

## Exploring the Capability of the Hospital Pharmacists in Conducting Pharmacy Practice Research: A Study from Malaysia

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### Abstract

The engagement of pharmacists in research activities is pivotal in the advancement of the pharmacy practice. The study aims to evaluate the confidence and competence of Malaysian hospital pharmacists in conducting clinical and practice-based research.

A cross-sectional study was carried out between September 2019 and April 2020 using an online survey. Pharmacists from eight different hospitals in Malaysia were involved in the study. The survey link was sent to all pharmacists of the included hospitals via email. Data were analysed using SPSS version 25.

A total of 226 pharmacists participated in this study, and their average age was 28 years old. About 82 % of the participants reported that they did not have any previous research experience, and around 62% of them indicated that the research training during their undergraduate study was inadequate. At least 60% of the participants reported inadequate competence and/or confidence in developing research protocols, critically appraising the literature, undertaking and applying appropriate statistical techniques, and interpreting research findings.

There is an urgent need to reinforce undergraduate and postgraduate research training in the institutions among potential and current pharmacists to build competence in research techniques such as literature reviews and scholarly participation.

**Keywords** Confidence, Competence Hospital pharmacists, Pharmacy practice research

### استكشاف قدرة صيادلة المستشفيات على إجراء أبحاث الممارسة الصيدلانية: دراسة من ماليزيا

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### الخلاصة

تعد مشاركة الصيادلة في الأنشطة البحثية أمراً محورياً في النهوض بممارسة الصيدلة. تهدف الدراسة إلى تقييم ثقة وكفاءة صيادلة المستشفيات الماليزية في إجراء البحوث السريرية والممارسة.

تم إجراء دراسة مقطعية بين سبتمبر ٢٠١٩ وأبريل ٢٠٢٠ باستخدام استطلاع عبر الإنترنت. صيادلة من ثمانية مستشفيات مختلفة في ماليزيا شاركت في الدراسة. تم إرسال رابط الاستبيان إلى جميع الصيادلة في المستشفيات المشاركة عبر البريد الإلكتروني. تم تحليل البيانات باستخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية الإصدار ٢٥.

شارك في هذه الدراسة ما مجموعه ٢٢٦ صيدلياً، وكان متوسط أعمارهم ٢٨ عامًا. أفاد حوالي ٨٢٪ من المشاركين أنه ليس لديهم أي خبرة بحثية سابقة، وأشار حوالي ٦٢٪ منهم إلى أن التدريب البحثي أثناء دراستهم الجامعية لم يكن كافياً. أفاد ٦٠٪ على الأقل من المشاركين بعدم كفاءة الكفاءة و / أو الثقة في تطوير بروتوكولات البحث، وتقييم الأدبيات بشكل نقدي، والقيام بتطبيق التقنيات الإحصائية المناسبة، وتفسير نتائج البحث.

هناك حاجة ملحة لتعزيز التدريب البحثي للطلاب الجامعيين والخريجين في المؤسسات بين الصيادلة المستقبليين والحاليين لبناء الكفاءة في تقنيات البحث مثل مراجعات الأدبيات والمشاركة العلمية.

**الكلمات المفتاحية:** الثقة، الكفاءة، صيادلة المستشفيات، بحوث الممارسة الصيدلانية

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## Introduction

In recent years, the professional roles of practising pharmacists have evolved in many parts of the world, including Malaysia<sup>(1)</sup>. As a result, there is increasing recognition of existing and emerging pharmacy services, roles, and models of practice geared toward improving patient care<sup>(2, 3)</sup>. To support this paradigm shift, practicing pharmacists should be equipped with essential skills to conduct pharmacy practice research<sup>(4-6)</sup>, thus improving the overall healthcare outcomes<sup>(2, 7-9)</sup>. Likewise, pharmacy practice in Malaysia and other Asian countries has evolved toward direct patient care and advanced pharmacy services. However, sufficient evidence has demonstrated that pharmacists' involvement in practice research is limited globally<sup>(10)</sup>.

Several studies have reported that hospital pharmacists are ill-equipped in terms of practice-based research skills<sup>(5, 11-16)</sup>. These studies also reported a lack of training on research as one of the main barriers to participation in practice research. In addition, pharmacists have also reported a lack of competence and skills to undertake high-quality research. Therefore, this highlights the need for research capacity building to strengthen hospital pharmacists' research competencies and capacities. Research capacity building is a driving force to developing and enhancing research culture and improving research skills within pharmacy practice<sup>(17)</sup>. In Malaysia, the culture of conducting research related to pharmacy practice and services has progressed at a faster pace in recent years. The Malaysian government, via the Pharmaceutical Services Programme, recognized scientific research as fundamental to aid policy decision-making and achieve the Pharmacy Programme Strategic Plan<sup>(18)</sup>.

