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PROGRAMME DESCRIPTION

Train-the-trainer programme building clinical pharmacy workforce capacity in Sri Lanka: Design and evaluation

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Abstract

Background: Clinical pharmacy services in Sri Lanka are a component of the response to the WHO's *Medication Without Harm*. Visiting Australian clinical pharmacy academics have supported Sri Lankan colleagues to address the limited clinical training available in hospital and university settings with undergraduate teaching since 2009 and Train-the-trainer (TtT) programmes in 2010 and 2016. A workshop in 2018 identified gaps in the capacity to upskill existing hospital pharmacy staff and spread clinical teaching across all universities. **Programme description:** In 2023, a 4-day TtT programme was attended by 20 pharmacists, nine academics from five universities and eleven hospital pharmacists. Learning outcomes included: demonstration of medication history taking, medication reconciliation, problem identification and resolution with interdisciplinary colleagues and patient education. A range of pedagogies (aligned with FIP Pharmacy Development Goals and Global Competency Framework) were used, including role plays, mock-wards, ward teaching, case-based-discussions, and entrustable-professional-activities. **Evaluation:** Overall satisfaction with the programme was high and trainees perceived an increase in their clinical skills relevant to their roles. After 10-months, All described implementation of components of the TtT into their university courses or clinical pharmacy activities, with 50% taking on roles as local trainers. **Future plans:** To enable trainees to facilitate sessions and participate in delivering future TtT programs; therefore, demonstrating sustainability.

Introduction

Sri Lanka has achieved remarkable indices in universal health coverage, far above the rates achieved by other countries in the WHO South-East Asia region and the World Bank income group (Ministry of Health Sri Lanka, 2021). Drug-related problems are one of the common issues in Sri Lankan healthcare that result in poor clinical outcomes, decreased quality and high healthcare costs. The Sri Lankan National Medicinal Drug Policy was established with the aim of ensuring that those using the healthcare system can access high-

quality medicines that are used rationally. It highlights the importance of research, safe and quality use of medicines (SQUM), and the important contribution graduates of pharmacy courses could make to the healthcare system (World Health Organization, 2006). Initially, pharmacy education in Sri Lanka comprised a certificate or diploma programme focused primarily on dispensing and supplying medications. In 1999, a university-level pharmacy degree (Bachelor of Science - Pharmacy) was introduced at the University of Colombo, with Bachelor of Pharmacy (BPharm) programmes subsequently available at six national universities (Coombes *et al.*, 2013).

In the first few years of delivering the undergraduate pharmacy programmes in Sri Lanka, the major barriers to teaching clinical pharmacy courses within the BPharm qualification were a lack of academic staff experienced in clinical teaching and a health system unfamiliar with the concept of clinical pharmacy and the role of a clinical pharmacist (Coombes *et al.*, 2013). In 2009, two Australian clinical pharmacists with experience in academic teaching and course delivery were invited to deliver clinical lectures for 4th (final) year BPharm students enrolled in a new course at the University of Peradeniya (UoP). The course ran over an 8-week period, with the visiting academics assisting local clinical pharmacologists and pharmaceutical science-based academics in the course delivery (Coombes, 2010; Coombes & Coombes, 2009).

Following this visit, key stakeholders in Sri Lanka and Australia developed a collaborative pharmacy teaching and research group, the *Collaboration of Australians and Sri Lankans for Pharmacy Practice, Education and Research (CASPPER)*; with pharmacy and medical clinicians, educators and researchers from Australia and the United Kingdom (UK) working with colleagues in Sri Lanka. CASPPER's aim is to develop clinical pharmacy services, through education and research, that enhance health outcomes for Sri Lankans. This collaboration was modelled on the South Asian Clinical Toxicology Research Collaboration (SACTRC), an international group based at UoP that was able to fund and facilitate post-graduate pharmacy researchers (www.sactrc.org). CASPPER was established as a not-for-profit company limited by guarantee, but it has nonetheless successfully contributed to undergraduate clinical pharmacy teaching and post-graduate research investigating the impact of the clinical pharmacist role in Sri Lanka.

Following the 2009 undergraduate clinical lecture series, a CASPPER team (five Australian and clinical pharmacists) provided the first 5-day Train-the-trainer (TtT) workshop at the University of Sri Jayewardenepura (USJ) for 18 pharmacy and pharmacology academics from all five universities offering current or potential BPharm courses in 2010. The workshop goal was to prepare academics to deliver a clinical pharmacy curriculum as a formalised course in the BPharm programs; it was funded by the WHO (Coombes *et al.*, 2015). Additionally, the team delivered a 6-week clinical pharmacy course to final year BPharm students at USJ. Participant feedback highlighted the need to increase interactive components, more clinical cases and ward visits, and for ongoing support from clinical teachers (Coombes *et al.*, 2013). The necessity for the TtT participants (and current BPharm graduates) to act as clinical pharmacist role models for future BPharm students was also identified. A second 1-day TtT workshop, delivered by four Australian clinical pharmacists at UoP in 2016, focused on preparing academics for case-based teaching using real-life cases in mock wards with simulated patients. Fourteen academics from the five universities attended this workshop (Coombes *et al.*, 2017).

