Pharmacy Practice Research – A Call to Action

Introduction to Pharmacy Practice Research

Pharmacists have a societal duty of care. How to best provide that type of care requires a scientific approach. Pharmacy practice research is a type of health services research. Although there is no universally accepted definition for pharmacy practice research, the International Pharmaceutical Federation Pharmacy Practice Special Interest Group (FIP PPR SIG), has defined it as the scientific discipline that studies the different aspects of the practice of pharmacy, and its impact on health care systems, medicine use, and patient care. The scope of pharmacy practice's research has expanded over the past 50 years to encompass clinical, behavioural, economic, and humanistic implications of the practice of pharmacy, as well as practice change and implementation of innovations such as health interventions and patient-care services in routine practice. These are often provided in collaboration with other health care professionals, supporting an interdisciplinary care and integrated healthcare delivery. The drive for the expanded role of pharmacists in most settings has undoubtedly been stimulated by patient demand, a natural professional evolution, but also facilitated by pharmacy practice research. As such, pharmacy practice research will continue to assist in shaping the future of the pharmacy profession.

It has been said that "*professions exist to serve society*"[1], otherwise, especially with the technological revolution, they will disappear. The mission of the pharmacy profession must address the medicines and health needs of individual patients and the society[1] which have changed over the past decades. The traditional roles of pharmacists have been historically focused on drug compounding and then on drug supply. These were originally challenged by the clinical pharmacy movement and then by the concept of Pharmaceutical Care, defined as "*the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life*" [2]. These changes have led to emerging roles for the pharmacy profession, mainly through the provision of health interventions and patient-care services, aiming at either optimizing the medication use process or at improving health [3,4].

Evidence-based practice requires that healthcare decisions are made based on the best available, current, valid, and relevant evidence[5]. Evidence-based practice is essential to deliver high quality patient care. Over the past years, pharmacy has increasingly used research to evaluate a wide range of new pharmacist-led services and interventions and their contribution to existing and new models of healthcare. These interventions have been tested in research environments, many of which have

provided supporting evidence for the role of pharmacists in improving clinical, economic and humanistic outcomes in different conditions and populations [6–15]. Designing feasible patient-care services and generating robust evidence of their impact (not only for patients but also for the different stakeholders involved in healthcare) is essential to influence policies that support their implementation and funding. Based on this evidence, researchers and pharmacy leaders called for patients, governments, and health insurance companies to remunerate pharmacists for their patient-care services. As a result, services such as medication reviews, smoking cessation counselling, minor ailment programs, chronic disease management, or vaccinations have been remunerated in various countries [16,17].

A large number of these innovations are not yet fully integrated into routine practice of pharmacists and the healthcare system, mainly due to lack of implementation programs and evidence-based implementation strategies[18]. These services will only continue to be remunerated if their ongoing contribution to patient care is proven. The ultimate goal is to achieve their sustainability, crucial to reaching their long-term integration and continuity into a given setting [19]. Therefore, developing effective services and achieving their long-term implementation and sustainability in daily practice is crucial to explore innovative models of care that address population needs, and in turn supporting the advancement and future existence of the pharmacy profession. Pharmacy Practice Research is a critical enabler to achieve these goals.

Pharmacy Practice Key Strategic Areas of Research

The development, evaluation, implementation and sustainability of health interventions and patient-care services represents a challenging process for pharmacy practice researchers. Traditional approaches such as the evaluation of health interventions through randomized controlled trials (RCTs), may not be sufficient to achieve practice and policy changes. A sole emphasis on the intervention's evaluation phase, in detriment of the development and implementation phases make these interventions weaker, decreasing the chances of its future implementation[20]. To address this problem, pharmacy practice researchers can go through a number of stages in the planning and execution of their research, including design, impact evaluation, implementation, and sustainability. One of the potential failures in PPR has been trying to aggregate all these steps involved in health services research, rather than using a multistage approach. The Medical Research Council Framework, provides an structured approach to develop, evaluate, and implement complex interventions (like professional pharmacy services) in health using a wide range of qualitative,

quantitative, and mixed-method research approaches [20]. This framework has been widely used in health services research, helping researchers make methodological and practical choices. The application of these techniques to Pharmacy Practice Research seems relevant, and an adaptation of the different phases that could be applied to health interventions and services are discussed below.

