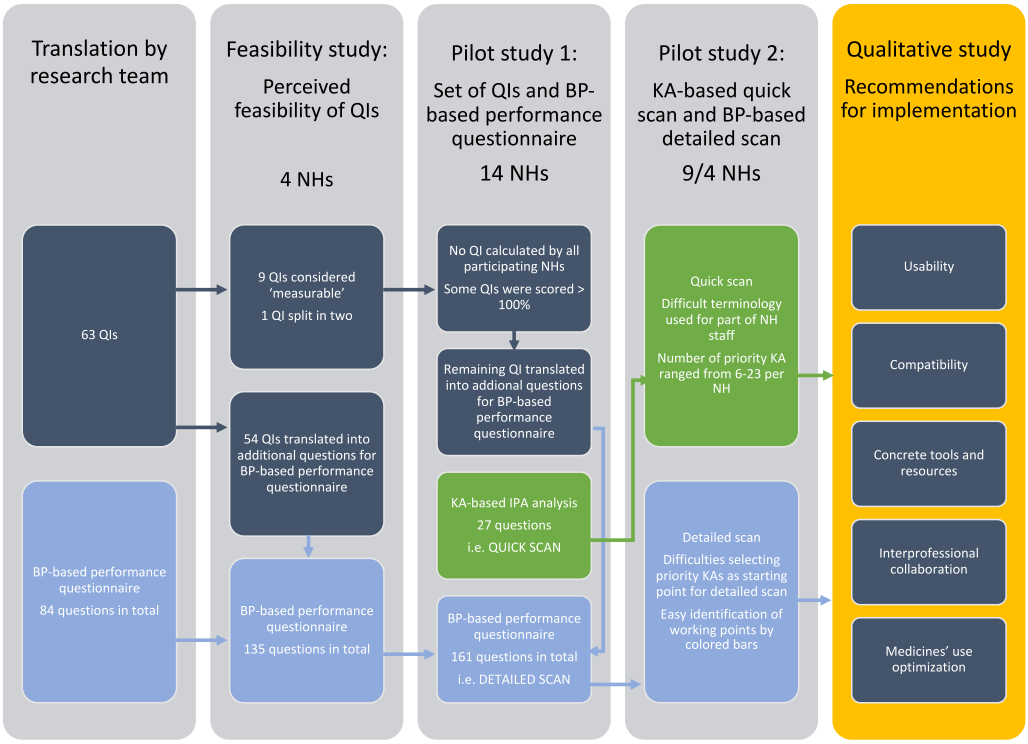

Fig. 1. Overview of the stepwise development of the quality assessment instrument (BP = best practice, IPA = importance-performance analysis, KA = key activity, NH = nursing home, QI = quality indicator).

Table 1
Example of a key activity and two associated BPs of the prescribing process, and their translation into the draft quality assessment instrument (GP = general practitioner, HCP = healthcare professional, QI = quality indicator, PQ = performance questionnaire).

Key activity	Best practices	Quality assessment	
Consultations are adequately planned, prepared and performed in order to allow a review of the resident's drug therapy and appropriate prescribing.	The GP visits his patient on a regular basis (i.e. at least once a month), depending on the individual care need and health status of the resident.	QI	% of current residents with at least one consultation per month during the last year
	The GP plans his next consultation in agreement with the (head)nurse.Every consultation is registered in the agenda and/or communicated to the relevant and involved HCPs beforehand.	PQ	How often does the GP schedule his next consultation with the (head)nurse? *Addressed to: CP and head nurses*
		PQ	How often are GP consultations registered in the agenda and/or communicated to involved HCPs? *Addressed to: head nurses*

'proportion of medication plans signed by the GP', and the 'proportion of prescriptions signed by the GP'.

As the aim was to develop an instrument that is easily accessible for NH staff and allows them to perform an accurate assessment of the quality of the medicines' pathway that helps them to set up quality improvement initiatives, it was decided to translate QIs scored as 'measurable with little effort' (n = 18), 'measurable with big effort' (n = 15), 'not measurable' (n = 14), and 'inapplicable' (n = 7) to additional questions for the performance questionnaire. Several of these questions were aimed to be answered by the quality coordinator, a HCP who was not yet defined to be involved in the first version of the BP-based performance questionnaire, resulting in an expansion of the target population.