In order to improve SQUM in Sri Lankan hospitals, a workshop focused on barriers and enablers to implementing clinical pharmacy services was facilitated by CASPPER at the University of Peradeniya (2018). Key stakeholders, including senior hospital pharmacists, academic pharmacists and members of the Pharmaceutical Society of Sri Lanka (PSSL), participated. Stakeholder consensus committed to expanding the hospital pharmacist's role beyond dispensing and supply to deliver clinical pharmacy services that focused on SQUM and improving patient care (Coombes *et al.*, 2020; Sakeena *et al.*, 2019). This included conducting medication histories and medication reviews to identify medication-related problems (MRPs); discussing and resolving these issues with medical staff; dispensing individually labelled medicines and providing information to patients to safely take their medicines (International Pharmaceutical Federation, 2023). Workshop discussions also identified i) access barriers for pharmacists to hospital wards and clinics due to workforce issues and a hospital service focus on pre-packing medicines rather than dispensing and labelling; and ii) knowledge, confidence, and skills barriers for pharmacists to conduct clinical pharmacy activities due to a lack of clinical training, role models and leaders. There was unanimous agreement for academic and hospital workforce clinical competency training and continuing professional development based on the International Pharmacy Federation (FIP) Global Competency Framework (International Pharmaceutical Federation, 2023) and workforce development goals in the Nanjing Statements on Pharmacy and Pharmaceutical Sciences Education [FIP GbCF]

(International Pharmaceutical Federation, 2017). In addition to the stakeholder workshop, a National Action Plan on Medication Safety for Sri Lanka proposed to meet the 2017 WHO Medication Without Harm Global Patient Safety challenge to reduce medication errors by 50% within five years, by "*employing graduate pharmacists as clinical pharmacists to the wards to attend to medication reconciliation at transitions of care, providing information, and taking preventive actions for medication safety*" (Ministry of Health Sri Lanka, 2021).

Through partnerships with senior pharmacy academics and local clinician champions, CASPPER facilitated the introduction of clinical pharmacy teaching to hospitals. Following approval for hospital access, clinical ward-based student teaching became a core component of the education programme at UoP and USJ. To support sustainability, academic teaching staff from the Sri Lankan undergraduate pharmacy programmes accompanied CASPPER staff and students to hospitals, in alignment with a TtT education model. Students discussed cases, delivered case presentations, and received formative feedback. During the COVID-19 pandemic, clinical pharmacy teaching continued virtually, with CASPPER team also inputting to examination development. This consisted of problem and case-based learning and included simulations using mock wards and formative Objective Structured Clinical Examinations (OSCEs) (Coombes *et al*., 2003). At a post-graduate level, the CASPPER partnership has provided supervisory support for in-country research (e.g. honours and MPhil students), thus generating a local evidence base for the positive contribution from clinical pharmacists to improving patient health outcomes. To date, CASPPER and SACTRC have successfully supported 13 local post-graduate students undertaking research in a variety of clinical areas, including cardiology, diabetes and cancer care. These research projects have identified opportunities to optimise medicines (Perera *et al.*, 2017)and provided evidence for the pharmacist's role in resolving MRPs and reducing hospital re-admissions (Shanika *et al.*, 2018; Shanika *et al.*, 2017). This "*boiler-plate*" methodology has now been extrapolated and replicated by other students to show clinical benefits in patients with chronic kidney disease, diabetes and acute coronary syndrome (Bagyawantha *et al.*, 2025; Mamunuwa *et al.*, 2017; Wickramasinghe *et al.*, 2024). Further studies are underway in patients with mental health and cancer disorders.

This paper outlines the continuing TtT programme journey adopted by the CASPPER partnership with the dual aim of preparing:

i. academics to lead and deliver undergraduate clinical pharmacy programmes and train and mentor junior hospital pharmacists; and
ii. hospital pharmacists to establish and deliver clinical pharmacy services and train and mentor junior hospital pharmacists.

The 2023 TtT programme content, approach to learning, teaching and assessment, and the trainee evaluation conducted immediately post-workshop and 10-months later, is described below).

Programme description

The 4-day TtT workshop, held in August 2023 at the USJ, was facilitated by seven pharmacists from Australia (including 2 Sri Lankan-born pharmacists). The trainers had wide-ranging clinical and educational experience as outlined in Appendix A. Trainers also included three Sri Lankan pharmacists who had previously attended at least one CASPPER-led TtT program. The 4-day TtT workshop utilised university and hospital facilities. Trainees included Sri Lankan pharmacists in academic pharmacy teaching roles and state and private sector hospital pharmacists interested in implementing clinical pharmacy services and hospital-based clinical pharmacy training. The programme outline is provided in Appendix B. The SQUIRE-EDU checklist and guidelines were applied to the description of this educational intervention (Appendix C) (Ogrinc *et al*., 2019).

