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The development and trial of a new approach to pharmaceutical competency development for primary healthcare personnel in Pacific Island Countries

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Abstract

Background: Any new approaches to pharmaceutical education in Pacific Island Countries (PICs) should consider the '20 cultural and learning principles' shown to be relevant to health personnel in PICs, and be based on the 'Essential Medicine Supply Management (EMSM) Competency Framework for Primary Healthcare Personnel in PICs'.

Aims: To determine what effective pedagogical approaches can be developed that show the development of country and cadre specific competencies in the area of EMSM for Primary healthcare personnel working at the facility level in PICs.

Method: A two stepped approach was used which included Course Development, and Validation in three PICs.

Results: A four day workshop was developed and validated by 59 participants with the use of skills games and a self-assessment tool demonstrating an improvement in EMSM competency.

Conclusion: This paper has documented the development and validation of a novel experiential approach for the improvement of EMSM competencies in primary healthcare personnel within PICs.

Keywords: *Assessment, competency, experiential learning, medicines, Pacific Islands, pharmacy, primary healthcare, supply chain*

Introduction

The challenges of maintaining medical supply systems in Pacific Island Countries (PICs) in a culturally varied and geographically difficult environment have previously been presented in this journal (Brown *et al*., 2012). In that article the need to focus on Pharmacy education in PICs was established, and the International Pharmacy Federation, Pharmacy Education Taskforce (FIP-PET) 'needs based' model chosen to be used in conjunction with action research methods to develop pharmacy education in this context (Brock *et al*., 2012). This previously published material forms the basis from which new pedagogical approaches can be developed and trialled in PICs.

Building blocks from recent research

Specifically it has been established that any new pedagogical approaches targeting pharmaceutical education in PICs should consider carefully the '20 cultural and learning principles' shown to be relevant to health personnel in PICs, and any curriculum content should be based on the validated 'Essential Medicine Supply Management (EMSM) Competency Framework for Primary Healthcare Personnel in PICs' (Brown *et al*., 2013; 2014). Existing training materials for PIC health personnel involved in EMSM at the facility level were reviewed by local practitioners who concluded that currently used materials do not cover the expected competency requirements, and the structure and content of the materials assessed does not consistently meet the local criteria for best practice in training (Brown, 2009). Newly developed pedagogical approaches should build on this knowledge.

Adult learning Theory

Learning is not only about acquiring knowledge but also about developing positive attitudes and useful skills. Effective learning creates curiosity, self-confidence and self-awareness with respect to knowledge and how that knowledge is acquired and applied. The learning process has been effective when someone can apply new or existing knowledge in a new way. Successful learning can improve the development of skills so that the knowledge an individual possesses can be used to good effect (Barnett, 1992).

Theories of adult learning are based on the unique characteristics of adults as learners and result in varied educational practices. Adult learning theories suggest that

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adults are independent and self-directing, have experience, can integrate learning to the demand of their everyday life, are more interested in problem centred approaches and are motivated more by internal drivers (Abela, 2009). Human resource development theory is based on many of these newer theories and provides guidelines for action (Ollis, 2008; Norman, 1999; Clawson, 2010).

Knowles' message is that effective adult 'teaching' begins with the students own context. Adults will learn faster when what they are studying has an immediate effect on their current situation in life. That is not to say that the lecturer cannot change the students' intellectual whereabouts by providing new information to them, only that the provision will be more effective if it builds on the foundation of interests and understanding already in place (Knowles, 1984; Wallace, 2008). More recently Abela contests that Knowles' theory of adult learning fails to mention reflection and extrinsic motivation, especially the role of the teacher as a major source of motivation for the learner (Abela, 2009). Abela suggests that Mezirow's concept of 'Transformative Learning' appears more appropriate when considering medical related education, where "transformative learning aims to effect change in established reference points used by the adult learner. These frames of reference are the meaning which people give to experiences and the structures to arrive at such meaning." (Abela, 2009). Transformative learning stresses the importance of the teacher in facilitating learners to question and reflect on their own assumptions and those of others (Abela, 2009). Using a variety of interactive learning methods is seen as important to foster adult learning in this context.

Biggs takes this approach one step further by pointing out that "the teacher's job is then to organise the teaching/ learning context so that all students are more likely to use the higher order learning processes" (Biggs, 2012). Biggs suggests a constructivist approach aligning learning objectives, context, learning activities and assessment to achieve the best learning outcomes, using problem based learning and learning portfolios as examples.