Despite the increasing attention among pharmacists regarding the preparation and competencies required to seek and succeed in a research career<sup>(7-9, 19)</sup>, few pharmacists have the opportunity to join formal graduate programs to expand their research capacity, especially those who practice in a busy hospital environment. In a recent study undertaken by Tan and Hatah<sup>(20)</sup>, Malaysian pharmacists with less involvement in research activities had low to moderate utilisation of research evidence in their practices. This suggests the implication of research skills on evidence-based practice among practising pharmacists. To date, information regarding the competence and ability of hospital pharmacists related to practice-based research is limited and not widely documented in Malaysia. It is important to evaluate if the Malaysians hospital pharmacist's workforce adequately trained and prepared to face the current challenges of and quest for cutting-edge health-related research as it is part of their competent skills that they should equipped in the

delivery of pharmaceutical care. Hence, the current study aimed to assess Malaysian hospital pharmacists' confidence and competence in conducting clinical and practice-based research.

## Methods

### *Study design, setting and recruitment procedure*

A multi-centered cross-sectional, online survey using SurveyMonkey® software was conducted to assess the Malaysian hospital pharmacists' confidence and competence in conducting clinical and practice-based research. Pharmacists working in public and private hospitals across Kuala Lumpur, Selangor, Putrajaya, and Perak states in Malaysia were approached. Eight hospitals that provided approval from their administration were included. The link to the survey was shared with the research officers of the respective hospitals. The survey link was then sent to all pharmacists of the included hospitals via email. Reminders were sent out every two weeks on several occasions over seven months. All information collected from the study was anonymized and kept confidential.

### *Participants and Sampling*

Registered pharmacists or provisionally registered pharmacists (PRPs) practicing in Malaysia during the study were included in the data collection period. The data were collected between September 2019 and April 2020. The survey included electronic participant information and a consent form. Participants were asked to confirm their willingness and consent to participate by clicking a checkbox. Those who opted not to participate were automatically signed out of the online survey and could not proceed further. The minimum required sample size for the study calculated using the Raosoft calculator was approximately 267. However, all pharmacists in the approved sites were approached to participate in the study due to the limitations associated with the low response rate of the online survey reported previously by other studies<sup>(21-23)</sup>.

### *Study Instrument*

The questionnaire adapted from a previous study<sup>(17, 24)</sup> comprised of four sections as follows: (1) Respondents' demographics; (2) Background in research activities; (3) Pharmacists' competence and confidence in planning and conducting research and; (4) Pharmacists' preferences for capacity building and formal postgraduate training. The questionnaire consists of 72 items<sup>(24)</sup>. Cronbach's alpha coefficients for the competence and confidence domains were determined as 0.96 and 0.98, respectively.

### *Data analysis*

The data were analyzed using IBM Statistical Package for Social Sciences (IBM SPSS Software), version 24. All categorical variables,

including respondents' sociodemographic and professional characteristics, items assessing competence and confidence in research, and other attitudinal items, are expressed as counts and percentages.

### Ethical approval

Ethical approval was obtained from the Medical Research Ethics Committee (MREC) of the Ministry of Health, Malaysia (NMRR-19-657-46520-IIR) and Monash University Human Research Ethics Committee (Ref. No: 2019-21354-34143). Additional approval was acquired from each hospital included in the study before commencing the study.

### Results

#### *Demographic and professional characteristics of the study participants*

Although more than 1000 hospital pharmacists were contacted to increase the response rate, only 226 agreed to participate in the study. The majority of the participants (73.45%) were female. The pharmacists in this study can be grouped distinctly according to the type of hospitals they were practicing in. Around 92% of the participants were working in public hospitals. In terms of age, the largest age group was 21-30 years old, which constituted 57.96% of all respondents. About 83% of the pharmacists attained their first professional pharmacy degree from Malaysia, while 16.81% obtained their degrees from non-Malaysian institutions such as the U.K. and New Zealand. The highest degree obtained by the majority (79.65%) was a Bachelor of Pharmacy degree. More than half of the pharmacists (53%) who responded to the survey had been practicing in a hospital pharmacy setting for five years or less (Table 1).

**Table 1. Demographic and professional characteristics of Malaysian hospital pharmacists who responded to the survey (n = 226)**

Characteristic*		Frequency (%)
<b>Gender</b>	Male	60 (26.55)
	Female	166 (73.45)
<b>Age (years)</b> Mean (SD) : 28 ± 7.82	21-30 years old	131 (57.96)
	31-40 years old	85 (37.61)
	41-50 years old	9 (3.98)
	51 years and above	1 (0.45)
<b>Country from which they obtained their first professional degree</b>	Malaysia	188 (83.19)
	Non-Malaysian country	38 (16.81)
<b>Highest level of education completed</b>	Bachelor's degree (BPharm)	180 (79.65)
	Master's degree (MS, MSc, MPharm, MBA)	43 (19.03)
	Doctor of Philosophy (PhD)	3 (1.32)
<b>Number of years spent in pharmacy practice</b>	5 years or less	119 (52.65)
	6-10 years	62 (27.43)
	11-15 years	36 (15.93)
	More than 15 years	9 (3.99)
<b>Number of years spent as hospital pharmacist in Malaysia</b>	5 years or less	142 (62.83)
	6-10 years	52 (23.01)
	11-15 years	25 (11.06)
	More than 15 years	7 (3.10)
<b>Type of hospital they are working at</b>	Public Hospital	208 (92.04)
	Private Hospital	18 (7.96)

#### *Research background and the interests of the hospital pharmacists who participated in the study*

The majority of the pharmacists who participated in the study (82.35%) indicated that they did not have previous experience in conducting research, and over a third of the pharmacists (48.04%) had received training by attending workshops. Probing was done to check the pharmacists' perception of the adequacy of the research training they received during their undergraduate studies. Less than two-thirds of them

(61.76%) reported that their training during their undergraduate study was inadequate compared to only 23.53%, who indicated that the training was adequate (Table 2). Further probing was done to check the pharmacists' perception of the research training adequacy they received during their postgraduate studies. Only 16.66% of the respondents stated that the training they received during their postgraduate study was adequate.