Programme objectives

i. Understand key principles of clinical pharmacists' roles in various clinical scenarios and key pharmaceutical care activities aligned with the FIP GbCF (International Pharmaceutical Federation, 2023) (Table 1);
ii. Trainees to undertake self-assessment of current clinical pharmacy teaching programmes or their own clinical practice against the FIP GbCF (International Pharmaceutical Federation, 2023);
iii. Observe and participate in clinical scenario stations utilising Australian Entrustable Professional Activities (EPAs) for competency feedback (Australian Pharmacy Council, 2023b);
iv. Observe and participate in mock wards utilising checklist feedback;
v. Participate in trainer-led ward-based clinical training and identify suitable cases for case-based discussions;

vi. Develop and present case-based discussions and receive feedback from both trainers and fellow trainees (Australian Pharmacy Council, 2023a);

vii. Develop skills to facilitate future clinical pharmacy training programmes in trainees' workplaces.

To increase trainees' confidence with implementing clinical pharmacy skills, an opportunity to observe the trainers was provided, alongside mock scenarios of role-play prior to implementing these skills in real-world hospital ward situations over the 4-day workshop. As this was a TtT programme, a key feature was to provide trainees with opportunities to practice clinical pharmacy skills in tandem with opportunities for feedback so that similar training could be replicated in their respective workplaces (Table I).

Table I: Train the Trainer programme outline

Programme item	FIP Global competency item	Objective	Delivery method	Evaluation and feedback tool
Medication history taking	2.1.1 2.1.2 2.6.6 2.6.7	• Understand, the purpose of a BPMH • Develop skills and process of taking BPMH • Demonstrate and receive feedback on taking a BPMH • Become familiar with documentation of BPMH on MAP	• Medication history video scenarios with documentation • Role play • Mock-wards with facilitators as patients & feedback to participants using MiniCex. • Hospital visits with CBDs	• EPA history taking tool • MiniCEX • CBD
Medication reconciliation on admission	2.1.3 2.1.4	• Document medication history and indication of medications from patient interview and review of medication record and patient held information • Present as a CBD	• Reconciliation role-play by CASPPER trainers • Hospital visits with CBDs	• EPA reconciliation tool
Medication issue identification	2.5.3	• Demonstrate clinical skills & obtain feedback on individuals' issue identification • Prioritisation & clinical reasoning	• Role-play with reconciliation checklist • Mock-wards with feedback to participants • Hospital visits with case identification	• EPA reconciliation tool • MiniCex • CBDs
Medication issue resolution	2.1.3	• Demonstrate skills to resolve medication issues including prioritisation & clinical reasoning & receive feedback	• Role play • Mock wards using facilitators as ward-based staff with feedback • Hospital ward visits with debrief	• EPA communication with healthcare staff • Feedback using checklist MiniCex • CBDs
Discharge medication education/counselling	1.3.1 2.6	• Demonstrate skills to effectively provide patient education about their medicines including what has been kept, started &/or stopped	• Video scenarios • Role play by facilitators with feedback • Mock wards with facilitators as patients and feedback to participants	• EPA tools • Mini-CEX
Communication with other health practitioners	2.1.3	• Demonstrate skills to effectively communicate with other health care professionals	• Role play with EPA tools • Mock wards using facilitators as ward based staff • Hospital ward visits • Supervised communication with other health care workers on wards.	• Feedback provided to participants using MiniCex • CBDs
Communication with patients and carers	1.3.1 2.6	• Demonstrate effective communication with patients and their families	• Mock wards using facilitators as patients and carers. • Hospital ward visits where participants were able to communicate with patients and carers in a supervised setting.	• Feedback provided to participants using MiniCex • CBDs

BPMH=Best Practice Medication History, MAP=Medication Action Plan; MiniCex=Mini-Clinical-Examination]; CBD=Case-based Discussions; EPA=Entrustable professional activities

The TtT programme met learning objectives (Appendix B) by:

i. Introducing and re-affirming concepts of key pharmaceutical care activities and expected outcomes from clinical pharmacy when undertaken by competent practitioners (presentation and discussion);

ii. Introducing medication history taking and medication reconciliation with the use of video role-play simulations of pharmacists taking histories from patients and documenting their findings using structured tools such as a Medication Action Plan (MAP) (Queensland Health (Clinical Excellence Queensland), 2018);

iii. Introducing the role of competency-based training and the development of a pharmacy workforce in programs, with learning objectives and outcomes mapped to the FIP GbCF (International Pharmaceutical Federation, 2023);(Table I)

iv. Describing the principles of self-assessment and reflection, peer observation and feedback;

v. Providing an overview of relevant work-based evaluation and feedback tools used in clinical pharmacy services in high-income countries (e.g. Australia) that can be used to structure a conversation and develop a plan to support pharmacy workforce development.