Adult learning theory, combined with the documented expectations of Pacific health professionals provides a platform from which to develop and trial new pedagogical approaches for EMSM competency development in primary healthcare personnel within PICs.

Aim

To determine what effective pedagogical approaches can be developed that show the development of country and cadre specific competencies in the area of EMSM for Primary healthcare personnel working at the facility level in PICs.

Methods

A two stepped approach was undertaken by two researchers (AB, PZ) to develop and trial a new pedagogical method for the improvement of medicines supply management competencies for primary healthcare personnel in PICs. The two steps included: Step 1 Course Development, and Step 2 Validation.

Step 1 Course Development

The following sequenced approach was used: selection of competencies to be covered, consideration of detailed content, development of assessment approach, workshop construction including selection of teaching methods, and documentation of an action research process for use in individual countries.

Selection of competencies

Relevant competencies in the areas of
managing essential medical supplies and professional development were chosen by the researchers (AB, PZ), from the 'essential medicine supply competency framework for primary healthcare personnel in Pacific Island Countries' to be addressed in the workshop (Brown *et al*., 2013).

Consideration of detailed content

The detailed content to be included in the workshop was determined by the researchers based on previous research involving health personnel in PICs as it related to the competencies to be addressed. The background research used as inputs included: Vanuatu and Papua New Guinea country case studies, 20 cultural principles to consider when preparing training in PICs, and assessment of existing materials (Brown *et al*., 2013). Fifteen workshop sessions were designed to run over a four day period. The detailed content was documented in a participant's manual designed to be both a manual for the course and an ongoing workplace reference documenting the standard operating procedures for that specific country.

Development of assessment approach

Two researchers (AB, PZ) developed a series of six competency based work stations (skills games) representing a subset of the competencies to be covered by the workshop. Each station or skills game, was designed to reflect work based practice using country specific props (*e.g*. forms, medicines). A marking schemer was developed for each skills game to enable pre and post comparison.

A self-assessment tool was developed by the researchers where participants were asked to assess their understanding of 13 competencies using a five point scale. This tool was used pre and post workshop for comparison.

Workshop construction including selection of teaching methods

Skills games, role play, group discussion, story telling and site visits provide the basis of the workshop with limited

use of computer projection and maximum involvement by local health personnel.

Documentation of an action research process for use in individual countries

Figure 1 outlines the country specific process that was developed by the researchers to ensure that the workshop and participants manual reflected the local context. The process ensures local ownership by engaging health personnel in the specific country environment where the course is to be run.

Step 2 Validation

The sequenced approach was trialled in Tuvalu, Pohnpei – Federated States of Micronesia and Vanuatu. These countries were chosen by the United Nations Population Fund (UNFPA) due to reported issues of medication supply in these countries. Participants were chosen for the workshop by the Ministry of Health in the respective country, on the basis of development need and staff availability. Participants were given a full explanation of the background to the development of the course, the new approach, and what to expect.

Participants attended the workshop sessions of their own free will and were given the opportunity to anonymously contribute to the validation and feedback processes by participating in pre and post skills games assessment and self-assessment. Detailed feedback was also collected on each session focussing on session length, difficulty, participant enjoyment and suggested improvements.

The de-identified data collected was then processed using the Statistical Package for the Social Sciences (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.). Descriptive statistics were calculated and the 'paired t-test' used to compare pre and post skills games, and self-assessment scores.

Results

Validation

A total of 59 (N=59) participants engaged in the three trial workshops. The participants included nurses 49% (n=29), healthcare workers 22% (n=13), and pharmacists 17% (n=10). Males represented 42.4% (n=25) and females 57.6% (n=34). Most of the participants, 83% (n=49), had greater than five years experience in their current work environment.

Feedback was collected around difficulty, feeling, time, understanding and explanation. Table I summarises participant feedback when considering the workshop as a whole, while Table II summarises feedback on the 15 individual sessions.

Results for the skills games and self-assessment appear as Table III and Table IV with significant improvements noted in all games and self-assessment mean comparisons using 'paired *t*-test' ($p < 0.0001$).

Discussion

The use of novel experiential approaches in health and EMSM education

There are many references in the literature to the use of novel approaches to educate both students and professionals in the health sector. Rowitz encourages academics and practice learners to move beyond theorising to the application of tools to improve practice learning, noting that such "tools have to be taught, tied to specific competencies, tested, evaluated, refined, expanded and clarified." (Rowitz, 2004). Similar innovative strategies have also been specifically suggested for nursing education (Hayes & Childress, 2000; Herrman, 2011). Games and exercises can increase learning by taking certain skill dimensions and putting the learning into an interactive mode (Rowitz, 2004). This paper presents the results of such approaches in the PIC context.

