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An analysis of hospital pharmacy practice in six countries of sub-Saharan Africa based on the International Pharmaceutical Federation Basel Statements on the future of hospital pharmacy

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Keywords
Basel Statements; hospital pharmacy practice; sub-Saharan Africa; International Pharmaceutical Federation; pharmacy best practices

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Abstract

Objectives The objective of this study was to update the self-assessment tool and to evaluate current hospital pharmacy practices in six sub-Saharan African countries.

Methods Questions in the validated survey were edited if the revised Basel Statement changed intent. A total of 13 updates were made. The survey was administered via e-mail to pharmacy personnel in any hospital centre in Ghana (258 total hospitals), Nigeria (17 038 total hospitals), Malawi (499 total hospitals), Uganda (155 total hospitals), Zambia (98 total hospitals) and Zimbabwe (1389 total hospitals). Snowball sampling increased reach of the survey across each country.

Key findings Responses were received from all six countries, with nine respondents from Ghana, 15 from Nigeria, two from Malawi, five from Uganda, nine from Zambia and four from Zimbabawe. Uganda had the highest achievement rates for tier one and tier three constructs, and Ghana had the highest achievement rate for tier two constructs. Malawi showed the lowest achievement rates in all three tiers. The six countries achieved an average of 82 per cent (SD = 24) of tier one constructs. Three tier one constructs were achieved less than 25 per cent of the time.

Conclusion Multiple tier one (minimum standards in hospital pharmacy practice) constructs were achieved greater than 90% of the time, possibly reflecting efforts made towards hospital pharmacy practice advancement in select countries of sub-Saharan Africa. Additionally, all countries achieved a majority of tier one overarching constructs. Despite these achievements, there are still many areas for growth, including select tier one constructs with low achievement rates.

Introduction

The practice of pharmacy is shaped by varying cultures, health systems, resources and education; however, the role every pharmacist plays focuses on ensuring the responsible use of medicines.[1] Having a collective vision on the optimal role of the hospital pharmacist will assure that best practices are achieved across these different practice settings. In 2008, International Pharmaceutical Federation (FIP) hospital pharmacists developed 75 consensus statements that

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provided a global framework for the vision of hospital pharmacy practice. These statements reflected the opinions of 348 representatives from 98 countries across the world. In 2014, a published update consolidated 75 statements into 65, with additions reflecting the changing practices of the profession.[2]

Since 2008, there have been efforts around the world to incorporate the Basel Statements into hospital practice. Over 70 countries have conducted research aiming to apply these statements to practice; however, 68 of these countries are within the European and Western Pacific regions.[3] In the wake of the United Nations Sustainable Development Goals and its focus on ensuring healthy lives and promoting well-being for all,[4] there is now a pressing need to utilize the Basel Statements for hospital pharmacy practice advancement in areas with the largest healthcare need. Despite the varying culture, pharmacy education and health systems around the world, the potential for the Basel Statements to make impactful change is high. Use of the statements in a tertiary care hospital in Northern Uganda showed improvement in pharmacy practices between 2009 and 2012 by increasing the number of statements that were successfully met.[5] Unfortunately, there is limited literature on the use and incorporation of these statements in under-resourced nations and a breadth of opportunities exist to continue exploring methods for successful incorporation into hospital pharmacy practices.

The Basel Statements are a list of best practices and optimal states. However, many institutions around the world still struggle to provide basic services. Without a tiered structure that gives guidance on necessary basic services, every hospital striving to improve will start at a different place and possibly miss the opportunity that is the most meaningful or impactful. For many years, the American Society of Health-System Pharmacists (ASHP) has maintained minimum standards for pharmacies in hospitals.[6] This guideline gives assistance to any hospital or pharmacy director on what standards they need to achieve or meet at a basic level. While every organization should strive for best practices, this allows all organizations to ensure they are offering minimum services. To develop a structured guideline to accompany the Basel Statements, four tier categories, zero through three, were created with tier zero being below minimum pharmacy practice standards, tier one being good hospital pharmacy practices and activities which support the safety of procurement, preparation, distribution and administration (i.e. minimum standards), tier two being the start of clinical service activities which address appropriate use and patient outcomes but do not serve every patient due to available resources and tier three being best pharmacy practices with robust clinical services assisted through integrated technology systems that serve every patient. For all hospitals, the goal would be to achieve at least no tier zero categories within the Basel Statements and striving to achieve ideal pharmacy practice (tiers 2–3) in as many categories as possible.