vi. Participating in, and practising facilitating, a rotating station workshop of five stations involving simulations with CASPPER trainers who role-played poorly performing pharmacists. Role-plays also introduced the principles and use of EPAs as a work-based evaluation, feedback and supervisory tool (Australian Pharmacy Council, 2023b). Rotating stations included:

   a. Medication history taking on receipt of a prescription in the pharmacy;

   b. Prescription review to ensure SQUM by identifying MRPs, followed by discussion with medical staff to clarify prescriptions and resolve any identified MRPs (two scenarios were provided: previous allergy and interacting medications);

   c. At discharge, providing patient education on new medicines, ceased medicines and/or medication changes;

   d. Providing patient education on new medicines and/or demonstration of a medication device (inhaler/ insulin) in an outpatient setting.

vii. Participating in a mock ward facilitation, training and debriefing session. Mock ward sessions included:

   a. Medication history taking from a patient and carer;

   b. Medication review identifying and resolving common clinical problems with medical staff;

   c. Medication discharge education;

   d. Discussing and resolving MRPs with medical staff on the ward.

viii. Participating in ward-based teaching and debriefing in a local Sri Lankan hospital. This comprised:

   a. small groups that included a CASPPER trainer, academic and hospital trainees;

   b. preparing the groups for communicating appropriately with staff and patients;

   c. describing how to identify and allocate suitable patients for teaching purposes;

   d. observing and participating as students and educators in the facilitation of ward-based teaching;

ix. Working together, each small group identified suitable patients from the wards, conducted patient interviews and developed case-based presentations as a mutually supportive learning opportunity (Tsekhmister, 2023);

x. Obtaining feedback from all trainees on the effectiveness of the workshop, individual impact and take-home knowledge, skills, and future implementation plans. Ethics approval was provided by University of Queensland HREC (2024/HE000358).

Evaluation

Data collection and analysis

The evaluation of the 4-day TtT workshop programme comprised two post-training questionnaires requiring structured quantitative and open-ended qualitative responses. The first questionnaire (T1) (Appendix III) was distributed to the 20 workshop participants following the final training day to gather immediate impressions and feedback about the programme content and trainers. The second questionnaire (T2) (Appendix III) was distributed to the same 20 workshop participants 10 months later to gather longer-term reflections on the training and impact on their clinical or teaching practice.

The T1 questionnaire was developed through a process of co-design, incorporating feedback from the first two cohorts of TtT trainees (2009 and 2010), assessed alignment of the TtT programme with the FIP GbCF pharmaceutical care cluster, specifically the assessment and monitoring of medicines and patient consultation, and was adapted to increase relevance to this particular programme (Bajis *et al.*, 2023). Language appropriateness was discussed with Sri Lankan tutors and modified to ensure questions would be clearly understood by local participants. The T1 online questionnaire distributed at the end of the 4th training day comprised 19 questions using a 5-point Likert Scale (11 questions related to overall impressions and eight to skills and relevance), and four open-ended questions (reflecting on practice changes participants intended to implement in the next few weeks, suggested improvements, other training requirements and how they rated their training experience). Demographic information, including workplace and pharmacy practice area, was also collected. The second online questionnaire (T2), distributed 10 months later comprised 13 questions including the same eight questions from T1 relating to clinical skills and workshop relevance; and five open-ended questions about practice initiatives implemented over the 10 months since the workshop, limitations to implementing practice changes, inter-professional relationships, other training requirements and the potential value of developing a "*community of practice*" with fellow workshop participants.

The questionnaires were purposefully developed for future evaluations of successive cohorts and were developed to be completed within 15 minutes. Questionnaire responses were collated through an online form and extracted into Microsoft Excel for analysis. Descriptive analyses were used for the Likert-scale responses and demographics. Thematic analysis was performed on the responses to the open-ended questions by three team researchers. Frequency counts of responses were described for themes/sub-themes and presented with example comments (Table II).

Results

A total of 20 Sri Lankan pharmacists attended the 4-day TtT workshop and completed the questionnaire at the end of Day 4 (T1); nine academics from five universities and eleven hospital pharmacists (nine working in five government hospitals and two in private hospitals). Eighteen of these 20 trainees completed a follow-up questionnaire (T2) 10 months later.

Figure 1 provides the 20 participants overall impressions of the workshop; 19/20 strongly agreed that they would recommend the workshop to others and all trainees agreed/strongly agreed that they felt engaged, that the workshop was well paced, that they were able to ask questions, and that the facilitators were confident with the material.

