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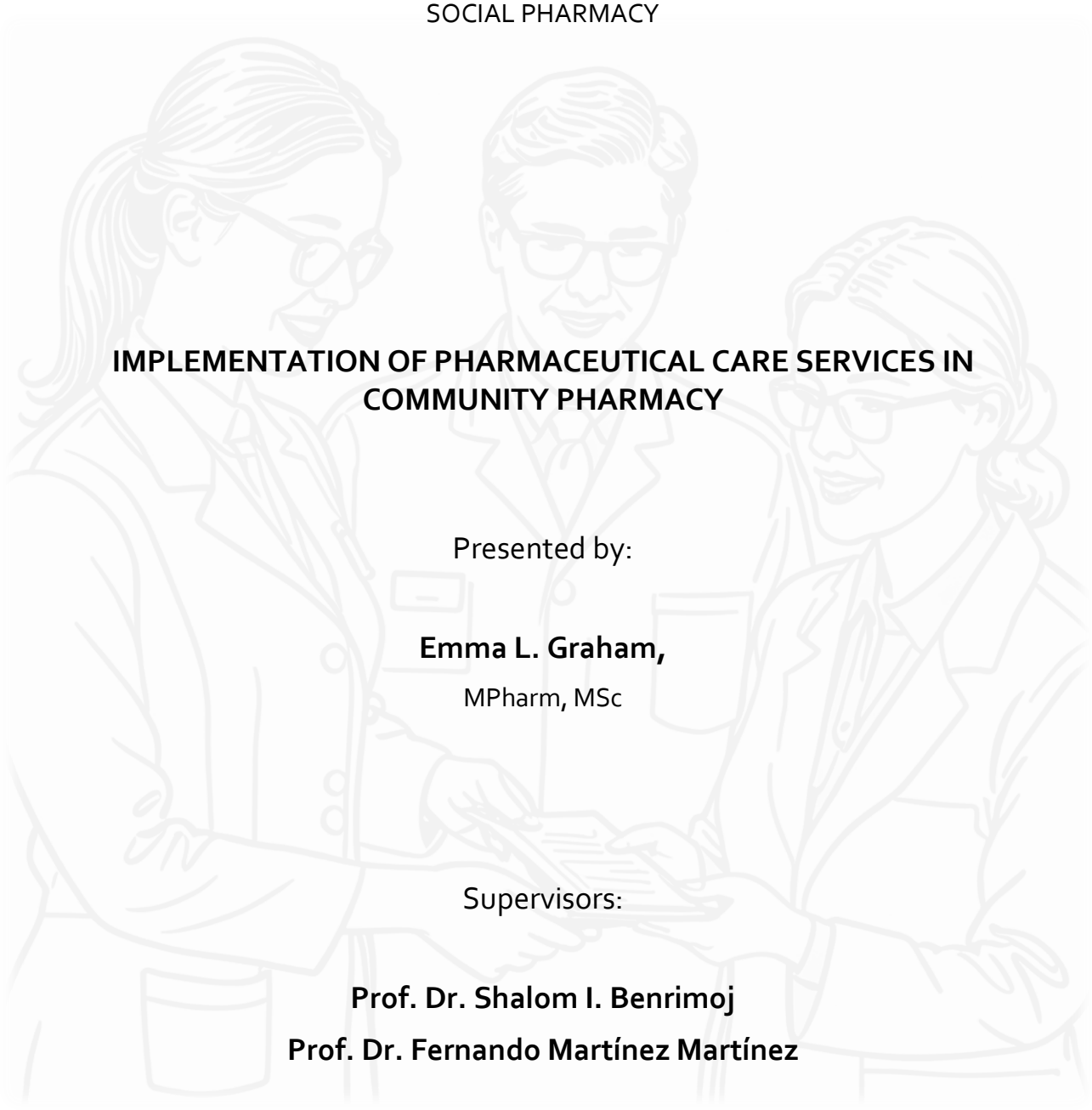