Needs assessment - Identifying unmet population needs.

Before the development of any health intervention or patient-care service, Pharmacy Practice Researchers must identify societal health needs that can benefit from pharmacists' care or from wider healthcare system changes[21]. Unless a health intervention is able to respond to current or future societal needs, its future sustainability is likely to be compromised. This is undertaken through a health needs assessment, which is the systematic method of identifying unmet health and healthcare needs of a population and making changes to meet these unmet needs [21]. Health needs assessment can provide clear objectives to design interventions and services which meet patient and population needs.

Societal health needs have been defined as "*the requirements at the individual, family, community and population levels -across the continuum of care- to achieve physical, cognitive, emotional, social, and spiritual wellbeing, taking into account the broad determinants of health*" [22]. Based on this definition, there are four key elements to be considered when undertaking a needs assessment.

1) Firstly, local, community and global environments are to be examined, assessing health at an individual, community and population level. A population centred need perspective implies that: (a) there is an epidemiological approach to the problem, (b) there is a focus on the needs of individuals, communities and population (so disparities are reduced and health equity is maximised) and (c) community orientation and engagement is ensured[22].
2) It is important to recognise that needs, - i.e. gaps between a current and a desired state of being - can be objective or subjective and physical or psychological, and are likely to change over time.
3) Efforts should be made to ensure a continuum of care, with integrated services ranging from illness prevention, health promotion, public health and screening, to chronic disease management, long-term care, and palliative care amongst others. This continuum of care would include services that are able to respond to current public healthcare crises (e.g. opioid abuse) or public health emergencies of international concern (e.g. communicable

disease outbreaks). Effective needs assessments can potentially lead to integration of the results into planning and commissioning of local services[21].

4) Lastly, health is a broad concept influenced by multiple determinants which incorporate wider social and environmental factors. These must be carefully examined to fully understand the nature of the problem[22]. The analysis is key to determine if the identified determinants could be targeted with a pharmacy intervention and if this intervention would be within pharmacists' scope of practice. Social factors influencing patient medicine use studied in social pharmacy, such as medicine and health-related beliefs, attitudes, rules, relationships, and processes, are just some of the many aspects to be considered in pharmacy practice research[23].

Specific attention should be paid to the local context in which this unmet need is identified and the feasibility of implementing an intervention. It must be noted that in some countries, especially in those with an ageing population, it is common to find a shortage of primary health care professionals such as physicians and nurses. This situation creates healthcare gaps that in some cases can be covered by pharmacists.

It has been recommended that societal health needs are identified through a collaborative process that is patient-focused, culturally sensitive, evidence-based, and outcome-focused[22]. The process involves a range of research designs which will ultimately help to determine priorities for the most effective use of resources, balancing clinical, ethical, humanistic and economic factors[21]. Approaches during this phase include - but are not limited to - qualitative research (when an in-depth understanding of a particular phenomenon is needed, with a focus on perceptions and experiences from the perspective of the patient or other stakeholders)[24], epidemiological approaches such as observational studies (used to describe the health status of populations and identify possible determinants of health outcomes) or systematic reviews and meta-analyses (used to synthesize the results of different studies when conflicting evidence exists in a given area).

Intervention development – Designing and modelling processes and outcomes

During this phase pharmacy practice researchers should aim at designing and modelling the intervention or patient-care service, in order to address the needs identified during the assessment phase. Identifying relevant evidence, Appraising other national and international services, and exploring the practical feasibility of an intervention in a given context are required. It is important to note that just picking up a service protocol form one country to another without contextual analysis

is fraught with problems. Moreover, poor design during the development of a service may result in a future implementation failure.

Exploring existing theories, models, and frameworks from within pharmacy and other disciplines that are applicable to the service model is required. This is a vital preparatory step in designing a service. When based on theory, health interventions are more likely to have positive effects on its target population[25]. Theory can assist researchers to understand the likely outcomes for a complex intervention and therefore enable the modelling of the process. Process and outcome indicators that monitor the intervention's performance during the evaluation, implementation and sustainability phases have to be established. Special attention should be paid to the identification of indicators that can be used in the future when monitoring the intervention's fidelity (i.e. the degree to which the intervention is delivered as described)[26].

