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The development of a marker system for Pharmacists' Behavioural Skills

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Abstract

Objectives Pharmacists increasingly require complex behavioural skills to fulfil enhanced roles within healthcare teams. Behavioural marker systems are used to assess behavioural (or non-technical) skills during immersive simulation. This study aimed to develop a marker system for pharmacists' behavioural skills in patient-focussed care scenarios, and to investigate its content validity.

Methods Literature describing existing marker systems and the requisite behavioural skills of pharmacists were presented to two expert panels, alongside video examples of pharmacists in patient-focussed care simulations. The expert panels used this information to develop a new behavioural marker system. A third expert panel assessed the content validity, and the item- and scale-content validity indices were calculated.

Key findings The resulting tool contains four categories, each with three or four skill elements: situation awareness (gathering information; recognising and understanding information; anticipating, preparing and planning), decision-making and prioritisation (identifying options; prioritising; dealing with uncertainty; implementing or reviewing decisions), collaborative working (involving the patient; information sharing; leadership or followership), self-awareness (role awareness; speaking up; escalating care; coping with stress). The scale-content validity index was 0.95 (ideal) and the only item below the acceptable cut-off was 'leadership or followership' (0.7).

Conclusions This tool is the first marker system designed to assess the behavioural skills of pharmacists in patient-focussed care scenarios. There is evidence of good content validity. It is hoped that once validated, the Pharmacists' Behavioural Skills marker system will enable pharmacy educators to provide individualised and meaningful feedback on simulation participants' behavioural skills.

Keywords: education; professional training; teaching methods; CPD

Introduction

Behavioural skills, also known as non-technical skills, can be defined as '*the cognitive, social and personal resource skills that complement technical skills, and contribute to safe and efficient task performance*'[1] and include skills such as leadership, teamwork and communication. These are considered important in pharmacy education, across various countries and stages of training. For example, in the UK, the Foundation Pharmacist Curriculum outlines that pharmacists collaborate with the wider team, and develop advanced skills such as decision-making and leadership.[2] The behavioural skills required of pharmacists have changed significantly in recent years, towards a greater patient-centred role,[3] which necessitates development of complex behavioural skills.[3] In the UK, students complete a four-year undergraduate MPharm degree, followed by a one-year foundation training role, during which they are referred to as trainee pharmacists.[4] Within their next few years, pharmacists will be expected to independently prescribe,[4] a task which requires a complex array of behavioural skills.[5]

Simulation-based training offers an opportunity to assess complex behavioural skills.[3] Healthcare simulation, which aims to magnify (or replace) real-world clinical experience,[6] involves rehearsal of clinical duties. Simulations are usually followed by structured debriefings. These differ from feedback, because learning is co-created by facilitators and learners through reflective thinking.[7]

There has been a call for more simulation-based assessments within pharmacy, especially those that are integrated rather than OSCE-style checklists.[8] Behavioural marker systems (BMS) are an example of an integrated assessment tool. BMS include overarching categories, skill elements and observable positive and negative behaviours. BMS have been developed across various disciplines to aid recognition and observation of behavioural skills, particularly within immersive simulation. Examples include Anaesthetists' Non-Technical Skills (ANTS) [9] and Non-Technical Skills for Surgeons

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(NOTSS).[10] Within pharmacy, a single BMS (Pharmacists' Non-Technical Skills (PNOTS[11])) has been developed for community pharmacists, with no BMS for primary care or hospital pharmacists.

BMS are designed for use by specific learner types within specific contexts.[1] For example, the behavioural skills required by pharmacists to update stock or to manage staff are different than those required for treating sick patients. Within the same context, the behavioural skills required by pharmacists, doctors and nurses treating a sick patient may differ. Across all care settings, pharmacists participate in patient-focussed care. This aspect of their role is arguably the most critical, in terms of the likelihood of harm when making a mistake, and the complexity of skills involved. For this reason, BMS are often designed specifically to assess behavioural skills when managing sick patients.[12]

The PNOTS BMS for community pharmacists, is not specific for patient-focussed care settings. If a BMS was available for assessing the behavioural skills of pharmacists in patient-focussed care settings (hospital, community and primary care), it would provide a structure for delivering individualised and meaningful feedback. Such feedback may help pharmacists to develop the complex behavioural skills required for their expanding roles within healthcare. A BMS may also provide a blueprint for assessment of such skills.