With the availability of the Basel Statements in 21 languages, the realization of its use on a global scale can become a reality; however, standardized tools must be made available to directly apply the statements to current practices. The Western Pacific region has created validated surveys that assess select Basel Statements, providing tools for formulary development and clinical pharmacy services that influence prescribing.[7,8] For a broader scope assessment, a hospital self-assessment tool and prioritization system was created, piloted and validated to allow hospitals to comprehensively assess their pharmacy practices against the Basel Statements.[9] This self-assessment tool was created based on the 2008 Basel Statements. Once updated, the scope of the validated survey tool for the 2014 statements will allow for the assessment of multiple themes and for interpretation of the survey results to identify the highest priority needs.[9]

Through survey tools, the Basel Statements can be used to evaluate current hospital pharmacy practices and identify the gaps and most urgent needs for improvement. The first activity of this study is to update the validated self-assessment survey[9] to reflect to changes made in the revised 2014 Basel Statements. Once updated, the focus of the study is to utilize the updated self-assessment and prioritization tool to explore hospital pharmacy practice needs in six countries within sub-Saharan Africa.

Methods

Update to the self-assessment tool

An update of the self-assessment tool was undertaken by the two lead investigators to ensure the survey tool reflected the revised 2014 Basel Statements. Methods for the development of the original self-assessment survey can be found in a previous publication.[8] Questions in the validated survey were edited if the revised Basel statement resulted in a change in the intent of the statement. The original self-assessment and prioritization tool was a 25-item survey with seven demographic questions and 18 self-assessment questions developed from 75 individual Basel Statements. A total of 13 changes were made to the tool, six questions had wording changes, three questions were deleted, and four questions were added (Appendix S1).

All questions were assigned a tier level (zero, one, two or three) to indicate their level of importance and urgency. Questions labelled as tier zero or one are

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necessary for safe and effective pharmacy practice. Questions labelled as tier two or three are ideals for pharmacy practice, but may require resources that are not available. Questions that were unchanged from the previous version of the tool kept their original tier assignments. For new questions, tier level was assigned by a consensus of study investigators with the intent to be consistent with the original tier categorization.

Survey administration

The survey was administered to six countries in sub-Saharan Africa: Ghana, Nigeria, Malawi, Uganda, Zambia and Zimbabwe. Countries were selected by their involvement in the FIP-UNESCO UNITWIN African Centre of Excellence in Pharmacy Education or by the pharmacist leader's relationship with FIP leaders.[10].

The survey was open to any pharmacy personnel and to any hospital centre with no limitations on the level of pharmacy education or type of hospital institution. The survey was anonymous; however, study participants had the option of completing seven optional demographic questions. The study was approved by the institutional review board.

The survey was disseminated via e-mail and administered electronically on Qualtrics Research Suite® from September to December 2016. Snowball sampling was utilized to increase reach of the survey across each country. One pharmacist leader was identified from each country to lead survey dissemination efforts. Each country's pharmacy leader sent the survey directly to their colleagues or provided a list of pharmacy colleagues to whom the survey tool could be sent. Survey respondents who optionally provided their e-mail address were contacted after participation to request their assistance in sending the self-assessment tool to other known pharmacy colleagues.

Data analysis

Data were evaluated by per cent achievement of Basel Statements within each tier. Using SPSS (SPSS© Statistics Version 24, IBM©, Armonk, NY, USA), descriptive statistics were evaluated for achievement of the Basel Statements.

Results

Survey update

The updated survey self-assessment tool resulted in a 26-item survey with seven demographic questions and 19 self-assessment questions. The 2014 Basel Statements are organized by a set of overarching statements followed by six themes.[1] The final revised survey tool contains constructs that assess all but theme six (human resources, training and development) and statements left out of the tool followed the rational from the original development of the tool in that they were either focused at the national level or unable to be measured using clear scales.[8]

Survey administration and data evaluation

Responses were received from all six countries with a total of 44 responses with nine responses from Ghana, 15 responses from Nigeria, two responses from Malawi, five responses from Uganda, nine responses from Zambia and four responses from Zimbabwe. The largest numbers of participants were from Nigeria, and almost half of all participants were from large academic medical centres (Table 1). Although the survey was open to all pharmacy personnel, including pharmacy technicians, the majority of participants were pharmacists.