Many other components can be considered when developing a service that contributes to improved patient outcomes and adds value to healthcare. Some examples include patient and market demand, current local and national agreements, potential funders/payers, local policies, interdisciplinary care and collaborative practice models, pharmacists' scope of practice and stakeholders' views, amongst many others. Considering the different perspectives from all stakeholders involved is crucial for success. For example, involving patients in this stage has been associated with more effective services[27], better relationship with the healthcare professional, and increased patient satisfaction[28]. A missed viewpoint or issue not identified early on may cause major difficulties during implementation. A possible approach during this stage could be the use of co-design (also known as participatory design, experience-based co-design, co-production, co-creation, or co-operative design). Co-design is increasingly being used in healthcare settings, including pharmacy[29], to increase the participation and engagement of stakeholders in the development of health services. Stakeholders could include individual patients, other health care professionals, groups, or organisations who may influence or be affected by decision-making on a particular action, aim, or policy. During a co-design process, future implementation and dissemination strategies are also covered.

Intervention evaluation – Assessing the intervention's feasibility and impact

Evaluating the impact of a health intervention or patient-care service is a key step in the process of establishing the added value and contribution of pharmacists. The main objective of this phase is to assess either the efficacy or effectiveness of the intervention or service on pre-defined study outcomes. This step is critical to generate evidence on its benefits and convince potential service payers, policy makers and other stakeholders to support its future implementation. However, it is

160 essential to consider the value from many other stakeholders' perspectives involved in patient care
161 to achieve a balanced overview of the intervention's impact. This is often achieved using the Kozma's
162 ECHO (Economic, Clinical, Humanistic Outcomes) model[30]. It implies assessing the clinical impact (eg.
163 clinical outcomes, important from the perspective of the health care provider), humanistic impact
164 (e.g health-related quality of life, important from the patient perspective) and economic impact (e.g
165 cost-effectiveness and cost-utility of the service, important from the policy maker and payer
166 perspective). Examples of potential outcomes are shown in table 1.

167 Once the study outcomes have been identified and defined, an appropriate study design should be
168 selected to evaluate the intervention's impact. The study design and length might be dependent on
169 the study outcomes to be tested. RCTs are the gold standard to evaluate innovations in health and
170 should always be considered as the most robust option. However, in some circumstances it is
171 preferable to randomly assign groups or clusters of people instead of individuals. Cluster RCTs
172 (cRCTs), widely used in health services research, have become essential to evaluate some types of
173 interventions when contamination between study groups is to be avoided[31] When a RCT or cRCT is
174 not feasible, alternative experimental approaches can be considered. Pragmatic designs such as
175 stepped-wedge cluster randomised trials, or sequential multiple assignment randomised trials
176 (SMART) are expected to increase in the future[32].

177 Some complex interventions and services may incur in an expensive and long evaluation process.
178 Therefore, where there is uncertainty about the practicability of a RCT or an alternative design, a
179 feasibility study would be appropriate[31]. Different types of feasibility studies have been defined,
180 according to their ultimate objective[31]. Feasibility studies are not designed to address the
181 effectiveness of an intervention. Rather, they are used to determine whether an intervention is
182 appropriate for further evaluation[33]. They also allow weaknesses to be identified, methods and
183 procedures to be tested and refined, and they can offer significant information regarding the design
184 so potential problems do not arise in the evaluation and implementation phases[20]. Feasibility studies
185 can address the stakeholders' intervention acceptability (e.g. patients, providers, other health care
186 professionals, policy makers), intervention demand, participant recruitment, retention rates,
187 intervention's implementability in a given setting or its practicality. They can also provide valuable
188 information to estimate potential effect sizes and sample sizes for the main trial. Potential research
189 approaches and methods vary depending on the study focus, and these often include a mix of
190 qualitative and quantitative approaches through structured or semi structured interviews, nominal or
191 focus groups, direct or participant observation and surveys. It must be noted that in some cases,

more than one feasibility study might be needed. Once the appropriate feasibility testing has been finalised, one should be confident the intervention's effectiveness can be evaluated in a larger trial.