Aim

The original aim of this study was to develop a BMS for trainee pharmacists, however, during the process of development, pharmacy educators felt that the skills in the BMS were transferable to all levels of pharmacy experience. The ultimate aims of this study were therefore:

1. To develop a BMS for pharmacists' behavioural skills in patient-focussed care scenarios.
2. To investigate the content validity of the BMS, and amend it as required.

Methods

Ethics

Ethical approval for this study was granted by the NHS Education for Scotland Research Ethics Committee (approval number NES/Res/30/22/Pharm). Study participants were volunteers and were free to leave the study at any time without giving a reason. Participants received information about the study before consenting, and completed written consent.

Study design

Literature regarding pharmacists' behavioural skills and two existing BMS were presented to two development panels, alongside video examples of pharmacists in patient-focussed care simulated scenarios, to help them develop a new BMS. The draft BMS was then sent to a third expert panel to assess content validity.

Aim 1: Developing the BMS

Use of literature

A recently published literature review investigating the behavioural skills required by pharmacists[13] formed part of the information provided to panel members. In addition, two BMS were chosen as appropriate starting points:

1. PNOTS[11]: This BMS was chosen as it is the only BMS produced specifically for pharmacists. It is designed for community pharmacy only. The team did not want to use it in its current form, as the designers had chosen to remove the teamwork category, and it was thought that this may be important in the context of patient-focussed care scenarios.
2. Medi-StuNTS[12] (Medical Students' Non-Technical Skills): This BMS was chosen as, in this context, trainee pharmacists attend interprofessional education sessions with medical students. Final-year medical students and trainee pharmacists were considered to be at a similar level of training, having each completed four years of undergraduate education with neither group yet permitted to practice independently. The Medi-StuNTS BMS contains elements such as 'followership', which may also be relevant to trainee pharmacists.

Categories and elements in Ashour *et al.*'s literature review and the two BMS were summarised (Table 1) to further enable panel members to make comparisons.

Use of videos

Trainee pharmacists and post-foundation pharmacists were consented to video record their simulation training to aid the panels in their decisions regarding the importance of different behavioural skills. Three videos contained trainee pharmacists undertaking interprofessional simulated patient-focussed care scenarios with final-year medical students (who were also consented). Two videos included post-foundation pharmacists in community or primary care scenarios, participating alone but communicating with colleagues by telephone. The videos were not scripted, but were genuine educational events. The scenarios were designed to involve complex decision-making and collaboration. They were patient-focussed care scenarios such as acute stroke. A synopsis of the included scenarios is shown in Supplementary Material S1. Scenarios were designed to challenge participants beyond their usual level of comfort, and lasted between 10 and 20 min. The videos chosen were a convenience sample; they included any participants who consented to participate within the study time period.

Recruitment for expert panels

Email invitations were sent to 13 pharmacy simulation educators who had been involved in simulation design or delivery (identified by the Associate Dean for Simulation in Pharmacy) and six non-pharmacist clinical education researchers with experience of designing or evaluating BMS (identified by the Lead for Research at the Scottish Centre for Simulation and Clinical Human Factors). The team planned to recruit between six and eight participants (including a mixture of pharmacy simulation educators and non-pharmacist simulation experts) for each of the two development panels (a total of 12–16 panel members).