Concerning pharmacists' perception of the research training adequacy during their career,

more than half of the participants (52.94%) stated that their training was inadequate compared to 24.51% who stated that their training during their job career was adequate. This was followed by another question to assess pharmacists' interest in conducting pharmacy practice or related research. Again, the responses were fairly distributed; less than 10% were highly interested, while 4.41% were totally not interested. Most of the respondents reported either never or sometimes to involve in pharmacy or healthcare-related research activities as a research investigator or co-investigator. Less than 4% of respondents reported that they were always involved in these researches.

Items were listed to identify the barriers and challenges that hinder the pharmacists' involvement in research activities. Lack of time was the most common barrier to research identified by 86.27% of the participants. Furthermore, 71.57% of the pharmacists in this study reported a lack of adequate training. Nearly half of the respondents (53.43%) acknowledged that the lack of interest hinders their participation in research activities. Interestingly, only 0.98% stated that there were no research barriers, as shown in Figure 1.

**Table 2 . Research background and interests of Malaysian hospital pharmacists who responded to the survey (n= 226)**

Parameter †		Frequency (%)
Previous research experience (as investigator, co-investigator, research assistant or associate)	Yes	168 (82.35)
	No	36 (17.65)
Previous research related training during your undergraduate, or postgraduate, or working career (participants were allowed to choose more than one answer)	No training obtained	48 (23.53)
	Workshop	98 (48.04)
	Seminar	70 (34.31)
	Specialized short course (1-6 months)	41(20.10)
	Others	15 (7.35)
Research training received while being in undergraduate pharmacy school	Not Applicable	30 (14.71)
	Inadequate	126 (61.76)
	Adequate	48 (23.53)
Research training received while being in postgraduate pharmacy school	Not Applicable	141 (69.12)
	Inadequate	29 (14.22)
	Adequate	34 (16.66)
Research training received during job career	Not Applicable	46 (22.55)
	Inadequate	108 (52.94)
	Adequate	50 (24.51)
Interest in learning more about conducting pharmacy practice or related research	Extremely Interested	36 (17.65)
	Interested	65 (31.86)
	Somewhat Interested	61 (29.90)
	Not very Interested	32(15.69)
	Not Interested at all	10(4.90)
Interest in conducting pharmacy practice or related research	Extremely Interested	19 (9.31)
	Interested	67 (32.84)
	Somewhat Interested	64(31.37)
	Not very Interested	45 (22.06)
	Not Interested at all	9 (4.42)
Involvement in pharmacy or healthcare related research activities as a respondent or subject	Always	9 (4.41)
	Usually	21 (10.29)
	Often	31 (15.20)
	Sometimes	132 (64.71)
	Never	11 (5.39)
Overall ability to design and conduct pharmacy practice or related research currently	Excellent	1 (0.49)
	Very Good	15 (7.35)
	Good	47 (23.04)
	Fair	100 (49.02)
	Poor	41 (20.10)

Continued table 2 .

Parameter †		Frequency (%)
Involvement in pharmacy or healthcare related research activities as a research investigator or co-investigator	Always	8 (3.92)
	Usually	14 (6.86)
	Often	19 (9.31)
	Sometimes	115 (56.37)
	Never	48 (23.54)
Number of peer-reviewed journal articles published within the last 5 years	0	118 (57.84)
	1-3	80 (39.21)
	≥4	6 (2.95)
Number of peer-reviewed posters and/or abstracts in local/regional conference within the last 5 years	0	123 (60.29)
	1-3	70 (34.31)
	≥4	11(5.40)
Number of peer-reviewed posters and/or abstracts in international conference within the last 5 years	0	168 (82.35)
	1-3	28 (13.73)
	≥4	8 (3.92)