Intervention implementation– incorporating innovations into practice

There is extensive evidence supporting the role of pharmacists in a range of disease states. However these benefits cannot accrue unless there is effective implementation[34]. Implementation science emerged to address the challenges associated with the incorporation of evidence-based innovations into practice[35], seeking to understand and work within real world conditions[36]. Like in other disciplines, implementation research has become a rapidly progressing interest for pharmacy practice researchers. Numerous frameworks, theories and models have been developed to address the science to practice gap, which have predominantly been targeted to specific disciplines, including pharmacy[37]. These conceptual approaches, which vary depending on their ultimate objective, have been acknowledged as a key element to facilitate the implementation of health innovations into practice [34,38]. For example, process models describe a number of implementation stages (e.g. exploration, adoption, installation/preparation, initial implementation, full operation) that guide the implementation process. Determinant frameworks, classic theories and implementation theories usually aim to understand and explain what factors influence implementation outcomes. Finally, evaluation frameworks provide a range of outcome indicators (e.g. acceptability, adoption, appropriateness, costs, feasibility[26]) that can be used to determine implementation success[26]. The application of these approaches vary depending on the implementation research question. Nevertheless, some criteria exist to help researchers identify an appropriate approach, instead of using theories that are convenient but not appropriate to meet the research objectives[39].

Different implementation research designs have been suggested, some of which have been successfully applied in pharmacy[18,40–42]. Hybrid designs, in which design components of clinical effectiveness and implementation research are blended according to the study's main objective, are widely used and reported in the implementation science literature[43]. Experimental epidemiological designs already described, qualitative and mixed method approaches such as quality improvement studies and participatory action research are common[36]. Extensive research has been undertaken to explore barriers and facilitators for services implementation. However, there has been a call for more rigorous implementation studies in pharmacy, which should consider using implementation theories, frameworks or models and report on appropriate implementation outcomes[44]. Therefore, researchers may want to question themselves: Has an implementation theory, model or framework been selected? Is it the most appropriate? Is the research design appropriate to meet the study

objectives? Have implementation process and outcome indicators being defined? How are they going to be assessed?

Sustainability - achieving the intervention's sustainment

Sustainability is the last phase in the creation of health interventions and patient-care services, which is becoming increasingly important for health services researchers and policy-makers. Once an evidence-based intervention has been implemented in practice, the ultimate objective is to achieve its long-term sustainability. Despite its importance, there is scarce evidence on how to achieve long-term sustainability of health interventions and services once the implementation phase is over. In fact, this step is not considered in the MRC framework.

Advancements in this area have resulted in the development of conceptual approaches to guide, identify determinants and even evaluate the sustainability of innovations in health care settings. However, there is some debate on how this important stage should be conceptualisedi[45]. Nevertheless, a definition for pharmacy practice research has been suggested*"Sustainability is a phase in the process of a professional pharmacy service, in which the service previously integrated into practice during the implementation phase is routinized and institutionalized over time to achieve and sustain the expected service outcomes"* [19]*.* According to this definition, sustainability seems to be conceptualised by two dimensions: routinisation and institutionalisation. These elements have also been identified as essential to achieve sustainable interventions and services in pharmacy[46]. In sustainability, routinisation refers to the maintenance of the pharmacy's routine for the service provision, through continuous improvement of the service's protocol and components. According to this element, sustainability is a dynamic process, with evaluation and continuous monitoring of the service's performance being critical to ensure the service is working effectively and producing its expected outcomes (as per the evaluation and implementation phase). This continuous monitoring can lead to a service adaptation if needed. Service adaptation is given high relevance in the literature and has been described as essential to ensure the long-term sustainability of evidence-base interventions[46,47] However, there is uncertainty on how adaptation and fidelity (i.e. the degree to which an intervention or program is delivered as intended) should be balanced.

Institutionalisation refers to the gradual adaptation of the pharmacy's context, structures, and processes, to the provision of the service. Within the concept of institutionalisation, three interrelated performance domains (environment, social and economic) with core factors across each domain, are hypothesised to moderate the service's sustainability. Some of these factors include but are not limited to leadership, goal setting, funding, staff training, or political support[46].

Pharmacy practice research key priorities during the sustainability phase should aim to validate and empirically test an evaluation framework in pharmacy. Other areas of interest could include developing monitoring systems for the intervention's performance through digital platforms, as well as adaptation and optimisation mechanisms, using innovative approaches such as machine learning. The development and evaluation of tailored sustainability strategies, targeted at the different sustainability factors, are to be studied. Research approaches imported from other disciplines such as change management, service value networks or service operations management seem to be potentially useful in advancing in this area.