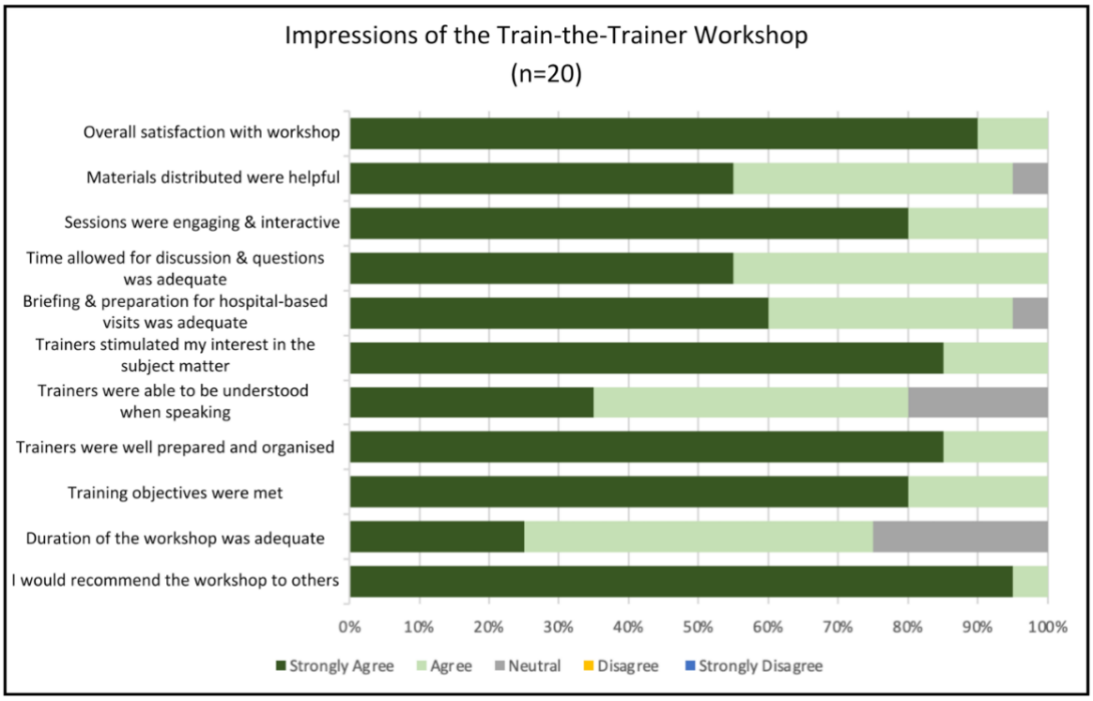

Figure 1: Overall impressions of the clinical pharmacy TtT workshop

Trainee responses to the open-ended questions were evaluated using thematic analysis. The themes, together with selected comments, are included in Table II. One of the strongest themes was the acknowledgement of the importance and value of real-world case-based discussion in the workshop that allowed a safe environment to practice the skills (such as medication review and reconciliation), combined with the ward-based teaching led by clinical pharmacists. Whilst there were no suggestions that training content should be removed/reduced, a number of participants shared that the 4-day workshop duration was difficult to manage with family and work commitments, especially as many had to travel considerable distances and fund accommodation.

Table II: Thematic analysis of participant comments about the TtT programme at T1 (n=20)

1. What ONE thing will you take back to your workplace & be able to put into practice in next few weeks?			
Theme	**Subtheme**	**Participants n**	**Comments**
Practice change	Implement tools/resources (standardise practice) – medication review & reconciliation – work-based assessment & feedback	 2 5	 "*Make proper checklist for patient history taking*" HP7 "*I'll implement a feedback system using sandwich model. I'll teach my staff regarding effective medicine history taking*" [HP3]
	Prioritisation & problem-solving practice	2	*"Focus on a few priority medicines that will prevent readmission and ensure adherence"* [AP19] *"Prioritising the medical needs and work on the needs*" [AP4]
Working together/building patient relationships & safe environments	Patient education	5	*"I would like to help patients to take their medicines properly while taking their history… ask each & every patient after issuing medicine 'do you have anything to ask me about these medicines?"* [HP9] *"Discuss with the patient what they have actually taken not what the [medical] records say"* [HP12]
Curriculum development & training	Practice-based learning simulation e.g. medication review, history etc)	4	*"We can introduce mock ward sessions to the student teaching"* [AP11]
	Implement toolkit/resources (standardise practice) – work-based assessment & feedback	1	*"Implementing a systematic feedback system for undergraduate, community & hospital clinical pharmacy training at the university"* [AP6]
2. How could we improve the training for future participants?			
Theme	**Subtheme**	**Participants n**	**Comments**
Review knowledge vs practice-based learning components to manage course duration	Pre-work (online) vs F2F training (lengthen vs shorten F2F duration)	5	*"Would be great if learning material can be provided before the presentations"* [AP20]
	Skill-based priorities – ward visits & case-based discussions	9	*"If we have more days with more cases that's more effective. Because we get more from these type of cases"* [HP9] *"Adding more small group discussions"* [AP2]
Review range of skill-based learning experiences	Increase range of clinical specialities	4	*"It is very beneficial if some other specialities are added for ward rounds"* [HP5] Examples suggested by range of participants e.g. psychiatry, oncology, elderly, paediatrics
Curriculum development & training	Nil	1	*"Its better if we have this [TtT] workshop at our university as well"* [AP1]
3. Is there any other training you need?			
Theme	**Subtheme**	**Participants n**	**Comments**
Clinical knowledge-based	Therapeutic updates (on-line learning & resources)	6	*"Training on standard treatment guidelines, key clinical pharmacy concerns"* [AP2] *"Update clinical knowledge"* [HP17]
Clinical skills-based	F2F communication & case-based discussions	5	*"Better if you could provide tips to convey our findings to prescriber. Here they are [a] little bit reluctant to accept our ideas due to the hierarchy of government professionals"* [HP15]
Other	– Research – Curriculum development – Procurement	1 1 1	*"I would like to get experience in research. As I work in a hospital, I would like to share my experience and can have more data about patients"* [HP9]