3.3. *Pilot study 1: applying the two-part instrument consisting of a BP-based performance questionnaire and a set of QIs (2019–2020)*

Fourteen NHs participated in the first pilot study. In total, 11 CPs, 15 head nurses, 12 pharmacists, and 13 quality coordinators of these NHs completed the BP-based performance questionnaire. The response rate per question ranged from 62% to 100%. Low response rates (<80%) were seen for one question targeting head nurses, two questions for pharmacists, and five questions for quality coordinators (see Table 1 in Supplementary file 4d 'Additional tables and figures of pilot study 1'). Feedback on the questionnaire, provided by CPs, further indicated that the majority of questions targeting them would be more suitable for GPs. Following this feedback, and considering the low response rates for multiple questions, questions were revised with the aim to target the right type of HCP, including GPs. Furthermore, quality coordinators indicated questions to be difficult, which led to modification of several questions for clarification.

Ten out of 14 NHs completed the Excel® file with QIs. The response rate per QI ranged from 60% to 90% of the NHs. This indicates that no QI was calculated by all participating NHs. One QI (i.e. % of temperature deviations of the fridge in which medication is stored, for which action was taken during the past year) was calculated by less than 80% of the NHs.

Results of the QI measurement showed that several QIs scored 100% in several NHs. Furthermore, multiple QIs scored higher than 100% in one of the participating NHs (see Fig. 1 in Supplementary file 4 'Additional tables and figures of pilot study 1'). The finding that QIs scored

higher than 100% indicated that measuring QIs was not performed accurately by nursing home teams and that the process of measuring QIs either lacked clarity or was perceived unfeasible. Keeping in mind the rationale for instrument development, the research team decided to translate the remaining QIs into additional questions for the performance questionnaire. This resulted in an expansion of the performance questionnaire, now investigating all BPs of the medicines' pathway and from here on entitled the 'detailed scan'.

As the medicines' pathway is a complex process that consists of a large number of BPs (N = 137), the detailed scan (as it now covers all these BPs) is very extensive. Hence, its completion, and subsequently its results indicating the scope and content of necessary quality improvement initiatives, may overwhelm involved HCPs and NHs, as has been the case in prior quality improvement projects.[20] Therefore, the research team decided to add a 'quick scan' to the quality assessment instrument, to be completed prior to the detailed scan. This quick scan assesses the quality of the medicines' pathway at the level of its KAs, opposed to the detailed scan that assesses the quality of its BPs, and was added to identify the KAs with the highest priority. Hence, priority KAs subsequently form the starting point for the detailed scan (i.e. limit the detailed scan to the BPs associated to the priority KAs).

3.4. Pilot study 2: applying a quick scan, followed by a detailed scan (2020–2021)

Nine NHs participated in the second pilot study. Overall, 4 quality coordinators, 4 CPs, 6 pharmacists, 16 head nurses, 21 nurses, 19 care aids, and 1 GP filled in the quick scan. An example of an IPA graph, resulting from the quick scan in one of the participating NHs, is provided in Fig. 2. In this NH, 9 priority KAs were identified. Across NHs, the number of identified priority KAs ranged from 6 to 23 per NH (see Table 1 in Supplementary file 5 'Additional tables and figures of pilot study 2'). One KA (i.e. A2) was identified as a priority in all nine participating NHs. This KA related to the process of (re-)admission and states that shortly after (re-)admission, within 3 months, a critical evaluation and possibly a modification of the medication plan should be performed (i.e. medication review), preferably by an interdisciplinary team that involves all relevant HCPs such as the GP, (head)nurse, pharmacist and coordinating physician.

Four of the 9 NHs further investigated the quality of their priority KAs. Difficulties with selecting the right KAs to start the detailed scan, was named as the major reason for not proceeding with the detailed scan by NHs that dropped out. Overall, the detailed scan was completed by 5 quality coordinators, 3 CPs, 6 pharmacists, 24 head nurses, and 9 GPs. An example of a result from the detailed scan for one participating NH, concerning key activity A2, can be found in Fig. 3.

During the focus groups, participants expressed appreciation for the sequential approach (i.e. the quick scan followed by the detailed scan) of the quality assessment instrument. Regarding the quick scan, participants indicated some questions and used terminology to be difficult for some NH staff members (e.g. care aids). Consequently, the suggestion was made to target the questions of the quick scan to specific types of HCPs within or working for the NH, as is the case for the detailed scan. Likewise, the fact that the detailed scan targets questions to specific types of HCPs was seen as an added value by participants. The start of the detailed scan was described as difficult. In particular, the selection of the right KAs (i.e. as identified by the quick scan) was often executed incorrectly, as was also noted by the research team during data analysis.