Achievement of Basel Statements

Stratified by country and assessing overall achievement of all Basel statements, Uganda reported the highest

Table 1 Survey participant characteristics

Variable	Participants *n* (%)	Unique hospitals[a] *n* (%)
Country (total # hospitals in country)	*n* = 44	*n* = 38
Ghana (258)[18]	9 (20)	6 (16)
Nigeria (17.038)[19]	15 (34)	15 (39)
Malawi (499)[20]	2 (5)	2 (5)
Uganda (155)[21]	5 (11)	5 (13)
Zambia (98)[22]	9 (20)	6 (16)
Zimbabwe (1389)[23]	4 (9)	4 (11)
Hospital category	*n* = 44	
Academic Medical Center/Teaching hospital	20 (46)	
Community or Tertiary hospital	15 (34)	
Specialty hospital	3 (7)	
Other	10 (23)	
Population of surrounding hospital community	*n* = 44	
≥500 000	32 (72)	
100 000–499 000	6 (14)	
50 000–99 000	3 (7)	
<50 000	3 (7)	
Profession of respondents	*n* = 44	
Pharmacist in leadership/management role	17 (39)	
Pharmacist	24 (55)	
Pharmacy technician	3 (7)	

[a]Participants were allowed to select more than one category if applicable.

[b]Number of unique hospitals captured in data, per each country.

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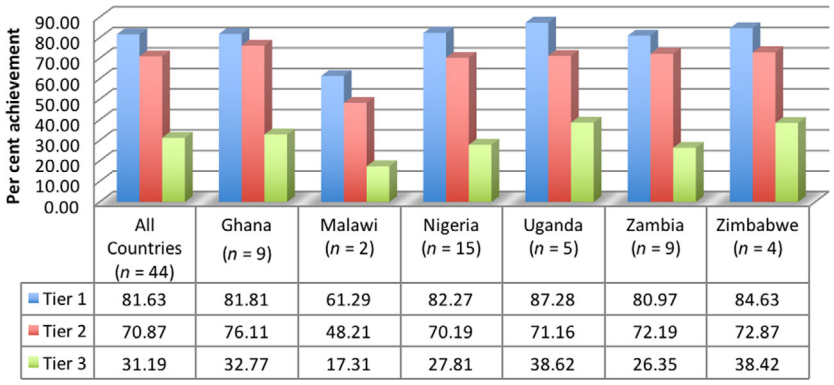

	All Countries (*n* = 44)	Ghana (*n* = 9)	Malawi (*n* = 2)	Nigeria (*n* = 15)	Uganda (*n* = 5)	Zambia (*n* = 9)	Zimbabwe (*n* = 4)
Tier 1	81.63	81.81	61.29	82.27	87.28	80.97	84.63
Tier 2	70.87	76.11	48.21	70.19	71.16	72.19	72.87
Tier 3	31.19	32.77	17.31	27.81	38.62	26.35	38.42

Figure 1 Average achievement of all evaluated Basel Statements organized by tier and country. Uganda shows the highest achievement of tier one and tier three Basel Statements, and Ghana shows the highest achievement of tier two Basel Statements. [Color figure can be viewed at wileyonlinelibrary.com]

achievement rates of tier one and tier three constructs and Ghana the highest achievement rate of tier two constructs (Figure 1). Malawi showed the lowest achievement rates in all three tiers. Results from all six countries revealed an average tier one achievement rate of 82 per cent (±24), average tier two achievement rate of 71 per cent (±22) and average tier three achievement rate of 31 per cent (±22). The two survey questions categorized as tier zero constructs include whether the hospital pharmacists have access to the full patient record (79% yes, 21% no) and how often in procurement the pharmacists are confident that the procured medication has met strong quality standards (5% rarely, 2% Never).