Facilitating design of the tool (Panel 1)

Members of Panel 1 were provided with Ashour *et al.*'s literature review and details of PNOTS and Medi-StuNTS, and asked to review these before the meeting. During the meeting, the principal researcher (SES) facilitated a discussion between

Table 1 Summary of categories and elements explored by the literature review,[13] PNOTS[11] and Medi-StuNTS[12]

Category	Ashour *et al.*'s literature review	PNOTS	Medi-StuNTS
Leadership	Managing conflicts and difficult situations Authority Accountability Reporting	Managing conflicts and difficult situations Promoting a safe working environment Supporting the pharmacy team	*Not included*
Teamwork and communication	Co-ordination Information sharing	*Not included*	Establishing a shared mental model Demonstrating active followership Patient involvement
Task management	Delegating Dealing with interruptions Time management Resource management	Delegation Dealing with interruptions and distractions *Prioritisation*[1]	*Not included*
Situation awareness	Being aware Recognising Anticipating	Being aware and recognising cues from the environment Anticipating future states	Gathering information Recognising and understanding information Planning, preparing and anticipating
Decision-making and prioritisation	Making well-informed decisions Information gathering/questioning strategies Implementing decisions with confidence	Gathering information Analysing relevant facts and selecting options Implementing decisions suitably	*Prioritising*[1] Recognising and dealing with uncertainty Reviewing decisions
Self-awareness	*Not included*	*Not included*	Role awareness Coping with stress Speaking up
Escalating care	*Not included*	*Not included*	Situation Awareness Decision-making and prioritisation Teamwork and Communication Self-awareness

[1]The element 'prioritising'/'prioritisation' is found in different categories within the two BMS.

panel members regarding their thoughts about the existing literature and relevant BMS, and how they related to the context of patient-focussed care scenarios for trainee pharmacists. The panel were provided with three videos involving trainee pharmacists, as described above, which they could watch as a group to generate ideas and provide context. The principal researcher facilitated a discussion about which categories and elements would be most appropriate for trainee pharmacists in patient-focussed care scenarios. The panel then split into pairs including one pharmacist and one non-pharmacist. Each pair were assigned a category, and were asked to create a list of positive and negative behaviours for the elements within their category. The categories, elements and behaviours were collated by the principal researcher, and a summary document was produced. All members of Panel 1 reviewed the document, making changes and comments. Changes were made if the majority of the panel agreed that they were needed.

Facilitating design of the tool (Panel 2)

Members of Panel 2 were provided with literature and BMS summaries as in the first panel, and also the document produced by Panel 1. They were asked to critically read these before the meeting. During the panel meeting, the principal researcher facilitated a discussion between the panel members, focussing on whether panel members agreed with the Panel 1 decisions about categories, elements and behaviours. Panel 1 had suggested that the BMS may be appropriate for all pharmacists and not only trainees. Panel 2 therefore had access to two videos of simulations involving post-foundation pharmacists in patient-focussed care settings. These videos were reviewed by Panel 2 during their meeting, to facilitate a discussion about the appropriateness of using the BMS for post-foundation pharmacists. After the meeting, the principal researcher made all suggested changes to the BMS. Document review and changes proceeded as per Panel 1.

A summary of the plan for each panel is given in Figure 1.

Aim 2: Content validity of the BMS

Recruitment for panel members

All pharmacy simulation educators in Scotland who had been invited to but were unable to attend the development panels were invited by email to participate in the content validity exercise. Participants were encouraged to identify any other possible interested parties (snowball sampling).[14] It is thought that ~5–10 participants are required for content validity assessment,[15] and therefore emails were sent to all 14 pharmacy simulation educators who were identified, anticipating that not all would participate.

Content validity questionnaire

Respondents were asked to read the BMS (with explanatory notes) and rate each skill element as 'essential', 'useful (but not essential)' or 'not useful or essential', as has been done for previous BMS.[16] Additional comments were sought, and respondents were asked to note any elements that they felt were important that had not been included in the BMS. The content validity questionnaire is shown in Supplementary Material S2.