IMPLEMENTATION OF PHARMACEUTICAL CARE SERVICES IN COMMUNITY PHARMACY

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IMPLEMENTATION OF PHARMACEUTICAL CARE SERVICES IN COMMUNITY PHARMACY

IMPLEMENTACIÓN DE SERVICIOS PROFESIONALES FARMACÉUTICOS ASISTENCIALES (SPFA) EN FARMACIA COMUNITARIA

PhD Thesis

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ABBREVIATIONS

Community Pharmacy Pharmaceutical Care Forum (FORO-AF)

Consolidated Framework for Implementation Research (CFIR)

Expert Recommendations for Implementing Change (ERIC)

General Medical Practitioner (GP)

Spanish Society of Primary Care Physicians (SEMERGEN)

Spanish Society of Family and Community Medicine (SEMFyC)

Spanish Society of Clinical, Family and Community Pharmacy (SEFAC)

Digital Object Identifier (DOI)

External Change Agent (ECA)

Combined Change Agent (CCA)

National Health Service (NHS)

Accident and Emergency (A&E)

ABSTRACT

Introduction: Minor ailments such as sore throats, cold sores, and colds are often self-limiting and can be managed without medical intervention. Despite this, many patients still seek medical advice, placing strain on healthcare systems. To ease this burden, several countries have introduced 'minor ailment services', allowing pharmacists to assess, treat, and refer patients when needed. This service is not funded in Spain. The Community Pharmacy Pharmaceutical Care Forum (FORO-AF) defines it as a '*pharmaceutical care service designed to address specific health issues, available to patients or caregivers who visit the pharmacy in search of the most suitable remedy for their condition*'. Although the generation of evidence of a service's efficacy and effectiveness is necessary and important, it does not guarantee its adoption in community pharmacies. To facilitate adoption, implementation science models and theoretical frameworks can be used. Implementation determinants, such as barriers and their causes, complicate implementation, and failing to address them often results in lack of service implementation, poor service, suboptimal patient care, and wasted resources. Targeted strategies to overcome these types of determinants are essential for optimal implementation.

Objectives: The following specific objectives were pursued:

1. To conduct a systematic review of international literature to map the relationship between barriers in health service implementation and the strategies used to address them, to evaluate and quantify the effectiveness of these barrier-strategy combinations.

2. To identify and categorise the determinants faced by pharmacists and their pharmacies during the implementation of a minor ailment service, as reported by change agents.

3. To identify the implementation strategies used by change agents during a minor ailment service implementation study and assess their effectiveness in overcoming their targeted barriers.
4. To develop guidance on selecting effective implementation strategies targeted to specific determinants when implementing services in community pharmacy settings.

Methods: This study was undertaken within a type 3 hybrid design effectiveness-implementation trial using a mixed methods approach. A systematic review of the literature was undertaken following the Cochrane methodology and PRISMA guidelines. Data were extracted in detail and analysed using R software. The study took place in community pharmacies across Spain which were implementing a minor ailment service. Pharmacies were divided into two groups, each receiving support from two different types of change agents (External Change Agents and Combined Change Agents). The interventions with pharmacies and pharmacists included structured training and follow-up of the change agents. Change agents recorded data on an eCRD platform, using CFIR 2009 determinants and Dogherty taxonomy strategies. Data analysis identified relationships between determinants and strategies using Sankey diagrams to visually represent the flow between barriers, causes, and strategies.

Research Ethics Committee of Granada (CEI-Granada) approved the study on the 5th of February 2020, under the code 0090-N-20. This protocol was also registered and published on ClinicalTrials.gov with ID NCT05247333 on the 18th of February 2022. The CEI-Granada approval was updated and reapproved in 2023.