The role of pharmacy practice research in universities

As dynamic institutions, universities have to evolve to identify and meet the demands of the society, by producing graduates t`hat are able to address those current and future demands. Over the past years, pharmacy has increasingly been using research in practice. One of the main objectives has been to evaluate pharmacists' contribution to new models of care through some of the approaches previously described. Schools of Pharmacy in some countries have significantly contributed to the advancement of the pharmacy profession either by university institutions or associated pharmacy practice research centres[48]. Most of their research is guided and driven by national local needs, such as chronic disease management in developed countries[48] or disease prevention in developing countries. Their findings have contributed to expand the role of pharmacists in local and global environments. Despite this and possibly due to it social component, pharmacy practice research has often been considered as a "soft" science in many pharmacy schools, leading into an erroneous perception of being a less valid scientific field.

Pharmacy practice research often integrates concepts and methods from disciplines outside pharmacy such as psychology, pharmacoeconomics, public health or implementation science, which stimulates interdisciplinary collaborations. There is evidence collaborative national and international research in this area is growing, showing an increased contribution to global health research[50]. To continue with its innovative contribution to the profession and the society, Universities need to invest in pharmacy practice research, creating departments, research centres, and allowing access to research funding that allow advances in the discipline. Professional organisations should continuously inform Universities on the graduate attributes that are needed in the current and future pharmacy workforce[49]. Universities, health professional organisations, governments, and consumer groups should work collaboratively to continuously shape the future of the pharmacy profession, lead innovation, and expand Pharmacy Practice opportunities. This could be done at national or international level. For example, the International Pharmaceutical Federation (FIP)

provides leadership for national pharmacy professional organisations, which in turn provide the impetus for setting national standards.

International Pharmaceutical Federation and Pharmacy Practice Research

The International Pharmaceutical Federation (FIP) is an international organization representing pharmacists and pharmaceutical scientists. Since its foundation in 1912, FIP's priorities have evolved in order to meet the needs and expectations of the profession, manifested through an increase of healthcare services and integration of emerging scientific innovations in the practice of the pharmacy. As stated in FIP's 2020 vision and strategic plan, its ultimate vision is to "*improve global health by advancing Pharmacy Practice and science to enable better discovery, development, access to and safe use of appropriate, cost-effective, quality medicines worldwide*".

The Board of Pharmaceutical Sciences (BPS) deals with FIP's scientific activities, with the ultimate objective of contributing to the improvement of world health, mainly through disease prevention and treatment strategies. Within the BPS, there are six Special Interest Groups (SIG's), which are in charge of continuously developing initiatives to assist FIP and its member organisations achieve this objective. In 2016, the BPS provided the opportunity to establish the Pharmacy Practice Research SIG (PPR SIG) as one of its pharmaceutical sciences areas of research. It was created with the main scope of increasing Pharmacy Practice contributions to global health through the provision of greater access to the latest high-quality international pharmacy practice research. Based on this objective, the PPR SIG also aims to cultivate an international forum for the dissemination of quality, international pharmacy practice research for all stakeholders and stimulate communication, discussion, networking and collaboration between international Pharmacy Practice stakeholders, including pharmacists and pharmaceutical scientists for the advancement of best practice. Research areas and efforts will be targeted at local and global priorities, with the ultimate objective of improving pharmacists' contribution to global health.

Call to action for Pharmacy Practice Research, Pharmacy Practice Education and Practice of Pharmacy

Based on the elements discussed in this paper, the following actions are proposed:

- Adopting the Pharmacy Practice definition suggested in this paper.
- Undertaking a societal health needs assessment before the development of patient-care services.

- Using robust epidemiological research designs when evaluating health interventions. When sufficient evidence is available, this should be synthesised using robust meta-analyses.
- Applying innovative research methods to address challenges that cannot be solved with current research approaches. This is especially relevant for addressing the current science-to-service gap, during implementation and sustainability phases.
- Implementing Pharmacy Practice teaching and research in all pharmacy curriculums.
- Stimulating global collaboration across pharmacy practice researchers and educators in order to support teaching and research.
- Consolidating a distinctive body of knowledge by creating consistent terminology and thesaurus and publishing in pharmacy journals when disseminating pharmacy practice research outputs.
- Reinforcing local and global pharmacy organisations' role, support and contribution to Pharmacy Practice Research for the advancement of best practice.