†22 participants skipped these items

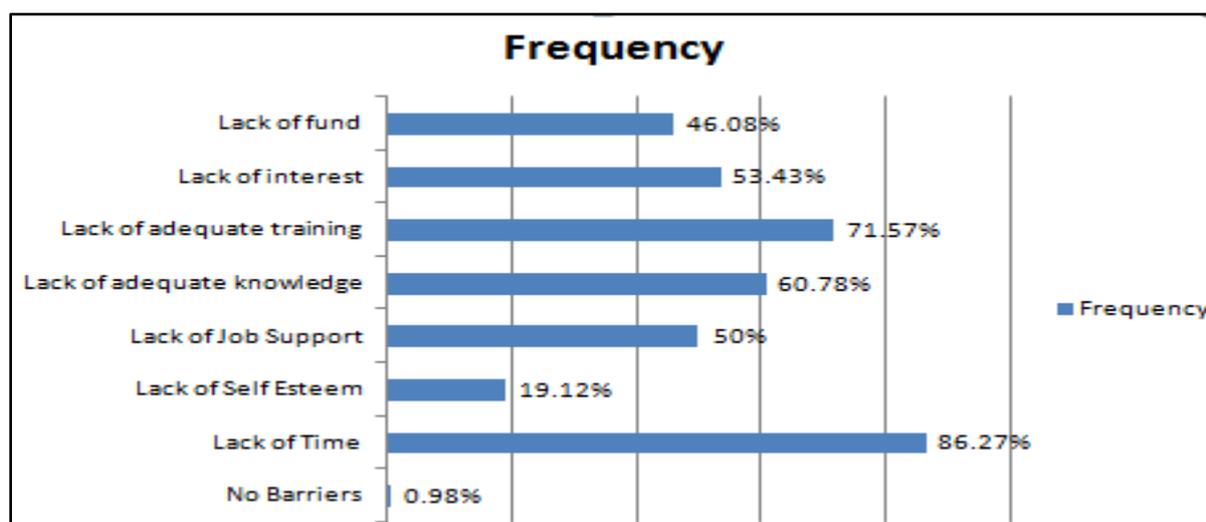


Figure 1. Pharmacists identified barriers to pharmacy practice-based research (n= 226).

#### *Confidence and competence level of the hospital pharmacists in planning and conducting research*

The pharmacists were asked to rate their competence and confidence in performing different aspects of designing, conducting, and analyzing research. The relevant data are presented in Tables 3 and 4. Based on the findings, most hospital pharmacists (not less than 84%) rated themselves as moderately to not competent and confident enough to conceptualize the research ideas.

Likewise, many of the respondents (more than 70%) believed that they were competent and confident in searching the literature efficiently, writing a research proposal or developing a protocol, collecting relevant data using pre-planned data collection forms, interpretation the findings and determining the significance of obtained results, summarizing the data in tables and/or charts, and preparing an oral or a poster presentation.

Table 3. Self-perceived competence of hospital pharmacists in planning and conducting research (n= 226).

Research competence domain <sup>†</sup>	Frequency (%)				
	Extremely competent	Very competent	Moderately competent	Not very competent	Not competent at all
Conception of research idea	4 (2.13)	25 (13.30)	72 (38.30)	68 (36.17)	19 (10.1)
Searching the literature efficiently	3 (1.60)	34 (18.09)	92 (48.94)	47 (25.00)	12 (6.37)
Critically reviewing research literature	4 (2.13)	18 (9.57)	87 (46.28)	60 (31.94)	19 (10.08)
Formulating research hypotheses and research questions	5 (2.66)	23 (12.23)	79 (42.02)	63 (33.51)	18 (9.58)
Proposing appropriate study designs or methods	4 (2.13)	20 (10.64)	64 (34.04)	73 (38.83)	27 (14.36)
Writing research proposal or developing a protocol	4 (2.13)	22 (11.70)	75 (39.89)	64 (34.04)	23 (12.24)
Defining target population, sample and eligibility criteria	4 (2.13)	31 (16.49)	73 (38.83)	59 (31.38)	21 (11.17)
Determining appropriate sample size	3 (1.60)	18 (9.57)	64 (34.04)	73 (38.83)	30 (15.96)
Choosing an appropriate sampling technique (e.g. random sampling)	3 (1.60)	24 (12.77)	56 (29.79)	77 (40.96)	28 (14.88)
Determining outcome measures (variables to measure)	2 (1.06)	25 (13.30)	68 (36.17)	68 (36.7)	25 (12.77)
Ethical considerations	13 (6.91)	32 (17.02)	71 (37.77)	52 (27.66)	20 (10.64)
Outlining detailed statistical plans to be used in data analyses	3 (1.60)	20 (10.64)	60 (31.91)	69 (36.70)	36 (19.15)
Designing a data collection form	9 (4.79)	28 (14.89)	78 (41.49)	51 (27.13)	22 (11.70 )
Developing and validating a study instrument (e.g. questionnaire)	3 (1.60)	20 (10.63)	62 (32.98)	66 (35.11)	37 (19.68)
Collecting relevant data using preplanned data collection forms	11 (5.85)	36 (19.15)	74 (39.36)	50 (26.60)	17 (9.04)
Managing and storing data including data entry into a database	12 (6.38)	40 (21.28)	65 (34.57)	53 (28.19)	18 (9.58)
Statistical analyses using software (e.g. STATA, SPSS, EpiInfo)	2 (1.06)	20 (10.64)	61 (32.45)	65 (34.57)	40 (21.28)

Continued table (3)

Choosing and applying appropriate "INFERENTIAL" statistical tests and methods	1 (0.53)	16(8.51)	53 (28.19)	71 (37.77)	47(25.00)
Summarizing data in tables or charts	9 (4.79)	39 (20.74)	78 (41.49)	47 (25.00)	15 (7.98)
Interpretation of the findings and determining the significance of obtained results	3 (1.60)	30 (15.96)	75 (39.89)	56 (29.79)	24(12.76)
Preparing a presentation (oral or poster)	10 (5.32)	36 (19.15)	76 (40.43)	49 (26.06)	17 (9.04)
Writing a manuscript for publication in a scientific journal	4 (2.13)	17 (9.04)	58 (30.85)	82 (43.62)	27 (14.36)

†38 participants skipped these items

Table 4 Self-perceived confidence of hospital pharmacists in planning and conducting research (n= 226).