3.5. Qualitative study: recommendations for the implementation of the quality assessment instrument (2021)

Three focus groups with a total of 11 participants (i.e. pilot study participants (n = 5), members from professional associations (n = 2), and supplying pharmacists (n = 4)) were performed. Five main recommendations were derived from the group discussions. Supportive quotes can be found in Supplementary file 6 'Participant recommendations for instrument implementation'.

1) to improve the instrument's usability

During focus groups, the quality assessment instrument was named a feasible and clear instrument to evaluate the quality of the NH's medicines' pathway. The quick scan was appreciated as a means to set priorities. Additionally, participants indicated that the presentation of the results of the detailed scan (i.e. the colored stacked bar charts) provided a clear image of the perception of the quality of the medicines' pathway and easily allowed the identification of specific working points. Nevertheless, participants emphasized the importance to provide the instrument in an easily accessible way to enhance its usability and implementation. To obtain this, participants suggested to eliminate the manual selection of processes and KAs in the detailed scan by

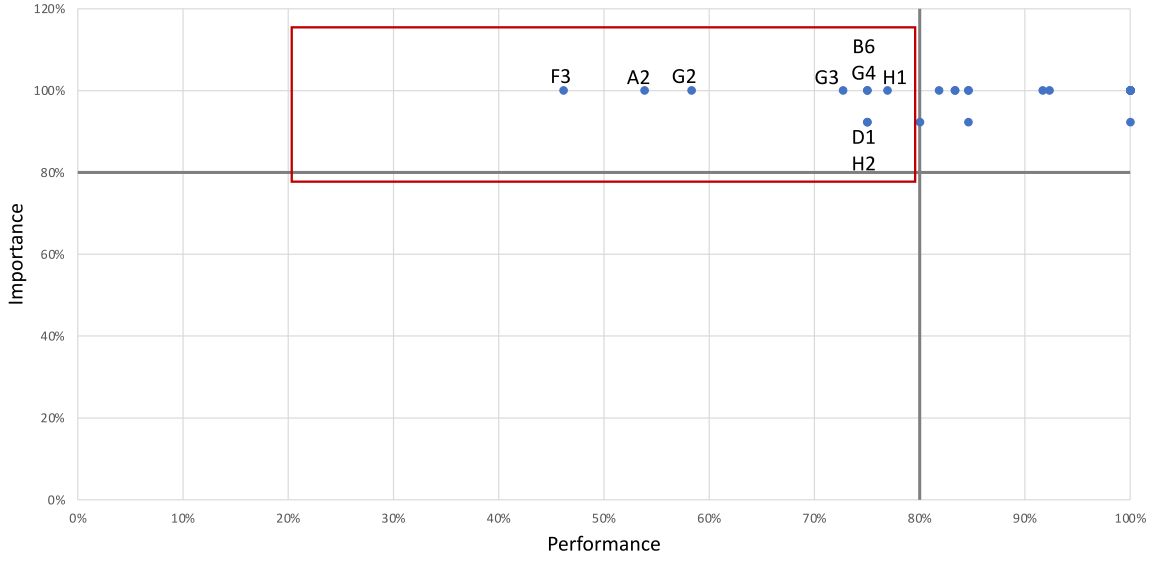

Fig. 2. Example of IPA graph with priority KAs (n = 9) framed in red. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