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References

1. Wiedenmayer K, Summers RS, Mackie CA, et al. Developing pharmacy practice. A focus on patient care. Geneva: World Health Organisation. 2006. Available from: https://apps.who.int/iris/handle/10665/69399.

2. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm*. 1990;47(3):533-543.

3. Benrimoj S (charlie), Feletto E, Gastelurrutia M, Martinez F, Faus MJ. A holistic and integrated approach to implementing cognitive pharmaceutical services. *Ars Pharm*. 2010;51:69-88.

4. Donabedian A. The quality of care. How can it be assessed? *JAMA*. 1988;260(12):1743-1748. doi:10.1001/jama.260.12.1743

5. Dawes M, Summerskill W, Glasziou P, et al. Sicily statement on evidence-based practice. *BMC Med Educ*. 2005;5(1):1. doi:10.1186/1472-6920-5-1

6. Rotta I, Salgado TM, Silva ML, Correr CJ, Fernandez-Llimos F. Effectiveness of clinical pharmacy services: an overview of systematic reviews (2000–2010). *Int J Clin Pharm*. 2015. doi:10.1007/s11096-015-0137-9

7. Garcia-Cardenas V, Armour C, Benrimoj SI, Martinez-Martinez F, Rotta I, Fernandez-Llimos F. Pharmacists' interventions on clinical asthma outcomes: a systematic review. *Eur Respir J*. 2015:1-10. doi:10.1183/13993003.01497-2015

8. Machado M, Bajcar J, Guzzo GC, Einarson TR. Sensitivity of patient outcomes to pharmacist interventions. Part I: systematic review and meta-analysis in diabetes management. *Ann Pharmacother*. 2007;41(10):1569-1582. doi:10.1345/aph.1K151

9. Machado M, Bajcar J, Guzzo GC, Einarson TR. Sensitivity of patient outcomes to pharmacist interventions. Part II: Systematic review and meta-analysis in hypertension management. *Ann Pharmacother*. 2007;41(11):1770-1781. doi:10.1345/aph.1K311

10. Beahm NP, Smyth DJ, Tsuyuki RT. Outcomes of Urinary Tract Infection Management by Pharmacists (RxOUTMAP): A study of pharmacist prescribing and care in patients with uncomplicated urinary tract infections in the community. *Can Pharm J (Ott)*. 2018;151(5):305-314. doi:10.1177/1715163518781175

11. Jodar-Sanchez F, Malet-Larrea A, Martin JJ, et al. Cost-utility analysis of a medication review

with follow-up service for older adults with polypharmacy in community pharmacies in Spain: the conSIGUE program. *Pharmacoeconomics*. 2015;33(6):599-610. doi:10.1007/s40273-015-0270-2

12. Al Hamarneh YN, Johnston K, Marra CA, Tsuyuki RT. Pharmacist prescribing and care improves cardiovascular risk, but is it cost-effective? A cost-effectiveness analysis of the RxEACH study. *Can Pharm J (Ott)*. 2019;152(4):257-266. doi:10.1177/1715163519851822

13. Malet-Larrea A, García-Cárdenas V, Sáez-Benito L, Benrimoj SI, Calvo B, Goyenechea E. Cost-effectiveness of professional pharmacy services in community pharmacy: a systematic review. *Expert Rev Pharmacoecon Outcomes Res*. 2016;16(6):747-758. doi:10.1080/14737167.2016.1259071

14. Schulz M, Verheyen F, Muhlig S, et al. Pharmaceutical care services for asthma patients: a controlled intervention study. *J Clin Pharmacol*. 2001;41(6):668-676. doi:10.1177/00912700122010438

15. Schulz M, Griese-Mammen N, Anker SD, et al. Pharmacy-based interdisciplinary intervention for patients with chronic heart failure: results of the PHARM-CHF randomized controlled trial. *Eur J Heart Fail*. 2019;21(8):1012-1021. doi:10.1002/ejhf.1503

16. Houle SKD, Grindrod K a., Chatterley T, Tsuyuki RT. Paying pharmacists for patient care: A systematic review of remunerated pharmacy clinical care services. *Can Pharm J / Rev des Pharm du Canada*. 2014;147:209-232. doi:10.1177/1715163514536678