Research Confidence domain†	Frequency (%)				
	Extremely confidence	Very confidence	Moderately confidence	Not very confidence	Not confidence at all
Conception of research idea	6 (3.45)	20 (11.49)	78 (44.83)	54 (31.03)	16 (9.20)
Searching the literature efficiently	4 (2.30)	26 (14.94)	85 (48.85)	46 (26.44)	13 (7.47)
Critically reviewing research literature	3 (1.72)	22 (12.64)	75 (43.10)	57 (32.77)	17 (9.77)
Formulating research hypotheses and research questions	4 (2.30)	17 (9.77)	76 (43.68)	59 (33.91)	18 (10.34)
Proposing appropriate study designs or methods	4 (2.30)	17 (9.77)	69 (39.66)	63 (36.20)	21 (12.07)
Writing research proposal or developing a protocol	3 (1.72)	20 (11.49)	73 (41.95)	58 (33.33)	20 (11.51)
Defining target population, sample and eligibility criteria	4 (2.30)	23 (13.22)	73 (41.95)	55 (31.61)	19(10.92)
Determining appropriate sample size	1 (0.57)	21 (12.07)	71 (40.80)	59 (33.91)	22 (12.65)
Choosing an appropriate sampling technique (e.g. random sampling)	2 (1.15)	23 (13.22)	60 (34.48)	68 (39.08)	21 (12.07)
Determining outcome measures (variables to measure)	4 (2.30)	22 (12.64)	66(37.93)	63 (36.21)	19 (10.92)
Ethical considerations	9 (5.17)	26 (14.94)	64 (36.78)	53 (30.46)	22(12.64)
Outlining detailed statistical plans to be used in data analyses	3 (1.72)	17 (9.77)	58 (33.33)	68 (39.08)	28 (16.09)
Designing a data collection form	6 (3.45)	30 (17.24)	66 (37.93)	52 (29.89)	20 (11.49)
Developing and validating a study instrument (e.g. questionnaire)	4 (2.30)	22(12.64)	62 (35.63)	61 (35.06)	25 (14.37)

Collecting relevant data using preplanned data collection forms	9 (5.17)	32 (18.39)	70 (40.23)	50 (28.74)	13 (7.47)
Managing and storing data including data entry into a database	10 (5.75)	31 (17.82)	69 (39.66)	47 (27.01)	17(9.76)
Statistical analyses using software (e.g. STATA, SPSS, EpiInfo)	1 (0.57)	17 (9.77)	59 (33.92)	60 (34.48)	37 (21.26)
Choosing and applying appropriate "inferential" statistical tests and methods	1 (0.57)	17 (9.77)	51 (29.37)	64 (36.78)	41 (23.56)
Summarizing data in tables or charts	10 (5.75)	32 (18.39)	72 (41.38)	43 (24.71)	17 (9.77)
Interpretation of the findings and determining the significance of obtained results	6 (3.45)	21 (12.07)	74 (42.53)	51 (29.31)	22 (12.64)
Preparing a presentation (oral or poster)	10 (5.75)	27 (15.52)	78 (44.83)	41 (23.56)	18 (10.34)
Writing a manuscript for publication in a scientific journal	2 (1.15)	19 (10.92)	61 (35.06)	63 (36.21)	29(16.66)

<sup>†</sup>52 participants skipped these items

#### Pharmacists' interest in pursuing postgraduate study

Nearly two-thirds of the respondents were interested in pursuing postgraduate studies. The majority of the hospital pharmacists (87.20%) indicated they were not interested in any postgraduate program. Of those who were interested and enrolled, 7.56% were pursuing their master degree. An overwhelming majority of the hospital pharmacists (84.21%) showed an interest in clinical pharmacy and practice research, while only 15.79% were interested in pharmaceutical science. Their interests lay majorly in the direct patient care for those interested in the clinical pharmacy research field (34.46% out of the participants). While for those interested in pharmaceutical science, over half (50.58%) were interested in pharmacology (Table 5).

**Table 5 .Pharmacists' interest in postgraduate studies (n= 226)**

Interest in postgraduate studies <sup>†</sup>	Frequency (%)
Not Interested	149(87.13)
PharmD	1(0.58)
Residency and/Fellowship	4(2.35)
Masters	13(7.60)
PhD	4(2.34)
<b>Area of interest in Clinical Pharmacy<sup>‡</sup></b>	
Pharmacoepidemiology and drug safety research	2(1.41)
Pharmacoeconomics research	22(15.49)
Pharmacotherapeutics research	17(11.97)
Social and behavioral aspects of pharmacy research	20(14.08)
Clinical and outcome research	32(22.54)
Direct Patient Care	49(34.51)
<b>Area of interest in Pharmaceutical Science<sup>§</sup></b>	
Pharmaceutics	11(18.64)
Pharmacokinetics	7(11.86)
Pharmacogenetics	5(8.47)
Medicinal Chemistry	5(8.47)
Pharmacology	30(50.87)
Pharmacognosy	1(1.69)

<sup>†</sup>90 missing data; <sup>‡</sup>107 missing data; <sup>§</sup>190 missing data.