Quantitative data analysis

Data were collated in Microsoft Excel version 2205. Content validity was assessed using the Item-Content Validity Index (I-CVI)

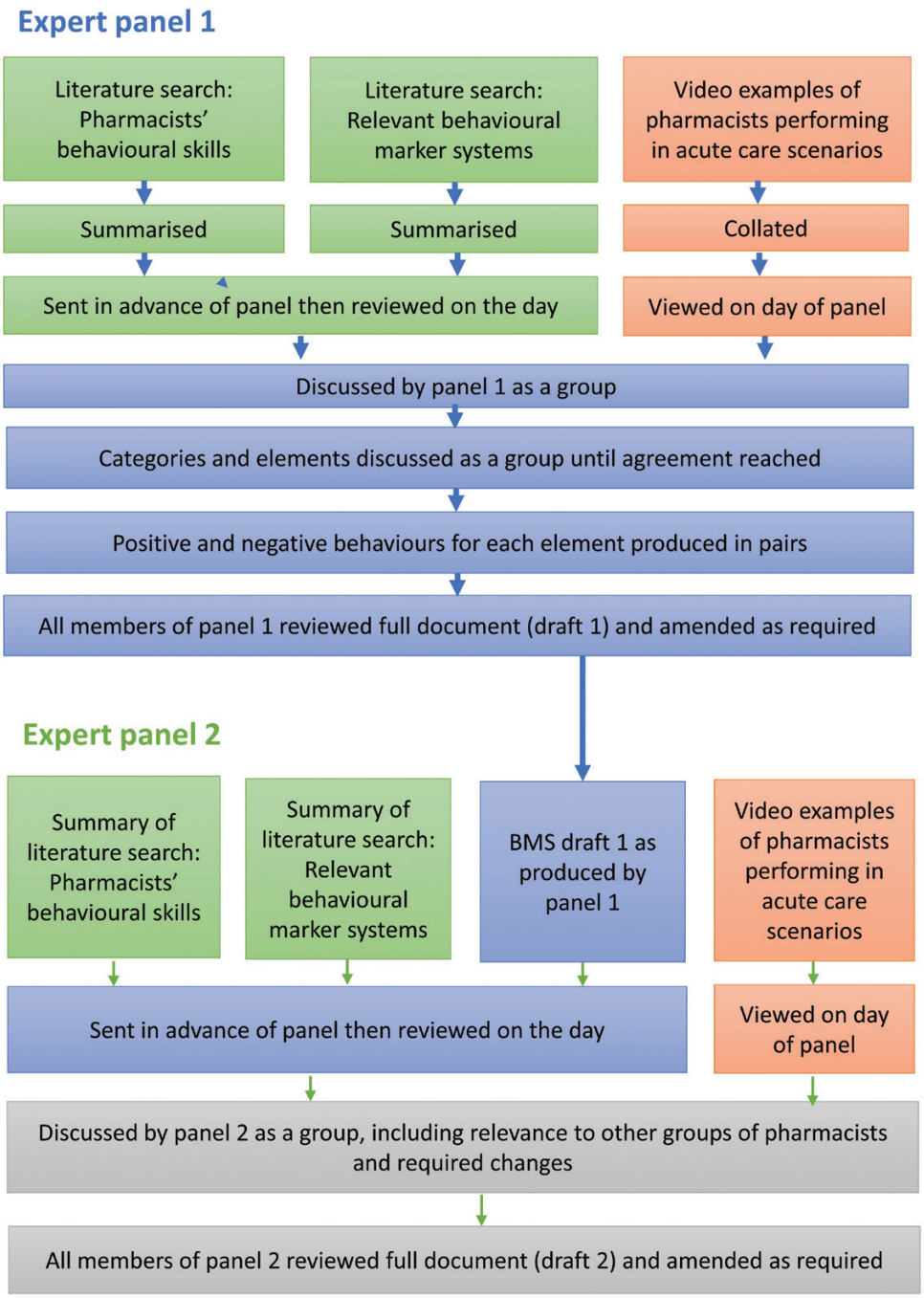

Figure 1 Steps taken to facilitate BMS design with expert panels.