4. How would you rate the training experience?			
Theme	**Subtheme**	**Participants n**	**Comments**
Practical & approachable	Nil	8	*"… your training sessions are very useful for us. Very practical. Friendly environment and very friendly teaching manner"* [HP7] *"Happy to engage with this programme and that made me realise my strengths and weaknesses and my areas for improvement"* [HP5]
Excellent	Nil	3	*"The programme was organised very well and provided an opportunity to develop collaboration between academia and practice pharmacists which would help to uplift clinical pharmacy practice in Sri Lanka"* [AP14]
Motivational	Nil	8	*"Very much supportive workshop. Could arise my enthusiasm to initiate clinical pharmacy practice at my hospital. Good job. Thank you very much"* [HP15]

At the 10-month follow-up (T2), 3/18 participants 'strongly disagreed' with all eight clinical skills and relevance statements, however, conversely, they provided positive comments to the five open-ended questions. It appeared they had misread the Likert-scale ratings, and consequently, these participants have been excluded from Figure 2, leaving a cohort of 15 participants. Figure 2 shows that at the end of the 4-day workshop (T1), participants perceived an increase in their core clinical skills and that this would be relevant to their work-based role. At follow-up (T2), similar reflections of the workshop were reported by participants, however, the proportion who strongly agreed that the training had been relevant to their work-based role and practice increased.

*Three respondents of the total n=18 were excluded from the 10-month follow-up for this section of the questionnaire because it appeared they had misinterpreted the Likert scale responses (all three had responded 'Strongly disagree' to all 8 statements whilst providing very positive free text comments.

Figure 2: T1 and T2 clinical skills and relevance feedback for the Clinical Pharmacy TtT Workshop

All of the T2 respondents described initiating new pharmacy practices, both in clinical or teaching settings. Table III provides a summary of these activities. They varied widely across participants' workplace settings, reflecting the final workshop session when trainees were asked to identify areas where they could initiate small positive changes in practice and continue to build on these 'turtle steps'.

Two shared examples of outcomes of their initiatives:

1) Two trainees led ward-based clinical pharmacy training for 50 4th year BPharm students in February 2024 at a university where academics had been unable to attend the workshop

"*We are delighted to share our turtle steps towards strengthening Clinical Pharmacy practice at [University name] by initiating the first ever ward-based clinical pharmacy training for BPharm students. This whole session has sparked the inspiration and motivation among the students to mould them as better pharmacists in the future*".

2) four hospital trainees supported by their academic trainee colleagues won a Quality Award for initiating ward-based pharmacy services at discharge from the cardiology ward at their hospital in February 2024.

Of significance is that nine of the 18 trainees described activities that involved teaching/training others, including BPharm students, other academic staff or hospital pharmacists, and applying their new knowledge and skills in practice as trainers and thus meeting a key objective of a TtT programme.

Table III: Trainees initiatives since the TtT workshop at 10-month follow-up

Academic pharmacist trainees	Clinical pharmacist trainees
• Conducting ward-based clinical pharmacy teaching with BPharm students (n=6)	• Implementing clinical pharmacy service on hospital wards (medical, cardiac, cancer,) as part of team (n=3)
• Using mock-wards to teach students before taking students to clinical wards (n=4)	• Introduced medication reconciliation &/or patient education at discharge from wards and clinics (n=5)
• Leading interactive student workshops with other health professionals (n=2)	• Training hospital pharmacist colleagues to conduct medication history and reconciliation (n=1)
• Review and restructure current clinical teaching activities (n=2)	• Training visiting BPharm students about medicines review & managing MRPs (n=2)
• Introducing student peer evaluation for role-play & presentations (n=2)	• Introduced weekly meetings for clinical pharmacist team for feedback & discussion of cases (n=1)
• Developed & introduced 30-hour training for hospital pharmacists at request of hospital to implement a discharge medication education service for medical patients (n=1)	• Educating patients on safe & appropriate medication use after taking best possible medication history in community settings (n=1)
• Supporting hospital pharmacists to deliver new clinical pharmacy services (n=1)	

Major limitations to implementing initiatives identified by most trainees were: pharmacy workforce shortages in both academic and hospital settings to facilitate clinical pharmacy teaching and/or practice; and de-prioritising clinical work over routine duties. Some trainees also identified a lack of an appropriate conduit to record or communicate their concerns with medical colleagues and recommendations about identified MRPs, and inadequate 'space' to talk with patients about medicines (e.g. taking a history and/or providing education). Another common issue was the lack of mentoring and supervision for trainees to discuss cases, develop the necessary skills and confidence in their practice, and their needs for ongoing professional development in clinical pharmacy. However, almost all trainees recognised positive changes overall in their relationships with their ward-based health professional colleagues and a strengthening in relationships between academic and hospital pharmacist colleagues as they worked together to train students in mock wards or clinical ward-based teaching. Increasing recognition of the importance of clinical pharmacists in the hospital setting was also reported including: lead physicians making regular time during ward rounds for MRPs to be discussed by the team, and an invitation to judge a competition on patient and medication safety. Establishment of a community of practice to support one another and share experiences as colleagues was also endorsed.