Novel experiential approaches to aspects of EMSM education have been suggested by a limited number of authors. Implementing problem-based training in undergraduate and paramedical training, and the encouragement of targeted problem-based in service educational programmes have been suggested by WHO as two of ten recommendations to improve use of medicines in developing countries (Laing et al,. 2001). Vesper et al present a one week experiential workshop where participants are asked to make direct observations in various work based environments regarding aspects of storage and distribution of refrigerated pharmaceuticals (Vesper et al., 2010). Site visits, group discussion and group presentations feature in their approach.

Course validation

Participant experience

This is the first time that a pedagogical approach has been documented where an experiential course was used to develop EMSM competencies in Primary Healthcare Personnel in PICs. The course was judged by participants to be pitched at the correct level of difficulty (average to very easy 97% [n=48]), with respondents showing an excellent degree of understanding as reflected in their competence assessment scores, (quite well to very well 97% [n=45]), and high level of feeling or enjoyment (liked it a little to a lot 93% [n=46]) during the course as a whole (Table I). Since 37% (n=18) of respondents found the time allocated to the workshop 'short to too short' consideration will be given to extending the workshop to five days.

Respondents rated each of the 15 sessions highly for enjoyment (all sessions rated at above 80% for 'liked it a little to a lot') and appropriate for the level of difficulty (all sessions rated at above 90% for 'average to very easy'). The sessions relating to introduction, skills games and ordering were rated 'short to too short' by 34% or more, indicating that these sessions should be made longer. The skills games were conducted with 15 minute rotations, which in light of this feedback, will be

Figure 1: Outline of the country specific sequenced development process for primary healthcare personnel for EMSM competency development.

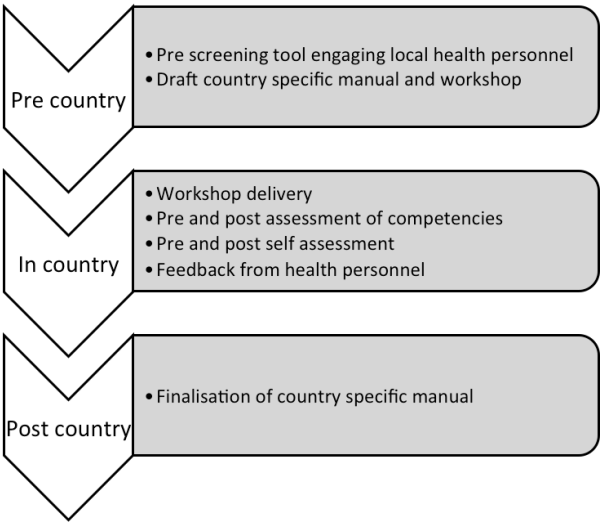

Table I: Summary of feedback considering EMSM workshop as a whole (N=59)

Difficulty (n=49)	**Very Hard**	**Hard**	**Average**	**Easy**	**Very Easy**
	0	2%	28.6%	49%	20%
Feeling (n=49)	**Really didn't like it**	**Didn't like it**	**Average**	**Liked it a little**	**Liked it a lot**
	0	0	6.1%	2.04%	91.8%
Time (n=49)	**Too long**	**Long**	**Just right**	**Short**	**Too short**
	0	0	63.3%	22.4%	14.3%
Understanding (n=46)	**Not at all**	**Only just**	**Average**	**Quite well**	**Very well**
	0	0	2.1%	13%	84.8%
Explanation (n=46)	**Not at all**	**Only just**	**Average**	**Quite well**	**Very well**
	0	0	0	8.7%	91.3%

Table II: EMSM workshop sessions mapped against the experiential approach used for each session and participant feedback (N=59)