Achievement by theme

The six countries achieved an average of 96 per cent (±10) of tier one overarching constructs with Zimbabwe and Uganda achieving 100 per cent and Malawi achieving 90 per cent (±21) (Table 2). Theme one, procurement,

Table 2 Achievement of basel statements by country and theme

		(% ± SD)						
Location	Tier	All statements	Overarching statement	Theme 1 = Procurement	Theme 2 = Influences on prescribing	Theme 3 = Preparation and delivery	Theme 4 = Administration	Theme 5 = Monitoring of medicines use
All Countries (*n* = 44)	1	81.6 ± 24	96.0 ± 7	86.8 ± 10	74.0 ± 45	69.6 ± 34	69.7 ± 26	80.0 ± 28
	2	70.9 ± 22	77.9 ± 14	72.0 ± 20	76.5 ± 23	47.0 ± 17	55.3 ± 38	66.3 ± 29
	3	31.2 ± 22	35.4 ± 26	48.5 ± 32	15.0 ± 16	22.2 ± 24	30.5 ± 4	31.3 ± 12
Ghana (*n* = 9)	1	81.8 ± 25	95.6 ± 6	91.2 ± 9	77.7 ± 38	64.4 ± 34	75.6 ± 23	61.0 ± 55
	2	76.1 ± 22	81.4 ± 15	75.0 ± 29	86.3 ± 14	55.7 ± 12	55.7 ± 38	65.3 ± 28
	3	32.8 ± 23	37.4 ± 25	39.0 ± 24	19.8 ± 27	22.2 ± 24	33.5 ± 15	47.7 ± 7
Malawi (*n* = 2)	1	61.3 ± 42	90.0 ± 21	50.0 ± 35	66.7 ± 58	50.0 ± 35	16.7 ± 41	100 ± 0
	2	48.2 ± 40	55.0 ± 44	62.5 ± 25	25.0 ± 29	33.3 ± 29	50.0 ± 50	50.0 ± 58
	3	17.3 ± 31	16.7 ± 40	25.0 ± 35	0.0 ± 0	20.0 ± 45	16.7 ± 29	16.7 ± 29
Nigeria (*n* = 15)	1	82.3 ± 25	95.2 ± 12	89.4 ± 10	73.3 ± 46	73.2 ± 29	69.7 ± 31	73.5 ± 38
	2	70.2 ± 26	82.0 ± 13	84.8 ± 14	76.5 ± 29	40.0 ± 29	55.7 ± 44	67.3 ± 31
	3	27.8 ± 27	40.0 ± 41	60.0 ± 28	13.3 ± 16	21.4 ± 29	27.0 ± 0	7.7 ± 9
Uganda (*n* = 5)	1	87.3 ± 26	100 ± 0	95.0 ± 11	75.0 ± 43	80.0 ± 33	70.4 ± 37	100 ± 0
	2	71.2 ± 30	78.7 ± 28	71.3 ± 22	76.3 ± 35	41.7 ± 14	55.7 ± 51	75.0 ± 29
	3	38.6 ± 32	45.9 ± 30	30.0 ± 42	11.3 ± 13	40.0 ± 45	32.5 ± 11	58.3 ± 29
Zambia (*n* = 9)	1	81.0 ± 27	96.3 ± 6	79.6 ± 14	75.0 ± 43	65.8 ± 48	69.7 ± 23	94.0 ± 9
	2	72.2 ± 22	78.7 ± 14	68.8 ± 21	79.0 ± 21	58.3 ± 25	57.7 ± 39	69.0 ± 30
	3	26.4 ± 23	30.5 ± 26	39.0 ± 40	14.8 ± 21	20.0 ± 24	28.0 ± 20	29.0 ± 14
Zimbabwe (*n* = 4)	1	84.6 ± 30	100 ± 0	88.4 ± 16	66.7 ± 58	73.2 ± 37	71.4 ± 41	100 ± 0
	2	72.9 ± 28	85.9 ± 20	77.0 ± 32	75.0 ± 29	44.7 ± 39	50.0 ± 17	62.5 ± 29
	3	38.4 ± 34	56.7 ± 36	75.0 ± 35	20.8 ± 14	6.60 ± 15	41.5 ± 12	27.7 ± 25

Reported achievement rates of all of the evaluated Basel Statements as well as achievement rates for each evaluated Basel Statement theme. Results are shown collectively and by country. Percentages are presented as the per cent achievement of all statements within the specified tier and within the specified column category.

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had the highest achievement rates of all the themes assessed, with an all country average achievement of tier one constructs at 86 per cent (±9.8), tier two constructs at 72 per cent (±20) and tier three constructs at 49 per cent (±32). Theme three, preparation and delivery, had the lowest achievement rates of all the themes assessed with an all country average achievement of tier one constructs at 69.7 per cent (±34), tier two constructs at 47 per cent (±17) and tier three constructs at 22 per cent (±24).