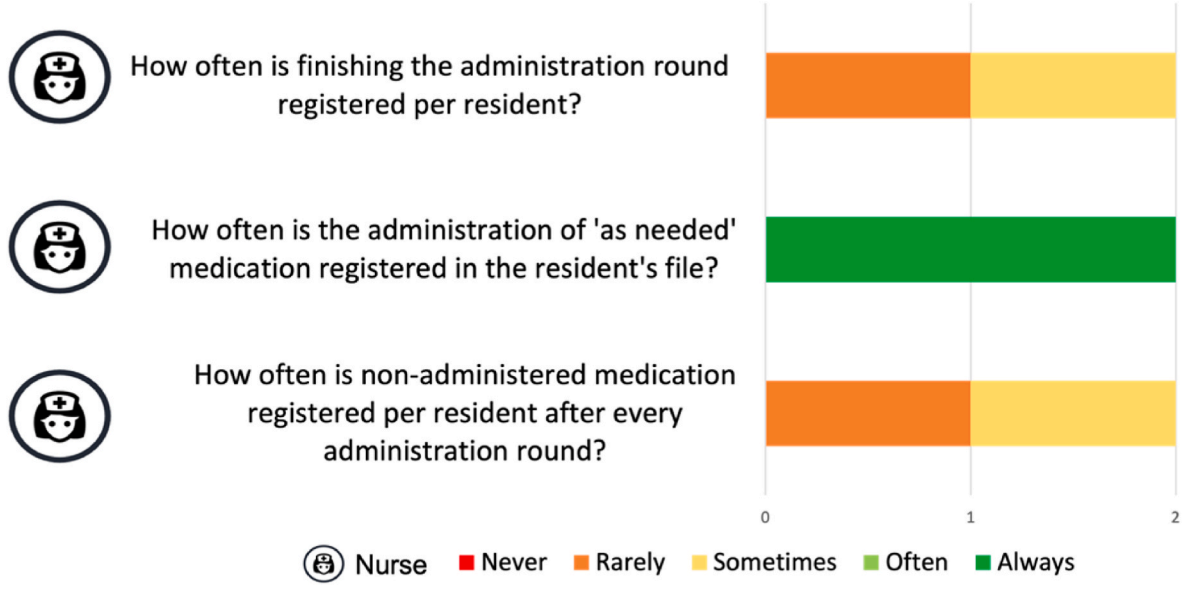

Fig. 3. Example of a result of the detailed scan (key activity G4, identified as priority in NH3), completed by 2 nurses.

automating the transition between the two questionnaires.

2) to work towards the instrument's compatibility with existing quality management systems

Most NHs already used a certain system to manage the quality of their care and services. In this regard, the question was raised as to whether or not the instrument should be fully integrated in existing quality management systems. Preferences of participants ranged from full integration of the quality assessment instrument to the development of an independent standalone platform. Nevertheless, based on participants' input, it became clear that the compatibility of the quality assessment instrument with existing quality management systems was more important than the full integration of the instrument therein.

3) to provide concrete tools and resources for quality improvement

Participants expressed a need for concrete tools and resources for quality improvement to be made available on the same platform as the quality assessment instrument. Such tools and resources could include an overview of the best practices of the medicines' pathway, an overview of relevant information on medication policy in NHs (i.e. law and legislation), and material to involve NHRs and informal caregivers in the medicines' pathway and quality measurement. Furthermore, participants unanimously expressed an interest in benchmarking opportunities.

4) to enhance interprofessional collaboration

Participants agreed that interprofessional collaboration is key to a qualitative medicines' pathway. As such, the inclusion of all involved healthcare professionals in the quality assessment was seen as an advantage. Likewise, tools and resources for quality improvement that could be provided on the platform should maintain an interprofessional focus and enhance collaboration between all involved HCPs.

5) to support medicines' use optimization at resident level

Besides the need for support at the level of the medicines' pathway (i.e. processes), participants suggested the platform should also support the optimization of medicines' use at resident level. In this regard, support and tools for the execution of medication reviews would be appreciated.

4. Discussion

To the best of our knowledge, this paper is the first to describe the development of a quality assessment instrument that allows NH staff to explore the quality of the different processes of the medicines' pathway. More specifically, the quality assessment instrument is promising in terms of supporting NHs to set priorities and identify working points at the level of their NH. This is important because, as results of the pilot studies show, the quality of the pathway varies between NHs. Moreover, the large number of BPs makes it unfeasible to optimize the entire pathway at once.

The slow and stepwise approach, along with the involvement of end users, allowed the development and optimization of a quality assessment instrument that meets the needs of NHs and that stimulates reflection regarding the quality of their medicines' pathway. Throughout instrument development, several modifications were made. Initially, the objective was to develop an assessment methodology to measure and standardize quality of care, in particular medication processes, in NHs. Hence, an approach using QIs was explored. Results showed, however, that NH staff considered most of the formulated QIs too difficult to be measured. Additionally, as noted during the first pilot study, the remaining QIs – although initially considered to be easily measurable – were most often calculated incorrectly. Results suggested that in most cases a qualitative estimation was made of the implementation status of the BP being targeted by the QI (i.e. "we always do this") by just one member of NH staff (e.g. quality coordinator), instead of performing a detailed numeric calculation by consulting the correct HCPs to collect the necessary numbers or data. These findings imply that NHs might not feel the need for medication-related QIs or that they do not have the resources to accurately calculate these QIs. The latter is certainly the case for the NHs that do not have an electronic medication management system in place (e.g. to register medication ordering and delivery). A recent policy report from the Flemish Government (2022) highlighted that NHs need an approach to identify quality gaps in their medicines' pathway in a way that helps them to subsequently take action to improve their medication processes where needed.[21] This supports the observation that the performance questionnaires seem better placed to allow NH staff to evaluate and reflect on the quality of their medicines' pathway. Indeed, results of these questionnaires directly provide input to NH teams to locally set up quality improvement