Session No.	**Experiential approach used**	**Difficulty**		**Feeling**	**Time**		**Top 3 liked comments from participants for this session**	**Other comments**
		Average	**Easy - very easy**	**Liked it a little - a lot**	**Just Right**	**Short - too short**		
1. Introduction	Free-discussion, games	56% (n=52)	38% (n=52)	98% (n=51)	65% (n=52)	34% (n=52)	Introduction of participants, group discussions, games	Exciting/ interesting,work related
2. Skills games 3. Skills games	Games, problem based learning, team based learning, simulations	38% (n=52)	60% (n=52	80% (n=54)	54% (n=46)	43% (n=46)	The calculation game, working in a group, the practical aspect, linking to what I should do at my work	Ensure adequate space
4. Why and national level	Buzz groups	54% (n=56)	43% (n=56)	92% (n=60	60% (n=58)	23% (n=58)	Discussion (sharing ideas and experiences), knowing the importance of the topic	More examples from participants
5. Ordering	Case studies, exercises, demonstration	38% (n=53)	57% (n=53)	91% (n=53)	65% (n=52)	34% (n=52)	The calculations, discussion around real work issues, games and practical aspects	Use country specific forms
6. Records	Demonstration, paired discussion, exercises	29% (n=49)	65% (n=49)	98% (n=51)	75% (n=51)	24% (n=51)	The importance of records, using stock cards, understanding better records reduce workload	More discussion
7. Received and unpacked	Demonstration,	30% (n=46)	70% (n=46)	93% (n=40)	76% (n=45)	21% (n=45)	Learning how to check off an order, using the stock card, the practical demonstrations	More exercises
7. Stored	Seminar, stories	21% (n=56)	79% (n=56)	98% (n=57)	81% (n=57)	16% (n=57)	Group work and discussions, role play and activities, understanding refrigerated storage	
8. Dispensing	Demonstration, role plays, free-discussion	28% (n=58)	71% (n=58)	95% (n=58)	81% (n=59)	15% (n=59)	Role play of counselling and feedback, the practical activities, the importance of dispensing correctly	How to read bad writing, script abbreviations
9. Donations	Seminar, stories	49% (n=59)	49% (n=59)	83% (n=57)	68% (n=57)	30% (n=57)	Learning the good and the bad, the need to assess donations, group work and games	Add more examples
9. Disposal	Seminar, stories	29% (n=51)	67% (n=51)	92% (n=53)	74% (n=53)	26% (n=53)	Understanding proper disposal, leaning alternative disposal methods	Consider more scenarios
10. Communication, supervision and checklists	Demonstration, role play, seminar	20% (n=46)	80% (n=46)	96% (n=46)	69% (n=45	31% (n=45)	Using the check list tools, the need to improve communication to improve service, the need to improved communication nurses/pharmacy	More practical components
11. Site Visits	Site visit, team-based learning	16% (n=31)	84% (n=31)	90% (n=31)	74% (n=31)	26% (n=31)	Seeing other clinics/ how they work, seeing evidence of issues discussed, opportunity to use what we have learnt	
12. Using medicine correctly	Seminar, stories, free discussion	27% (n=48)	73% (n=48)	93% (n=46)	81% (n=48)	19% (n=48)	The importance of counselling patients, group work and stories, the role of health personnel	
12. Money	Free-discussion	43% (n=40)	55% (n=40)	80% (n=40)	84% (n=37)	16% (n=37)	Learning how to record and report money, the link between good management and money	
15. Summary and closing	Seminar, free-discussion	16% (n=43)	84% (n=43)	93% (n=44)	73% (n=45)	27% (n=45)	Clear understanding and reminder of what we have learnt	

lengthened to 20 mins for future versions of the workshop.

Games, group work, group discussion, and site visits featured prominently in the three most liked comments documented from each session (Table II). This confirms the relevance of the 20 cultural and learning principles used to construct the course (Brown *et al*., 2014). The following quotes from participants reflect the importance of using games and site visits to establish the cultural context of learning in PICs:

- Participant TU5, a nurse with >10 years experience wrote, "Games showed me and teaches me more clearly how to manage my pharmacy and how to control my drugs properly at my clinic. Skills games are an important tool, it works."
- Participant VAN7, a nurse with 5-10years experience wrote, "I like that we start doing the games before we were taught what to do."
- Participant TU10, a nurse with >10years experience wrote, "Best session for me. The skills games have helped me a lot to correct misleading information. I also learnt a lot from other colleagues who work in different clinics."
- Participant FSM12, a nurse with >10 years experience wrote, "I am most happy to visit a clinic and use what I have learnt from the workshop because I am practically doing it. I am feeling more confident."
- Participant VAN23, a nurse with >10 years experience wrote, "It is really good and gives me ideas to do in my own areas where I work."