and Scale-Content Validity Index (S-CVI).[17] These methods of assessing content validity are commonly used in validation studies of BMS.[16, 18–21] The I-CVI[17] was calculated for each skill element. I-CVI is the proportion of respondents rating each item as essential. An I-CVI cut-off of >=0.78 was chosen to indicate good content validity.[15, 16] S-CVI[17] was calculated to measure the content validity of the system as a whole. S-CVI is the mean of the I-CVI values for the system. Cut-offs of 0.8 (acceptable) or 0.9 (ideal) were chosen, in keeping with previous studies.[16]

Qualitative data analysis

Two researchers independently analysed and coded the free text comments from the content validity questionnaire into inductive categories that related to changes to the BMS. Coding was compared and disagreements were discussed until consensus was reached. The research team, a group of seven simulation experts and/or pharmacy educators, then discussed the suggestions to reach consensus about which changes should be made. It was intended to use a majority vote in the case of disagreement, however after discussion, full consensus was achieved.

Results

Aim 1: Developing the BMS

Panel members

Eight pharmacy simulation educators and five non-pharmacist simulation experts agreed to attend the development panels.

Three panel members were subsequently unable to attend. Characteristics of participating panel members are shown in Table 2.

Pharmacy simulation educators included pharmacists with dedicated education roles and experience of facilitating simulation for trainee pharmacists. At least six of the pharmacy simulation educators were also practising pharmacists, and at least one practising pharmacist was present in each of the three panels. Simulation experts were non-pharmacist clinicians who had previous experience of designing, evaluating and utilising BMS.

From the authorship team, V.R.T., J.K. and F.S. were participants in Panel 1, S.M.S. was a participant in Panel 2, and A.P. and J.M. were participants in Panel 3.

Initial BMS

The initial BMS, named Draft PhaBS (Pharmacists' Behavioural Skills) is shown in Supplementary Material S3.

Panel members were asked to define the circumstances in which the BMS could be used. They agreed that the BMS was applicable to all levels of pharmacist, from trainees upwards. It was to be used for patient-focussed care scenarios, and would be most relevant if used in scenarios involving more than one team member.

Aim 2: Content validity of the BMS

Content validity panel members

Nine pharmacy simulation educators and one non-pharmacist simulation expert agreed to participate in the content validity study, and their characteristics are shown in Table 2. The pharmacy simulation educators had a mixture of community, hospital and primary care pharmacy backgrounds, and the majority had a formal simulation education role.

Item-Content Validity Index

The I-CVI score for each skill element is shown in Table 3.

As shown in the table, the only item below the I-CVI acceptable cut-off of 0.78 was the element of 'leadership or followership'. The S-CVI is 0.95, which is above both the acceptable (0.8) and ideal (0.9) cut-off scores.

Free text results

Free text responses are shown in Box 1. All suggestions were discussed with the research team and many resulted in changes to the BMS (see Supplementary Material S4 for a summary of the changes that were made and Supplementary Material S5 for the final version of PhaBS).

Expert panels failed to reach a consensus regarding whether PhaBS should be used as a formative or summative assessment tool.

Discussion

The team have produced a BMS for pharmacists involved in patient-focussed care scenarios, the first of its kind. The content validity of the BMS has been assessed, and appropriate changes have been made. The process of producing the BMS has been described so that others could replicate it, creating a new tool by using the literature and adapting existing tools.

Strengths and limitations

This study has resulted in the creation of a new BMS by using existing literature and tools as a foundation, and harnessing the knowledge of experts in both simulation and pharmacy education. Views from educators in different regions of Scotland were sought, involving 22 experts in total, a mixture of pharmacists and non-pharmacists. The study uses up-to-date nomenclature including 'behavioural skills' as opposed to 'non-technical skills', which has been endorsed within the simulation literature.[22] The BMS has adopted wording from the trainee pharmacists' curriculum[2] (such as 'collaborative working' instead of 'teamwork and communication') to ensure consistency and constructive alignment.