## Discussion

This study is one of the initial studies which examined the pharmacists' confidence and competence in conducting clinical and practice-based research within the Malaysian context. The findings suggested that most hospital pharmacists in our sample expressed limited interest in participating in research activities. In addition, the pharmacists expressed facing barriers to performing pharmacy practice research which dates back to their undergraduate studies. This study's respondents were hospital pharmacists, predominantly from public hospitals, and the majority indicated that they received their bachelor's degree from Malaysia.

Over half of the respondents indicated that they feel the research training they received in their undergraduate studies was inadequate. While several workshops, seminars, and specialized short courses teach research skills to undergraduate students, their frequency is often limited as they would be done to avoid interruption with the regular lecture schedules. Moreover, when these research training programmes are carried out, they are often made optional or carried out in an environment where they cannot retain much information. Consequently, this would result in students having limited exposure to research activities and being incompetent in research activities by the time they graduate. Therefore it is necessary to reinforce the importance of engaging in research activity from the undergraduate study<sup>(25)</sup>.

Pharmacists' research skills need to be taught and developed from the early stages of their study before they proceed to postgraduate study. Previous studies also support the importance of training in research from the early days to develop research-related proficiency enculturation<sup>(26, 27)</sup>. Furthermore, several reports across different disciplines show that engaging in an undergraduate research experience can enhance disciplinary skills, such as research design, data collection and analysis, information literacy, and scientific communication<sup>(28-30)</sup>. This would suggest that for competence and confidence in research activities to be developed in the hospital pharmacists, it would be initiated from their undergraduate studies.

The hospital pharmacists also indicated that the research training which they received through their job career was inadequate. While the job career is an ideal environment for research training to be conducted, it is often filled with work activities that leave minimal research training time. Therefore, the pharmacists would have to rely on the research skills which they would have acquired before commencing their jobs. This is consistent with the study of Amjad et al (2018), which indicates that involvement in clinical activities for hospital pharmacists creates a challenge when they do not

have the prerequisite skills<sup>(31)</sup>. This would decrease the interest in participating in research activities as it would expose their incompetence. Therefore, instead of participating in these clinical activities, the hospital pharmacists would only concentrate on their prescribed roles<sup>(32)</sup>.

According to this study, career progression and efficiency in the pharmaceutical career are enhanced by continuous research participation. The pharmacy degree's objectives clearly state that progression occurs through research activities; thus, it is inherent for the respondents to be willing to participate<sup>(33)</sup>. However, a considerable number of respondents indicated no interest at all, partial interest, and indifference. The other proportion was willing to participate in the research study, but considerably a small group relating to the entire population. This leads to the necessity of probing into the hindrances of undertaking research and how they can be alleviated to lead to increased interest and participation rates. This is supported by Talsma's study, which notes that the key to increased and competent participation rates in the pharmaceutical study stems from identifying barriers and resolving them before reinforcing the importance of the research activities and culture<sup>(34)</sup>.

Despite the higher proportion of the pharmacists having experience in prior research activities, the results display a limited selection of training methods used. Based on Alqahtani et al., the methods used in training have a bearing on the efficacy and competency skills that the participants have training initiatives such as workshops are effective, especially when they are interactive sessions. However, they have their limitation in terms of location and time limits<sup>(35)</sup>. Therefore, the burden is on the facilitators to evaluate the training methods used to ensure that the participants gain skills. This would help optimize the research training methods to address the low level of confidence that hospital pharmacists have in designing and conducting research activities despite their prior experiences<sup>(36)</sup>.

Moreover, the current study showed that most participants had low involvement in research activities that are often related to low levels of participation at the international level in research collaborations, participating in conferences and peer reviews. However, scholarly peer reviews are doing well at the local and regional levels but do not often progress to international levels. Therefore, it would necessitate identifying why academic publications are not prominent at the international level. According to the literature, collaborative efforts at the international level often lead to more information sharing, skills transfer, and widened insight into areas of interest in the

pharmaceutical field, facilitating more significant innovation and productivity in the industry<sup>(15, 37)</sup>.

At the center of this study lies the issue of the self-perceived competence of hospital pharmacists. By having a high level of self-confidence and competence in undertaking research activities, one would be proactive and productive in their work. In undertaking research-related activities such as literature review, formulation of hypotheses and writing up their findings, approximately half of the pharmacists disclosed that they were moderately competent. Simultaneously, their remaining counterparts were less competent and confident in undertaking the aforementioned research activities. Therefore, the self-evaluation exercise indicated moderate to low confidence and competence levels, which tallies with the low participation and completion of research by the hospital pharmacists in Malaysia<sup>(14)</sup>.

Additionally, the respondents demonstrated the highest competency levels in data-related skills, including designing a data collection form and managing and storing data within a database. In contrast, they indicated the least competence in choosing and applying appropriate statistical tests and methods. This is similar to Iorga's study, which emphasised that identifying, designing, and analysing an appropriate research instrument is considered one of the essential skills a pharmacist should have to do more research within the pharmaceutical field<sup>(38)</sup>. Consequently, high confidence in conducting pharmacy practice research should be built gradually through optimal educating and training. Hence this can be proposed as a plausible solution for the hospital pharmacists<sup>(39)</sup>.