Achieving constructs in tier one

Tier one constructs within the self-assessment tool that were achieved, on average, less than 50 per cent included transferring patient medicines information as patients move between and within sectors of care (22%), storage of concentrated electrolyte products outside of patient wards (23%), independent checking of chemotherapy doses against the original prescription by a pharmacist and one additional healthcare professional at the point of care prior to the administration (23%), and appropriate and current information resources to ensure safe preparation and administration (45%). Alternatively, tier one constructs that had achievement rates higher than 90 per cent included pharmacists being responsible for ensuring the proper dispensing of medications (100%), ensuring the proper storage to maintain the quality, safety and security of medications across the supply chain (98%), packing of medications (95%), labelling of medications (95%) and determining what medications are included in ward stock (90%).

Discussion

The updated self-assessment tool is currently the only tool available that allows for a broad assessment of multiple Basel Statements, providing a more comprehensive analysis of current practices. The tool can be used in any hospital setting in any country and can be completed by any pharmacy personnel, making it highly adaptable. Through the assignment of tiers, this is also the first tool utilizing the 2014 Basel Statements that allows users to determine high priority areas for hospital pharmacy practice improvement. Our use of this tool in six countries of sub-Saharan Africa revealed a number of tier one practices that need to be improved upon (i.e. double-checking chemotherapy medications) as well as key areas in pharmacy practice that are being successfully implemented (i.e. dispensing and storage of medications). These results can inform allocation of limited resources to improve pharmacy practices.

Although our research reveals a number of important concepts, we recognize the limitations of the study. With a low response rate of hospitals in our selected countries, there is the possibility of non-response bias within our results. The low response rate also impacts the generalizability of the data, and results may not be reflective of overall pharmacy practices in hospitals within the country. Additionally, there were varying numbers of participants from each country, and due to this, general representations that include data from all countries may not be fully representative of hospital practices from countries with only two or three participants. Lastly, additional demographic information indicating public vs private institutions could have been collected to further determine whether resource allocations impacted achievement of the Basel Statements. Despite its limitations, our results provide participating hospital institutions with a baseline assessment of pharmacy practices in accordance with the FIP Basel Statements and a system for prioritizing the most important needs.

Validation of the updated self-assessment tool was not pursued for a number of reasons. This study has inherently strong evidence for validity since the self-assessment tool was directly translated from the Basel Statements into survey questions. Due to this direct translation, test content validity (previously thought of as face validity) and internal structure validity are automatically met. Further factor analysis would simply be a reflection of the Basel Statements themselves rather than the self-assessment tool. Response process validity was evaluated in the original validation study by Lyons *et al* through five cognitive interviews.[9] Because those interviews did not result in adding or deleting any survey items and were only used to make minor revisions to the survey language, we maintain a high level of trust in the revised survey. Lastly, validity with regard to relationships to other variables would require visiting hospitals that responded to the survey; however, this was outside of the scope of this study.

Our survey results reveal a number of tier zero and tier one practice gaps that could be made a priority for pharmacy practice advancement in surveyed nations. Pharmacist access to the entire patient record is essential in ensuring quality patient care by monitoring patient records and medications. Double-checking of chemotherapy medications, storing high-risk electrolyte medications in separate areas and having the appropriate drug resources to ensure proper medication administration all work towards preventing medication errors and patient harm. Not meeting these minimum practice standards could be associated with high rates of preventable adverse effects (PAEs) in these settings. The Institute of Medicine reported findings, in 1999, that medication errors in hospitals alone are estimated to account for over 7000[11]

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deaths yearly, and in more recent research, PAEs were estimated to cause more than 440 000 deaths yearly.[12] Evidence of mortality and morbidity due to PAEs in sub-Saharan Africa is equivalent, if not larger.[13] Despite the underdeveloped pharmacovigilance systems in many sub-Saharan African countries, it has been found that up to 50% of all hospitalized patients developed PAEs due to medications.[13] Additionally, PAEs accounted for up to 50% of the reasons for treatment modification.[13] These numbers are likely underreported due to the lack of developed pharmacovigilance systems and processes in sub-Saharan Africa. Recognizing the potential for harm and also understanding limitations due to resources available in these areas, identifying practice gaps and knowing which areas should be a priority for advancement could work towards reducing and preventing PAEs.