Results: The systematic review included 51 studies that reported 555 implementation strategies linked to barriers in healthcare. Almost 70% (66.7%, n=34) did not use a determinant framework or strategy taxonomy. The most common barrier was related to '*innovation deliverers: capability'* (n=122, 22%). The strategy with the highest success rate was 'mandate change' (effective for 87.2% of barriers). In the nationwide implementation study that followed, 4,239 determinants were recorded on the eCRD platform. Over 75% of these were reported by external change agents (ECAs). Change agents used a range of communication methods to identify these determinants, with email being the most common. The highest number of determinants were included in the *'characteristics of individuals'* domain (n=193, 35.7%), followed by *'process of implementation'* (n=165, 30.5%). Change agents recorded 1,389 implementation strategies in response to the identified determinants. Findings showed that 71.7% of barriers were successfully addressed, with individual strategies outperforming multifaceted approaches. The most frequently used strategy categories were '*leading and managing change'* (n=485, 34.9%) and '*monitoring progress and ongoing implementation*' (n=324, 23.3%). A total of 4,343 links were made between determinants, their causes, and the strategies operationalised to address them. Of these, 1,681 strategies were effective, 835 were ineffective, and 1,827 had no recorded outcome. The most common relationship involved the barrier '*intervention characteristics'*, the cause '*characteristics of individuals involved*', and the strategy '*other'* (n=915, 21.6%). Sankey diagrams were developed to visualise how determinants and their causes were connected to the implementation strategies designed and operationalised by the change agents.

Conclusions: This study improves implementation processes in community pharmacy by identifying key barriers and effective implementation strategies. An innovative visual Sankey tool was developed which matches strategies to barriers, supporting change agents in making better, evidence-based decisions.

Spanish Language Abstract

Introducción: Los síntomas menores, como dolor de garganta, herpes labial y resfriados, suelen ser autolimitados y pueden tratarse sin necesidad de intervención médica. Sin embargo, muchos pacientes siguen consultando a los médicos, provocando una sobrecarga en los sistemas sanitarios. Para aliviar esta presión, varios países han implementado «*servicios para síntomas menores*», que permiten a los farmacéuticos evaluar, tratar y derivar a los pacientes cuando es necesario. Aunque este servicio aún no está financiado en España, el Foro de Atención Farmacéutica en Farmacia Comunitaria (FORO-AF) lo define como un «*servicio profesional prestado ante la demanda de un paciente o usuario que llega a la farmacia sin saber qué medicamento debe adquirir y solicita al farmacéutico el remedio más adecuado para un problema de salud concreto*». Aunque la generación de evidencia acerca de la eficacia y efectividad de un servicio es necesario e importante, esto no garantiza su implementación en las farmacias comunitarias. Para facilitar la implementación, modelos y marcos teóricos de ciencia de la implementación pueden ser utilizados. Los factores de implementación, como las barreras y sus causas, dificultan la implementación. No abordarlos, a menudo resulta en una falta de implementación de servicio, un servicio ineficaz, una atención deficiente y un desperdicio de recursos. Estrategias dirigidas para abordar estos tipos de factores de implementación son esenciales para una implementación óptima.

Objetivos: Se fijaron los siguientes objetivos específicos:

1. Llevar a cabo una revisión sistemática de la literatura internacional para determinar la relación entre las barreras en la implementación de los servicios sanitarios y las estrategias utilizadas para abordarlas, con el fin de evaluar y cuantificar la efectividad de estas combinaciones de barreras y estrategias.

2. Identificar y categorizar los factores de implementación a los que se enfrentan los farmacéuticos y sus farmacias comunitarias durante la implementación de un servicio de síntomas menores, documentado por agentes de cambio.
3. Identificar las estrategias de implementación utilizadas por agentes de cambio durante un estudio de implementación de un servicio de síntomas menores y evaluar su efectividad para superar las barreras a las que se dirigían.
4. Desarrollar una guía para seleccionar estrategias de implementación efectivas dirigidas a factores de implementación a la hora de implementar servicios en entornos de farmacia comunitaria.