The TtT model is not new and indeed was proposed by the FIP as a core component in the transformation of global pharmacy through an evidence-based pharmacy workforce development programme following the Nanjing Workforce Development Statements

(International Pharmaceutical Federation, 2017). A key exemplar model is the Indonesian TtT programme delivered as part of the FIP Transformation Programme in November 2020 (Ikatan Apoteker Indonesia, 2020; International Pharmaceutical Federation). This current manuscript, outlining the CASPPER TtT programme and evaluation, reports on the successful mapping of a number of the FIP Workforce Development Goals (International Pharmaceutical Federation, 2020). Overall, the programme has delivered a practical translation of the FIP Workforce Development Goals, with particular reference to: Increasing academic capacity (WDG 1); Early career training (WDG2), Competency development (WDG 5); Leadership development (WDG 6), Working with others (WDG 8), and Continuing Professional Development strategies (WDG9). This programme has also built upon the TtT Indonesian (IAI) programme (Ikatan Apoteker Indonesia (IAI2020 (Ikatan Apoteker Indonesia, 2020; International Pharmaceutical Federation) and the evaluation has assessed participants' impact and outcomes over time (WDG 11).

This programme has further enabled the initiation and continuation of an international research collaboration, demonstrating the positive impact of including clinical pharmacists in the multidisciplinary health team. The next stage in the research will involve a collaboration between a local Sri Lankan psychiatrist and pharmacists and two CASPPER trainers at a teaching hospital mental health unit.

Future plans

Key changes to improve future TtT programmes based on trainer and trainee reflections and feedback about the programme's current limitations include:

- Develop real-world role-plays of pharmacists' interactions with patients and other health professionals and record these in Sinhala and Tamil;
- Update medication charts for mock-wards and rotating case-based scenarios with real-world local cases (including patient characteristics and medications) drawn from TtT case-based discussions;
- Provide an opportunity for previous TtT participants to join the Trainer team to develop confidence in delivering undergraduate teaching and future TtT programs; and to practice and consolidate their clinical pharmacy teaching and training skills in the workplace with feedback from CASPPER trainers;
- Participants recommended that future training should: encompass a pre-TtT online course focused on knowledge; prioritising skill-based learning during the programme (e.g. face-to-face communications); and case-based discussions to assist with interprofessional skills development (discussing medication management with medical and nursing staff and pharmacy colleagues) and receiving feedback in the workplace;
- Range of ward visits to expand trainees' clinical knowledge-base across a range of specialties, e.g. oncology, geriatrics, psychiatry, paediatrics from a case-based perspective.

An additional key limitation of the effectiveness and scalability of this TtT programme is that role plays, ward-based teaching, and one-on-one feedback, which were highly-valued by trainees, are resource intensive, difficult to replicate virtually, and consequently, these issues restrict the number of attendees. The scalability of this TtT model is therefore limited in its current format, however, the evaluation with this cohort showed promising impact with sustainable changes in both clinical and academic pharmacy practice.

In conclusion, the evaluation of the CASPPER TtT programme demonstrated the benefit of workplace-based training and longer-term outcomes, including engaging and empowering TtT participants to implement clinical pharmacy activities in their academic and clinical workplaces. In the 10-months between programme delivery and follow-up, half of the trainees had taken on roles as clinical pharmacy trainers in their work settings; this sustained change in practice was a key objective of the TtT.

Conflict of interest

The authors declare no conflict of interest.

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Appendix A: Trainer experience and skill mix and Key to trainers

(CT1) CASPPER Trainer and TtT Programme lead (PhD, MSc Clinical pharmacy), Teaching Hospital chief pharmacist, clinical practitioner, educator, researcher, leader and manager with 12 previous CASPPER visits;

CT2) CASPPER Trainer and Programme Lead (PhD, MSc Clinical pharmacy), Conjoint university and teaching hospital, clinical educator with 14 previous CASPPER visits;

(CT3) CASPPER Trainer – Clinical Pharmacist cancer care (PhD), Cancer care clinician, leader and manager and previous university tutor, previous on line CASPPER teaching and tutoring;

(CT4) CASPPER Trainer – Clinical pharmacist mental health (PhD), Mental health professor, researcher and educator ;

(CT5), CASPPER Trainer – Clinical pharmacist Emergency and Trauma Centre, senior clinical pharmacist, educator and academic tutor;

(CT6), CASPPER Trainer – Clinical pharmacist Foundation Resident-1, 7-year experienced clinical pharmacist, previous on line CASPPER teaching and tutoring;

(CT7), CASPPER Trainer – Clinical pharmacist Foundation Resident-2, 4-year experienced clinical pharmacist;

(SLT1) Sri Lankan Trainer – Local TtT Programme Lead and Head of Department of Pharmacy in Sri Lanka (PhD), delivers clinical pharmacy programme at local university now delivering at out-lying hospitals;

(SLT2) Sri Lankan Trainer – Senior Lecturer, Department of Pharmacy and Pharmaceutical Sciences (PhD), delivers academic clinical pharmacy course

(SLT3) Sri Lankan Trainer - Probationary lecturer.