initiatives. As this became the main objective of the instrument, opposed to directly provide policy makers or researchers with a quantitative overview of the quality of the medicines' pathway in NHs, translating the remaining QIs into performance questions was considered a logical next step. Still, QIs are being used worldwide to assess and standardize the quality of care in NHs and available literature suggests consensus that QIs are the way forward to monitor healthcare quality, also in NHs.[22] Future research should therefore continue to investigate which QIs could be measured to assess (aspects of) the quality of the medicines' pathway in NHs, and how the quality assessment instrument described here can contribute to this. Currently, measurement of QIs related to the medicines' pathway in NHs is often limited to an assessment of the prevalence of psychotropic drug use.[23–26] According to the Donabedian model of quality healthcare, the prevalence of psychotropic drug use among NHRs can be classified as an outcome indicator.[27] Based on the quality assessment instrument proposed here, however, process indicators can potentially be developed, which have been shown to be more sensitive to changes in quality of care and to be better suited in providing feedback to set up quality improvement initiatives when compared to outcome indicators.[28,29]

Second, questions in the detailed scan (i.e. performance questionnaire) were revised more than once, leading to several changes in formulation and terminology to improve the questionnaire's clarity. Furthermore, questions were revised with regard to the HCP they addressed. Based on study results and participants' suggestions, two profiles were added to the target population of the quality assessment instrument: quality coordinators and GPs. Several questions were re-addressed to these HCPs, resulting in a quality assessment instrument that targets all involved HCPs as stated in prior research.[9]

The final instrument applies a sequential approach (i.e. the quick scan followed by the detailed scan), which was appreciated by participants as this allows them to use the instrument in a flexible manner. The quick scan helps NH to identify priority areas (i.e. KAs) that are potential sources for a reduced quality of their medicines' pathway. Since all KAs were considered important (>80%) in the pilot study of the quick scan, the need for assessing the importance of each KA may be questioned. Nevertheless, the importance scoring was maintained in the final instrument since importance scores can help to produce a NH-wide support base during decision-making with regard to setting up the necessary quality improvement initiatives.

The results of the detailed scan are presented by means of color codes and indicate which HCPs are involved in the questioned BP (see Fig. 3). Participants indicated that this provides them with a clear picture of potential working points throughout their medicines' pathway or priority KAs.

At the end of the second pilot study, some challenges still needed to be addressed to ensure successful uptake in the NH setting. Several participants expressed concerns regarding the used terminology in the questionnaires. To this end, a glossary of frequently used terminology (e.g. medication review, therapeutic drug formulary) was added at the beginning of both scans. Also, the selection of the prioritized processes and KAs at the start of the detailed scan, was clearly an issue. Hence, it is crucial to tackle this problem when programming the quality assessment instrument into an IT application.

Furthermore, participants of the focus groups made several recommendations that can promote the successful implementation of the instrument. One of these recommendations refers to the need for easy accessible tools and resources for quality improvement – preferably integrated in the tool itself or within the same online platform. This need was clearly felt based on the experience with the current quality assessment initiatives set up by the government (see 'Setting'), providing NHs with an overview of the quality of (certain aspects of) their medicines' pathway and raising awareness on this important topic, but not giving guidance on what a qualitative pathway entails, nor on how to set up and target quality improvement initiatives. In this regard, NH staff need more extensive and continuous support, for which the quality assessment instrument can be a starting point. Listening to participants' remarks and suggestions, the provided support should possess an interprofessional focus. Indeed, previous research has pointed out that a lack of interprofessional collaboration may contribute to the prevalence of medication errors across the medicines' pathway.[2] Last, participants expressed a preference for tools and resources to optimize medication use of individual NHRs. Rightfully so, since a systematic review has shown that the highest number of medication errors relates to the prescribing process of the medicines' pathway and that these contain the highest risk of harm for the individual.[2] However, other processes of the medicines' pathway are challenging as well, and should not be overlooked.