17. Houle SKD, Carter CA, Tsuyuki RT, Grindrod KA. Remunerated patient care services and injections by pharmacists: An international update. *Can Pharm J (Ott)*. 2019;152(2):92-108. doi:10.1177/1715163518811065

18. Garcia-Cardenas V, Benrimoj SI, Ocampo CC, Goyenechea E, Martinez-Martinez F, Gastelurrutia MA. Evaluation of the implementation process and outcomes of a professional pharmacy service in a community pharmacy setting. A case report. *Res Soc Adm Pharm*. July 2016. doi:10.1016/j.sapharm.2016.05.048

19. Crespo-Gonzalez C, Garcia-Cardenas V, Benrimoj SI. The next phase in professional services research: From implementation to sustainability. *Res Soc Adm Pharm*. 2017. doi:10.1016/j.sapharm.2017.05.020

20. Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M. Developing and evaluating

400 complex interventions: the new Medical Research Council guidance. *BMJ*. 2008;337:a1655.
401 doi:10.1136/bmj.a1655

402 21. Wright J, Williams R, Wilkinson JR. Development and importance of health needs assessment.
403 *BMJ*. 1998;316(7140):1310-1313. doi:10.1136/bmj.316.7140.1310

404 22. Defining Societal Health Needs. Royal College Definition and Guide. Canada: Royal College of
405 Physicians and Surgeons of Canada. 2012. Available from:
406 http://www.royalcollege.ca/rcsite/health-policy/quality-standards-practice-e.

407 23. Almarsdottir AB, Granas AG. Social Pharmacy and Clinical Pharmacy-Joining Forces. *Pharm*
408 *(Basel, Switzerland)*. 2015;4(1). doi:10.3390/pharmacy4010001

409 24. Amin MEK, Nørgaard LS, Cavaco AM, et al. Establishing trustworthiness and authenticity in
410 qualitative pharmacy research. *Res Soc Adm Pharm*. 2020.
411 doi:https://doi.org/10.1016/j.sapharm.2020.02.005

412 25. Conn VS, Enriquez M, Ruppar TM, Chan KC. Meta-analyses of Theory Use in Medication
413 Adherence Intervention Research. *Am J Health Behav*. 2016;40(2):155-171.
414 doi:10.5993/AJHB.40.2.1

415 26. Proctor E, Silmere H, Raghavan R, et al. Outcomes for implementation research: Conceptual
416 distinctions, measurement challenges, and research agenda. *Adm Policy Ment Heal Ment*
417 *Heal Serv Res*. 2011;38:65-76. doi:10.1007/s10488-010-0319-7

418 27. Doyle C, Lennox L, Bell D. A systematic review of evidence on the links between patient
419 experience and clinical safety and effectiveness. *BMJ Open*. 2013;3(1):e001570.
420 doi:10.1136/bmjopen-2012-001570

421 28. Palumbo R, Manna R. What if things go wrong in co-producing health services? Exploring the
422 implementation problems of health care co-production. *Policy Soc*. 2018;37(3):368-385.
423 doi:10.1080/14494035.2018.1411872

424 29. Franco-Trigo L, Hossain LN, Durks D, et al. Stakeholder analysis for the development of a
425 community pharmacy service aimed at preventing cardiovascular disease. *Res Soc Adm*
426 *Pharm*. 2017;13(3):539-552. doi:https://doi.org/10.1016/j.sapharm.2016.06.009

427 30. Kozma CM, Reeder CE, Schulz RM. Economic, clinical, and humanistic outcomes: a planning
428 model for pharmacoeconomic research. *Clin Ther*. 1993;15(6):1121-1132; discussion 1120.