PhaBS has more in common with Medi-StuNTS than with PNOTS. It is possible that there was a bias towards inclusion of the Medi-StuNTS categories due to involvement of the team that created Medi-StuNTS in the development panels for PhaBS. This was mitigated against by the inclusion of a large number of pharmacy simulation educators with no previous exposure to either BMS. It is likely that the inclusion of Medi-StuNTS categories was due to a similarity in the kind of simulated scenarios used in the BMS development, patient-focussed care scenarios undertaken by junior clinicians.

Many of the co-authors were participants within the study. While unusual within scientific research, this study aimed to construct a new tool, and develop it to its fullest potential, and therefore there was no requirement for the authorship team to remain unbiased. Within the development of similar tools, there is a precedent for the use of authors as participants.[23]

The content validity of PhaBS was assessed using the I-CVI and S-CVI. Alternative methods of calculating content validity include the content validity ratio, however, this is thought to be simple to calculate but very difficult to interpret.[24] Another alternative is to use inter-rater reliability measures (e.g. a weighted kappa statistic), but these are intended to

Table 2 Characteristics of panel members, demonstrating representation from all Scottish regions in which trainee pharmacists are educated.

Panel	Total invited	Total attended	Expertise		Region of Scotland (main role)			
			Pharmacy educator	Simulation expert	South East	West	North	National
1 (development)	19	8	4	4	3	3	1	1
2 (development)		4	3	1	3	1	0	0
3 (content validity)	14	10	9	1	1	5	2	2

Table 3 Participant responses and I-CVI score for each skill element

Category	Skill element	Participant responses			I-CVI score
		Essential	Useful (but not essential)	Not useful	
Situation awareness	Gathering information *(What?)*	10	0	0	1.0
	Recognising and understanding information *(So what?)*	10	0	0	1.0
	Anticipating, planning and preparing *(Now what?)*	10	0	0	1.0
Decision-making and prioritisation	Identifying options	9	1	0	0.9
	Prioritising	10	0	0	1.0
	Dealing with uncertainty	9	1	0	0.9
	Implementing or reviewing decisions	10	0	0	1.0
Collaborative working	Involving the patient	10	0	0	1.0
	Information sharing	10	0	0	1.0
	Leadership or followership *(either or both may be demonstrated by one participant within a scenario)*	7	3	0	0.7
Self-awareness	Role awareness	10	0	0	1.0
	Speaking up	10	0	0	1.0
	Escalating care	10	0	0	1.0
	Coping with stress	8	2	0	0.8

Box 1 : Example free text responses regarding inclusion of different elements.

Twelve comments were in support of inclusion of elements. For example:

Role awareness: '*This is crucial, pharmacists historically skulked around wards with minimal integration'.* (R6)

Five comments explained the reason for not considering an element to be essential: For example:

Leadership/followership: '*Not marked as essential as may not be applicable in all situations, e.g. single person scenario'.* (R10)

Ten comments made suggestions regarding alterations to the wording of behaviours. For example:

Involving the patient: '*Exploring ideas, concerns and expectations where applicable'.* (R9)

Two comments suggested adding new elements. For example: *'With pharmacists increasingly taking on advanced clinical roles and the profession moving towards all members registering as Independent Prescribers, the ability to assess patients (e.g. physical examination) and interpret and act on clinical findings may be considered in the context of behavioural markers'.* (R9)

One comment was a question about how PhaBS would be used: '*What happens when the trainee pharmacist obtains a score? Is there a minimum score which triggers a follow up by supervisor?'.* (R2)

evaluate inter-rater agreement for scores, and not to assess content validity.[24] Critics of the CVI measures cite concerns that agreement may be inflated due to chance.[24] This has been mitigated against by using Polit's proposed method of using 8–12 raters and a cut-off I-CVI of >0.78.[17]

PhaBS has not yet been trialled on learners, and is thus still conceptual. It was produced in a single country, and views of international pharmacy educators have not yet been sought. Finally, it was originally conceptualised as a tool to assess trainee pharmacists. Our panels consider it relevant for other levels of pharmacist, but it would need to be trialled with post-foundation pharmacists of varying levels of experience, to establish its usefulness for these groups.