### Limitations

Despite this study providing insight into hospital pharmacists' self-perception towards confidence and competence in research activities, this study has its limitations. There was a low response rate, as the number of respondents who participated was less than the sample size. However, this reflects the extent of the Malaysian hospital pharmacist's reluctance to participate in research activity. In addition, due to the nature of the research model, where the respondents have to provide the inputs of their skills, the concept of self-bias is evident. Give that some of the research questions required the respondents to recall information from several years ago, thus resulting in recall bias.

### Conclusion

The hospital pharmacists in Malaysia indicated moderate to low levels of confidence and competence in undertaking research activities. There is a need to reinforce undergraduate and postgraduate research training in the institutions to

build competence in research techniques such as literature reviews and scholarly participation. There is also a need to modify appropriate training methods to help the pharmacists plan research instruments, implement and effectively collect the data while being competent in utilizing the statistical tools available. As a result, this would provide the necessary skills and techniques to build confidence and competence in undertaking research activities among pharmacists, leading to better outcomes that may significantly improve Malaysia's healthcare system.

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### Conflict of interest

The authors have no conflict of interest relevant to this study.

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### References

- Hassali MAA, Shafie AA, See OG, Wong ZY. Chapter 2 - Pharmacy Practice in Malaysia. In: Fathelrahman AI, Ibrahim MIM, Wertheimer AI, editors. Pharmacy Practice in Developing Countries. Boston: Academic Press; 2016. p. 23-40.
- Schumock GT, Butler MG, Meek PD, Vermeulen LC, Arondekar BV, Bauman JL, et al. Evidence of the Economic Benefit of Clinical Pharmacy Services: 1996–2000. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*. 2003;23(1): p. 113-32.
- Schumock GT, Meek PD, Ploetz PA, Vermeulen LC. Economic Evaluations of Clinical Pharmacy Services—1988–1995. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*. 1996;16(6): p. 1188-208.
- Bond C. The need for pharmacy practice research. *International Journal of Pharmacy Practice*. 2006;14(1): 1-2.
- Peterson GM, Jackson SL, Fitzmaurice KD, Gee PR. Attitudes of Australian pharmacists towards practice-based research. *Journal of Clinical Pharmacy and Therapeutics*. 2009;34(4): 397-405.
- Kritikos VS, Carter S, Moles RJ, Krass I. Undergraduate pharmacy students' perceptions of research in general and attitudes towards pharmacy practice research. *International Journal of Pharmacy Practice*. 2013;21(3): 192-201.
- Dowling TC, Murphy JE, Kalus JS, Nkansah NT, Chappell JS, Wiederhold NP, et al. Recommended Education for Pharmacists as