The self-assessment tool revealed select theme areas that institutions are achieving at lower rates. Activities within the two themes of preparation and delivery and medication administration were achieved at the lowest rates among all countries. The low rates of achievement in these select areas of hospital pharmacy practice may be influenced by challenges in the general healthcare system and management of the institutions. Systemic weaknesses within the healthcare system in sub-Saharan Africa include lack of financial resources and weak management practices.[14] Low numbers of pharmacists in Africa and low numbers employed in the hospital sector may also contribute to inability to meet standards.[15] Within our surveyed countries, Ghana has 1.19 pharmacist/10 000 people, Zimbabwe has 0.56 pharmacists/10 000 people, and Uganda has 0.16 pharmacists/10 000, compared with 8.08 pharmacists/10 000 people and 8.82 pharmacists/10 000 people in the United Kingdom and the United States, respectively.[15] An evaluation of the advantage of regular surveys to improve the management of an essential drug programme found the use of regular surveys was a quick, simple, reproducible, and cost-effective way of obtaining objective data, providing a dynamic picture and allowing for immediate adjustment of activities, which can lead to a better use of resources.[16] Utilizing this self-assessment survey can aid in moving towards sustainable health systems. An assessment of practices and important gaps provides institution management and leadership a direction for priorities. This could help strengthen the ability to focus on significance needs and allocate resources accordingly. Additionally, the self-assessment tool can be easily re-administered over a period of time, which allows for monitoring of progress in improvements.

Despite low achievement rates in some areas, a number of tier one constructs were achieved greater than 90% of the time. Pharmacists are highly involved in the dispensing, storage, packing, labelling and formulary development of medications in the hospital, tasks that are vital to ensuring the quality and accuracy of medications dispensed. Uganda showed the highest achievement of tier one and tier three constructs, a possible indicator of their efforts to advance pharmacy practice over the past decade. A prime example is St. Mary's Lacor Hospital, in the Gulu district of Northern Uganda.[5] Beginning in 2009, in collaboration with Pharmacists without Borders, Lacor Hospital conducted a baseline evaluation using the 2008 Basel Statements and focused on 24 recommendations for improvement, encompassing six out of seven themes in the Basel Statements. Over three years, they increased the number of achieved statements from 15 to 35, improving pharmacy practices in patient education, medicines procurement and medication compounding, among many more.[5] Evidence of pharmacy practice advances can also be found within other countries in sub-Saharan Africa. Since the 1990s, hospital pharmacy in Nigeria has undergone a transformation and shifted from being product-oriented to more practice and patient-oriented.[17] This shift introduced clinical pharmacy courses and the introduction of the Doctor of Pharmacy degree.[17] Within Zimbabwe, external funders partner with Ministry of Health to improve supply chain management through comprehensive supply chain training programmes at the professional and student levels. Although there is still opportunity for the growth of additional cognitive clinical pharmacy services, improvement over the past three decades is evidence of the ability to advance the profession with limited resources. The advancement of pharmacy practice in Nigeria is another example of the opportunities for growth of the profession in countries of sub-Saharan Africa. This self-assessment tool will provide an avenue for establishing priorities for improving and monitoring the advancement of pharmacy practice within institutions, both in developed and developing nations.

Further research on the use of this self-assessment tool during the implementation and improvement of identified pharmacy practice will provide insight into its value for monitoring progress and advancement. To ensure participants of the survey are able to fully understand and comprehend its contents, translating this survey into local languages may be necessary. Additionally, our results did not detect a difference in achievement of tiers despite differences in number of pharmacists, hospital beds and pharmacist to hospital bed ratio, possibly due to low respondent numbers. Those utilizing this self-assessment tool may benefit from incorporating additional demographic data that can be collected to ascertain variables that impact Basel statement achievement. Overall, additional research on the impact of pharmacy workforce capacity on pharmacy practice advancement would be useful.

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Conclusion

Hospital Pharmacy Practices within developing nations can be evaluated using this newly developed self-assessment tool. High priority gaps in hospital pharmacy practices identified based on the tier system can be targeted for improvement by hospital administrators to advance pharmacy practice in respective hospitals, thereby improving patient care. Use of this tool may allow to more efficient use of limited resources to improve hospital pharmacy practice areas that will make the largest impact in community health.

Declarations

Conflict of interest

All authors whose names are listed immediately above certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements) or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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Authors' contributions

All Authors state that they had complete access to the study data that support the publication.

Ethical approval

UNC Biomedical IRB approved this study under study # 16-1808.

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1. Updated Self-Assessment tool[a] with Tier rankings.

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