Leadership

When creating PhaBS, there were some areas of disagreement within panels. Three out of 10 content validity panel members considered 'leadership or followship' to be 'useful but not essential'. This was surprising and interesting to the research team, who consider these skills to be essential for collaborative working. Hospital pharmacy literature focuses on positive outcomes when pharmacists are involved as part of the acute care team. Outcomes reported include improved decision-making, continuity of care and patient safety[25]; reduced mortality and ICU stay for patients,[26] fewer drug errors[26] and reduced costs.[27] In contrast, community pharmacy literature focuses on the perceived barriers to collaborative working. These include financial issues,[28] differences between attitudes of clinicians and managers,[28] issues regarding hierarchy and power imbalance between different professional groups,[29] a poor grasp of each other's knowledge and skills[29] and poor communication between community pharmacists and general practitioners.[30] It is possible that differences in clinical background (hospital versus community pharmacy) may have accounted for some of these varying outlooks. It has also been suggested that pharmacists may shy away from leadership roles due to a tendency towards perfectionism, which must be relinquished to be effective instigators of change.[31] Nevertheless, leadership is one of the domains in which trainee pharmacists must be able to demonstrate their skills.[2] Designing patient-focussed care simulations in which it is possible for pharmacists to demonstrate and develop leadership behaviours should be considered.

Use in practice

With regards to how PhaBS should be used, the panels in this study failed to agree on whether it should be a formative or

summative assessment tool. There are arguments in favour of using it summatively. For example, there is currently no summative assessment tool for examining behavioural skills when pharmacists participate in simulated patient-focussed care scenarios. There is also a theory that summative assessment may drive learning,[32] and that learners do not always engage with formative assessment.[33] However, the research team would argue in favour of using PhaBS formatively. Rather than driving deep learning, summative assessment may actually inhibit learning.[34, 35] Psychological safety in simulation, defined as '*the belief that one can express oneself without fear of negative consequences or feedback*',[36] can be threatened by summative assessment.[37] Conversely, formative assessment has been shown to improve learners' self-regulation strategies and academic well-being.[38] It is therefore recommended that PhaBS is used as a formative assessment tool, after further studies of validity and educational impact have been carried out. It is not recommended to routinely use this tool in practice until further work has been done, as detailed below.

Further work

Future studies could examine the face validity and educational impact of PhaBS with different levels of pharmacists, and in different contexts, including different countries. If PhaBS is to be used for summative assessment or for research purposes, it would be important to assess its reliability and construct validity.

When developing future BMS, it would be interesting to know whether the most useful starting point is a BMS designed for the same profession, or a BMS that was developed for other groups within similar clinical contexts. Further studies could usefully examine similarities between BMS, and whether similarities are based mostly on profession, scenario design or some other aspect.

Conclusions

PhaBS is the first BMS designed to assess the behavioural skills of pharmacists in patient-focussed care scenarios. It is the first pharmacy BMS with evidence of good content validity. Further work is needed to establish the reliability, construct validity, face validity and educational impact of the BMS.[39] It is hoped that PhaBS will enable pharmacy educators to provide individualised and meaningful feedback on simulation participants' behavioural skills, to facilitate learning that can be transferred to the clinical context.

Supplementary Material

Supplementary data are available at *International journal of Pharmacy Practice* online.

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Author Contributions

Briefly, S.E.S. and V.R.T. posed the research question. All authors were involved in the study design. S.E.S. and S.M.S. collected the data. All authors contributed to the data analysis. S.E.S. wrote the first draft of the article and all authors reviewed and amended the drafts.

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Conflict of Interest

None declared.

Data Availability Statement

Materials supporting the findings are available. Some of these have been provided as Supplementary Materials, and others are available by contacting the corresponding author.

Data Access Statement

Authors had complete access to the study data, and access is ongoing.

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