Table III: Game average scores. Day 1 compared to Day 4 (N=59)

	n	Day 1 Mean score/10 (M, SD)	Day 4 Mean score/10 (M, SD)	Day 1 to Day 4 % variation in Mean	Paired *t* test	
					t	*p*-value <
Game 1. Completing a stock take	46	6.43, 1.56	7.78, 1.9	21%	5.103	.0001
Game 2. Calculating your order	44	4.93, 2.62	8.23, 2.3	67%	5.258	.0001
Game 3. Unpacking your order	36	6.00, 2.01	7.14, 1.93	19%	3.921	.0001
Game 5. Dispensing to patients	30	6.85, 1.77	8.28, 0.97	21%	4.807	.0001
Game 6. Problems to fix	47	5.82, 1.21	6.64, 0.99	14%	4.482	.0001

Participant assessment

Within this study the skills games used were validated by participants as being appropriate with before and after assessment demonstrating an improvement of competency through the completion of the skills games (p<0.0001) (Table III). Most improvement was seen in Game 2 'calculating your order' (67% n=44) reflecting an initial poor understanding of this concept. Game 1, 3 and 5 all showed an increase of at least 19% across all participants while Game 6 'problems to fix' results improved the least over the course of the workshop. This may demonstrate that problem solving and lateral

Table IV: Self assessment average scores from a five point scale. Day 1 compared to Day 4 (N=59)

How well do you understand each of the following	n	Day 1 Mean score/ 5 (M, SD)	Day 4 Mean score/5 (M, SD)	Day 1 to Day 4 % variation in Mean	Paired *t* test	
					t	*p*-value
What happens at a national level to organise medicines	37	2.84, 1.17	3.92,1.09	38%	4.4	<.0001
How to contact National Medical Stores	36	3.44, 1.25	4.39, 0.84	28%	4.3	<.0001
How to contact your provincial pharmacy department	36	4.00, 1.12	4.64, 0.72	16%	2.9	.007
Why is it important to use medicine correctly	38	4.26, 0.80	4.71, 0.46	11%	3.2	.003
What records need to be kept to order medicine properly	36	3.61, 1.10	4.58, 0.65	27%	4.7	<.0001
How to order the medicines and medical equipment you need	36	3.58, 1.12	4.64, 0.49	30%	5.7	<.0001
How to receive your order	38	3.89, 1.25	4.68, 0.53	20%	4.0	<.0001
How to unpack your order	38	3.82, 1.21	4.66, 0.58	22%	4.8	<.0001
How to set out your medicines store in the clinic	38	3.74, 1.18	4.63, 0.59	24%	4.8	<.0001
How to dispense medicines to patients	37	4.22, 0.89	4.81, 0.40	14%	3.7	.001
How should medicines be disposed of	38	3.66, 1.10	4.79, 0.41	31%	6.4	<.0001
What to do about medicine donations.	38	3.21, 1.34	4.71, 0.52	47%	7.0	<.0001
How to look after money properly	38	3.13, 1.36	4.34, 0.78	39%	5.8	<.0001

thinking skills may not be addressed sufficiently in the workshop, or that the assessment method may not be appropriate.

The use of a participant self assessment tool provides a window into the self reflection of participants (Table IV). A better understanding of medicine donations (47% n=38, $p<0.0001$) and what happens at the national level (38% n=37, $p<0.0001$) was documented. The least self-assessment improvement in understanding was reported for the areas of dispensing (14%, n=38, $p<0.0001$) and medication use (11%, n=38, $p<0.0001$), which although still significant, may reflect a good initial understanding of these concepts as they are core competencies for primary healthcare workers, taught in pre-service training.

Our results and feedback confirm previous findings that pedagogical approaches should include: student centred approaches to learning, group activities, training that reflects the competencies required, the use of PIC localised features, exercises consistent with work tasks, flexibility to be inclusive of different systems across the region, and assessment to ensure development of competencies (Brown *et al*,. 2014).

This study has demonstrated an improvement in EMSM competency achieved through the use of an experimental course. The transfer of these competencies to the workplace must not be assumed with the following quote recalling the need to embrace a systematic approach to health system improvement that includes education as only one of a number of factors which need to be addressed to create change (WHO, 2009).

T6, nurse with >10years experience said; “Since working in the outer island is a busy place where you have to look after the whole community alone, most of the time I don’t have time to do extra jobs like this (stock take). Need to have a few staff to help around.”

Conclusion

This paper has documented the development and validation of a novel experiential approach for the improvement of EMSM competencies in primary healthcare personnel within PICs. The engagement of local health personnel in every stage of the back ground research, course development and validation has been a key element for success. The future challenge will be the trial of this approach in further PICs and the ability of participants to overcome local barriers to ensure the demonstration of EMSM competency in their workplace, a goal that can only be achieved if a systematic approach to health systems strengthening is undertaken.

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