The final quality assessment instrument has potential to support individual NHs in their quality monitoring of the medicines' pathway. Throughout instrument development, valuable lessons concerning quality monitoring have been noted. Most importantly, NHs are in need of a quality assessment approach that allows them to not only evaluate the quality of the medicines' pathway but also supports them in setting up the necessary quality improvement initiatives. In this regard, the presented sequential approach was proven to be a promising strategy. In a context characterized by high work demands and staff shortages, such approach allows NH teams to set priorities and dedicate their time to what really matters. Besides this, it became evident that the development of QIs as quality measures needs thorough consideration as their use did not go to plan. Using QIs requires certain resources to be in place (e.g. electronic medication management system) in order to be meaningful and to be calculated both accurately and systematically. The availability of such resources can vary between organizations or even countries. This potentially explains why QIs are successful quality measures in several countries but not in Belgium. Hence, as our findings highlight once again, it is important to involve end users throughout the development of such indicators in order to ensure feasible and meaningful measures.

Future research should investigate which strategies are needed to support the instrument's wide-scale implementation. Moreover, the quality assessment instrument gives policy makers meaningful insights in what entails a qualitative medicines' pathway in NHs. Upon wide-scale implementation, the results of the assessment using this instrument will provide policy makers information on the quality of the medicines' pathway across NHs. Therefore, future research should also investigate how results obtained with the quality assessment instrument can help policy makers 1) to implement effective strategies for optimization of the medicines' pathway, and 2) to organize benchmarking as a quality improvement strategy.

As the quality assessment instrument focuses on an effective and safe medicines' pathway, and less on the realization of a person-centered medicines' pathway, future research should also explore how NHRs and informal caregivers are involved in the medicines' pathway. Since NHRs (and their informal caregivers) were not included in the development of the framework, their involvement in the different processes of the medicines' pathway remains unclear. Likewise, it is not known how residents and their informal caregivers would like to be involved in this pathway. The knowledge of current resident and informal caregiver involvement practices and their preferences towards involvement will allow an update of the framework, and subsequently the modification of the quality assessment instrument, to make it more person-centered. As such, the instrument will help NHs to achieve not only an effective and safe, but also a person-centered medicines' pathway. Hence, using the instrument will promote qualitative healthcare services as defined by the World Health Organization.[1]

4.1. Methodological considerations

Recruitment of NHs and participants in the different studies that were part of the development process of the quality assessment instrument was mostly executed by means of convenience sampling, which

may have resulted in selection bias. Nursing homes participating may have been more open towards feedback with regard to their medication processes and more motivated to set up quality improvement initiatives, opposed to NHs that did not (voluntarily) participate. Important to consider as well is that only a small number of NHs and HCPs participated in the final qualitative study. More focus groups, or more participants per focus group, might have resulted in additional findings.

5. Conclusion

The initial quality assessment instrument consisted of a combination of quantitative quality indicators and a performance questionnaire for HCPs involved in the medicines' pathway of NHs (i.e. nurses, coordinating physician, pharmacist). A series of feasibility and pilot studies allowed the stepwise optimization of the instrument and resulted in modifications to improve its clarity and feasibility. The final instrument applies a sequential approach: a quick scan based on the principle of an importance-performance analysis with the aim to identify priority KAs, followed by a detailed scan of priority KAs to detect specific working points. Taking into account end users' recommendations will promote a successful implementation of the quality assessment instrument. The quality assessment instrument will give policy makers meaningful insights in what entails a qualitative medicines' pathway in NHs. Moreover, results of quality assessments using this instrument will provide information on the quality of the medicines' pathway, and variation therein, across NHs.

Author statement

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Funding source

The first part of the work (feasibility study) was funded by the National Institute for Health and Disability Insurance (NIHDI) (Belgium). The funding body had no in study design, data collection, data analysis, or the decision to publish the results. The rest of the work was supported by the Research Foundation Flanders [1S75119 N]. Similarly, this organisation was not involved in study design, data collection, data analysis, interpretation of data, writing the manuscript or in the decision to submit the manuscript for publication.

Declarations of competing interest

None.

Acknowledgements

The authors would like to acknowledge all students for their contribution to the development of the quality assessment instrument: Sofie Beirinckx, Anne Goossens, Jessica Gors, Valerie Caubergs, Lieselore Smans, Iris Verbiest, Evelien Engels, and Eline Vroonen.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.sapharm.2023.07.008.

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