- Competitive Clinical Scientists. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*. 2009;29(2): 236-44.
8. Poloyac SM, Empey KM, Rohan LC, Skledar SJ, Empey PE, Nolin TD, et al. Core Competencies for Research Training in the Clinical Pharmaceutical Sciences. *American Journal of Pharmaceutical Education*. 2011;75(2): 27.
  9. Smith JA, Olson KL, Sowinski KM, American College of Clinical P. Pharmacy Practice Research Careers. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*. 2009;29(8): 1007-11.
  10. Awaisu A, Alsalmiy N. Pharmacists' involvement in and attitudes toward pharmacy practice research: A systematic review of the literature. *Research in Social and Administrative Pharmacy*. 2015;11(6): 725-48.
  11. Carol LA, Martha B, Ines K. Pharmacists' views on involvement in pharmacy practice research: Strategies for facilitating participation. *Pharmacy Practice*. 2007;5(2).
  12. Davies G, Dodds L, Fleet E, Horne R, Joshua A. Pharmacy practice research in the hospitals of South East Thames regional health authority, England. *International Journal of Pharmacy Practice*. 1993;2(3): 184-8.
  13. Kanjanarach T, Numchaitosapol S, Jaisa-ard R. Thai pharmacists' attitudes and experiences of research. *Research in Social and Administrative Pharmacy*. 2012;6(8): e58-e9.
  14. Abubakar U, Sulaiman SA, Usman MN, Umar MD. Nigerian pharmacists' self-perceived competence and confidence to plan and conduct pharmacy practice research. *Pharmacy Practice (Granada)*. 2018;16(1).
  15. Sultana K, Al Jeraisy M, Al Ammari M, Patel R, Zaidi STR. Attitude, barriers and facilitators to practice-based research: cross-sectional survey of hospital pharmacists in Saudi Arabia. *Journal of Pharmaceutical Policy and Practice*. 2016;9(1): 4.
  16. Derek Stewart, Abdulrouf Pallivalapila, Wessam Elkassem, Moza Al Hail, Diack Lesley, Binny Thomas, et al., editors. Taking forward the research agenda: assessing the needs of pharmacists employed by Hamad Medical Corporation in Qatar. 43rd ESCP international symposium on clinical pharmacy patient safety: bridging the gaps; 2014; Copenhagen, Denmark: Springer; 2015.
  17. Awaisu A, Kheir N, Alrowashdeh HA, Allouch SN, Jebara T, Zaidan M, et al. Impact of a pharmacy practice research capacity-building programme on improving the research abilities of pharmacists at two specialised tertiary care hospitals in Qatar: a preliminary study. *Journal of Pharmaceutical Health Services Research*. 2015;6(3): 155-64.
  18. Pharmaceutical Services Programme. Pharmacy Research Priorities in Malaysia. Ministry of Health Malaysia; 2018.
  19. Blouin RA, Bergstrom RF, Ellingrod VL, Fletcher CV, Leff RD, Morris A, et al. Report of the AACP educating clinical scientists task force. *American journal of pharmaceutical education*. 2007;71(Suppl): article S05.
  20. Tan SY, Hatah E. Knowledge, attitudes, practices, and barriers related to research utilization: a survey among pharmacists in Malaysia. *Int J Clin Pharm*. 2017;39(2): 450-8.
  21. Aitken C, Power R, Dwyer R. A very low response rate in an on-line survey of medical practitioners. *Australian and New Zealand Journal of Public Health*. 2008;32(3): 288-9.
  22. Dobrow M, Orchard M, Golden B, Holowaty E, Paszat L, Brown A, et al. Response audit of an Internet survey of health care providers and administrators: implications for determination of response rates. *Journal of medical Internet research*. 2008;10(4): e30.
  23. Stone P, Ream E, Richardson A, Thomas H, Andrews P, Campbell P, et al. Cancer-related fatigue—a difference of opinion? Results of a multicentre survey of healthcare professionals, patients and caregivers. *European journal of cancer care*. 2003;12(1): 20-7.
  24. Awaisu A, Bakdach D, Elajez RH, Zaidan M. Hospital pharmacists' self-evaluation of their competence and confidence in conducting pharmacy practice research. *Saudi Pharmaceutical Journal*. 2015;23(3): 257-65.
  25. Kaae S, Traulsen JM. Qualitative methods in pharmacy practice research. *Pharmacy Practice Research Methods: Springer*; 2020. 31-54.
  26. Favero TG. Undergraduate research using single-subject research design in exercise physiology. *Advances in physiology education*. 2019;43(3): 392-6.
  27. Langemeyer I. Modelling Undergraduate Research and Inquiry—Why Enculturation matters. *Outlines Critical Practice Studies*. 2019;20(1): 71-94.
  28. Russell SH, Hancock MP, McCullough J. Benefits of undergraduate research experiences: surveys indicate that undergraduate research opportunities help clarify students' interest in research and encourage students who hadn't anticipated graduate studies to alter direction toward a Ph.D.(THE PIPELINE). *Science*. 2007; 316 (5824): 548.
  29. Lopatto D. Survey of Undergraduate Research Experiences (SURE): First Findings. *Cell Biology Education*. 2004;3(4): 270-7.

30. Lopatto D, editor Undergraduate Research as a Catalyst for Liberal Learning 2006.
31. Amjad CM, Ansari MI. Role and challenges of hospital pharmacists working in Liaquat University Hospital Hyderabad/Jamshoro, a public sector hospital, Pakistan. *Journal of University Medical & Dental College*. 2018;9(1): 33-43.
32. Mekonnen AB, McLachlan AJ, Jo-anne EB, Mekonnen D, Abay Z. Barriers and facilitators to hospital pharmacists' engagement in medication safety activities: a qualitative study using the theoretical domains framework. *Journal of pharmaceutical policy and practice*. 2018;11(1): 2.
33. Hallit S, Hajj A, Shuhaiber P, Iskandar K, Ramia E, Sacre H, et al. Medication safety knowledge, attitude, and practice among hospital pharmacists in Lebanon. *Journal of evaluation in clinical practice*. 2019;25(2): 323-39.
34. Talsma K, Schüz B, Norris K. Miscalibration of self-efficacy and academic performance: Self-efficacy ≠ self-fulfilling prophecy. *Learning and Individual Differences*. 2019;69: 182-95.
35. Alqahtani RA, Aldahash MA, Alhulail SA, Alzahrani MY, Alfehaid L, Almodaimegh H. Experience of and attitudes toward research among pharmaceutical sciences and PharmD students in Saudi Arabia. *Health Professions Education*. 2019;5(1): 58-65.
36. Schindel TJ, Yuksel N, Breault R, Daniels J, Varnhagen S, Hughes CA. Pharmacists' learning needs in the era of expanding scopes of practice: Evolving practices and changing needs. *Research in Social and Administrative Pharmacy*. 2019;15(4): 448-58.
37. Shaikh H, Crowl AN, Shrader S, Burkhardt CD. Assessing Self-Perceived Interprofessional Collaborative Competency on Advanced Pharmacy Practice Experiences Through Interprofessional Simulations. *American Journal of Pharmaceutical Education*. 2020;84(4).
38. Iorga M, Dondaş C, Soponaru C, Antofie I. Determinants of hospital pharmacists' job satisfaction in Romanian hospitals. *Pharmacy*. 2017;5(4): 66.
39. Fakeye TO, Adisa R, Olukotun RT, Morawo PK. Hospital and community pharmacists' perception of the scope, barriers and challenges of pharmacy practice-based research in Nigeria. *Pharmacy Practice (Granada)*. 2017;15(1).



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