Appendix B: Final programme

	Day 1	**Day 2**	**Day 3**	**Day 4**
9-10.45	● Opening and Induction BY VICE CHANCELLOR ● Introductions of team SLT1 & CT1 ● Objectives of the week - SLT1 & CT1 ● CASPPER collaboration SLT1 & CT1 ● Why have Clinical pharmacy? CT1	● Introduction of FIP Global Competency Framework as a guide for Pharmacist development CT1 ● Review key pharmaceutical care competencies CT1 ● Introduce key principles of and demonstration of Evaluation and feedback tools of clinical practice CT2	Case Based Discussions and key messages to whole Group – 1 CT1-7 and SLT 1,2,3	Case Based Discussions and key messages to whole Group -3 CT1-7 and SLT 1,2,3
10.45-11.00	Morning tea – Split into 4 Groups	Morning tea	Morning tea	Morning tea
11.00 -	Introduction to clinical pharmacy activities: Use video of pt interviews (CT1-3,5-7) 1. Best Practice Medication history 2. Medication Reconciliation 3. Use of Medication Action plan (MAP) 4. Discharge Counselling 5. Introduction to Case Based Discussion (CBDs)	Small Group (4 grp 5) workshop, give feedback key using Entrustable professional Activities to CT 1,2,3,5,6,7) 1. Med History (2.1.1, 2.1.2, 2.6.6, 2.6.7) 2. Med Reconciliation (2.1.3 + 2.1.4) 3. Patient education (1.3.1 + 2.6) 4. Discussion of an interaction with a prescriber (2.1.3)	Case Based Discussion - 2 CT1-7 and SLT 1,2,3	Case Based Discussion - 4 CT1-7 and SLT 1,2,3
12.30-1.30	Lunch	Lunch + travel to hospital	Lunch + travel to hospital	CASPPER team + Facilitators Lunch Debrief – final discussions and Farewell

	Mock ward Clinical teaching: Nursing teaching ward n=6 CT1-7 Venue: Mock Ward or moveable chairs/ small tables	Travel approx. ½ hour	
1.30-4.00		Colombo South Teaching Hospital (Visit -1 and ID pts for CBD general Medical, Male + female (3 groups/ ward CT1-3,5-7 and SLT 1,2,3 CT4 (mental Health) male ward + 2 learners	Colombo South Teaching Hospital Visit -2 and ID pts for CBD general Medical, Male + female (3 groups/ ward CT1-3,5-7 and SLT 1,2,3 CT4 (mental Health) male ward + 2 learners

Key to trainers:

CT1 = CASPPER Trainer – Programme lead

CT2 = CASPPER Trainer – Programme lead

CT3 =CASPPER Trainer – Clinical pharmacist

CT4 = CASPPER Trainer – Clinical pharmacist

CT5 = CASPPER Trainer – Clinical pharmacist

CT6 = CASPPER Trainer – Clinical pharmacist

CT7 = CASPPER Trainer – Clinical pharmacist

SLT1 =Sri Lankan Trainer – Local Sri Lankan Lead

SLT2 = Sri Lankan Trainer – Local Sri Lankan Clinical educator

SLT3 = Sri Lankan Trainer – Local Sri Lankan Clinical educator

Appendix C: Participant information and consent form for follow up to clinical pharmacy Train the Trainer workshop questionnaire

Dear Participant

It is at least six months since you attended the National Clinical Pharmacy Workshop at either University of Sri Jayewardenepura or Peradeniya held in collaboration with CASPPER. Participation in completing this survey is voluntary. As we can all learn from each other along the journey to developing clinical pharmacy in Sri Lanka, we would like you share your experiences from your participation in the workshop and share any changes you have made in either the practice and or teaching of clinical pharmacy in the last six months with other attendees.

Work place :……Area of pharmacy: Hospital, Academia /University, Administration, other: ……..

New initiatives taken in the practice and or teaching of clinical pharmacy during the last six months (after the workshop): [Describe]

Limitations encountered when attempting changes to practice/initiating clinical pharmacy practices after the workshop: [Describe]

Please provide any examples of changes in interprofessional relationships after the workshop?

Further training areas you think were not included? If yes please describe:

Would you value frequent meetings of this group to share experiences? Yes No If YES , how often?

Thank you for your time and valuable comments. The CASPPER team