31. Eldridge SM, Lancaster GA, Campbell MJ, et al. Defining Feasibility and Pilot Studies in Preparation for Randomised Controlled Trials: Development of a Conceptual Framework. *PLoS One*. 2016;11(3):e0150205-e0150205. doi:10.1371/journal.pone.0150205

32. Grayling MJ, Wason JMS, Mander AP. Stepped wedge cluster randomized controlled trial designs : a review of reporting quality and design features. *Trials*. 2017:1-13. doi:10.1186/s13063-017-1783-0

33. Bowen DJ, Kreuter M, Spring B, et al. NIH Public Access. 2010;36(5):452-457. doi:10.1016/j.amepre.2009.02.002.How

34. Garcia-cardenas V, Ph D, Pharm M, et al. Evaluation of the implementation process and outcomes of a professional pharmacy service in a community pharmacy setting . A case report. 2016. doi:10.1016/j.sapharm.2016.05.048

35. Eccles MP, Mittman BS. Welcome to Implementation Science. *Implement Sci*. 2006;1:1. doi:10.1186/1748-5908-1-1

36. Peters DH, Adam T, Alonge O, Agyepong IA, Tran N. Implementation research: what it is and how to do it. *BMJ*. 2013;347:f6753. doi:10.1136/bmj.f6753

37. Moullin JC, Sabater-Hernández D, Benrimoj SI. Model for the evaluation of implementation programs and professional pharmacy services. *Res Soc Adm Pharm*. 2016;12(3):515-522. doi:10.1016/j.sapharm.2015.08.003

38. Nilsen P. Making sense of implementation theories, models and frameworks. *Implement Sci*. 2015;10:1-13. doi:10.1186/s13012-015-0242-0

39. Birken SA, Powell BJ, Shea CM, et al. Criteria for selecting implementation science theories and frameworks: results from an international survey. *Implement Sci*. 2017;12(1):124. doi:10.1186/s13012-017-0656-y

40. Fuller JM, Saini B, Bosnic-Anticevich S, Cardenas VG, Benrimoj SI, Armour C. Testing evidence routine practice: Using an implementation framework to embed a clinically proven asthma service in Australian community pharmacy. *Res Soc Adm Pharm*. 2017:1-8. doi:10.1016/j.sapharm.2017.05.019

41. Lelubre M, Clerc O, Grosjean M, et al. Implementation study of an interprofessional medication adherence program for HIV patients in Switzerland: quantitative and qualitative implementation results. *BMC Health Serv Res*. 2018;18(1):874. doi:10.1186/s12913-018-

3641-5

42. Lelubre M, Wuyts J, Maesschalck J, et al. Implementation study of an intermediate medication review in Belgian community pharmacies. *Res Social Adm Pharm*. 2019;15(6):710-723. doi:10.1016/j.sapharm.2018.09.002

43. Curran GM, Bauer M, Mittman B, Pyne JM, Stetler C. Effectiveness-implementation hybrid designs: combining elements of clinical effectiveness and implementation research to enhance public health impact. *Med Care*. 2012;50(3):217-226. doi:10.1097/MLR.0b013e3182408812

44. Brandt J, Lê M, Jantscher S, et al. Research in Social and Administrative Pharmacy Medication review service implementation in community pharmacy settings : Scoping review with focus on implementation studies. *Res Soc Adm Pharm*. 2019;(August):1-11. doi:10.1016/j.sapharm.2019.10.005

45. Walugembe DR, Sibbald S, Janzen M, Ber L, Kothari A. Sustainability of public health interventions : where are the gaps ? 2019:1-7.

46. Crespo-Gonzalez C, Benrimoj SI, Scerri M, Garcia-Cardenas V. Sustainability of innovations in healthcare: A systematic review and conceptual framework for professional pharmacy services. *Res Social Adm Pharm*. February 2020. doi:10.1016/j.sapharm.2020.01.015

47. Chambers DA, Glasgow RE, Stange KC. The dynamic sustainability framework : addressing the paradox of sustainment amid ongoing change. 2013:1-11.

48. Salgado TM, Patterson JA, Bajaj SK, et al. Research in Social and Administrative Pharmacy Characterization of pharmacy practice research centers across the United States. *Res Soc Adm Pharm*. 2020;16(2):230-237. doi:10.1016/j.sapharm.2019.05.009

49. Gubbins PO, Micek ST, Badowski M, et al. Innovation in clinical pharmacy practice and opportunities for academic--practice partnership. *Pharmacotherapy*. 2014;34(5):e45-54. doi:10.1002/phar.1427

50. Al-aqeel S, Mendes AM, Taisir H, Fernandez-llimos F. Research in Social and Administrative Pharmacy International collaboration in pharmacy practice research : A bibliometric analysis. *Res Soc Adm Pharm*. 2020;(May):1-6. doi:10.1016/j.sapharm.2020.05.019

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