Metodología: Este proyecto se llevó a cabo en el marco de un estudio híbrido efectividad-implementación tipo 3 que utilizó un enfoque de métodos mixtos. Se realizó una revisión sistemática de la literatura siguiendo la metodología Cochrane y las directrices PRISMA. Los datos se extrajeron y se analizaron mediante el programa informático R. El estudio se llevó a cabo en farmacias comunitarias de toda España que estaban implementando un servicio de síntomas menores. Las farmacias se dividieron en dos grupos, cada uno de los cuales recibió apoyo de dos tipos diferentes de agentes de cambio (agentes de cambio externos y agentes de cambio combinados). Las intervenciones con farmacias y farmacéuticos incluyeron formación estructurada y seguimiento de los agentes de cambio. Los agentes de cambio registraron datos en una plataforma eCRD, utilizando factores de implementación CFIR 2009 y estrategias de taxonomía Dogherty. El análisis de datos identificó las relaciones entre factores de implementación y estrategias utilizando diagramas de Sankey para representar visualmente el flujo entre barreras, causas y estrategias.

El Comité de Ético de Investigación Provincial de Granada (CEI-Granada) aprobó el estudio el 5 de febrero de 2020, bajo el código 0090-N-20. Este protocolo también fue registrado y publicado en

ClinicalTrials.gov con ID NCT05247333 el 18 de febrero de 2022. La aprobación del CEI-Granada fue actualizada y reaprobada en 2023.

Resultados: La revisión sistemática incluyó 51 estudios que recogieron 555 estrategias de implementación relacionadas con barreras en la atención sanitaria. Cerca del 70% (66,7%, n=34) no utilizaron un marco de factores de implementación ni una taxonomía de estrategias. La barrera más común estuvo relacionada con las «*capacidades de los prestadores de la innovación*» (n=122, 22%). La estrategia con mayor índice de éxito fue «*cambio impulsado por la dirección*» que resultó efectiva para el 87,2% de las barreras. En el estudio de implementación a escala nacional que se realizó a continuación, se registraron 4.239 factores de implementación en la plataforma eCRD. Más del 75% de ellos fueron comunicados por Agentes de Cambio Externos (ECA). Los agentes de cambio utilizaron diversos métodos de comunicación para identificar estos factores de implementación, siendo el correo electrónico el más común. El mayor número de factores de implementación se registró en el dominio de las «*características de los individuos*» (n=193, 35,7%), seguido por «*proceso de implementación*» (n=165, 30,5%). Los agentes de cambio registraron 1.389 estrategias de implementación en respuesta a los factores de implementación identificados. Los resultados mostraron que el 71,7% de las barreras fueron abordadas con éxito, siendo las estrategias individuales más efectivas que las combinadas. Las categorías de estrategias más utilizadas fueron «*liderar y gestionar el cambio*» (n=485, 34,9%) y «*monitorizar el progreso y la implementación continua*» (n=324, 23,3%). Se establecieron 4.343 vínculos entre factores de implementación, sus causas y sus estrategias aplicadas para abordarlos. De estas, 1.681 estrategias fueron efectivas, 835 inefectivas y en 1.827 no se registró ningún resultado. La relación más frecuente fue entre la barrera «*características de la intervención*», la causa «*características de los individuos*» y la estrategia «*otros*» (n=915, 21,6%). Se elaboraron diagramas de Sankey para visualizar cómo se relacionaban los factores de

implementación y sus causas con las estrategias de implementación diseñadas y puestas en práctica por los agentes de cambio.

Conclusiones: Este estudio mejora los procesos de implementación en la farmacia comunitaria mediante la identificación de barreras clave y estrategias de implementación efectivas. Se desarrolló una innovadora herramienta visual, Sankey, que relaciona las estrategias con las barreras, apoyando a los agentes de cambio en la toma de mejores decisiones basadas en la evidencia.

INTRODUCTION

Globally, pharmacists represent the third largest group of regulated healthcare professionals, with the majority practising in community settings (1). Traditionally, community pharmacies have been recognised as establishments primarily focussed on the distribution of medicines to patients. However, in the more recent times, the role of the pharmacist has evolved, placing greater emphasis on patient-centred care, with pharmacists currently involved in many clinical aspects of patient care (2). Community pharmacies, as easily accessible healthcare premises and often the first point of contact for patients, have increasingly shifted toward patient care, facilitating the development of pharmaceutical care services (3,4). These services encompass a broad range of healthcare activities, extending far beyond traditional roles of medication dispensing (5–7). Higher levels of patient satisfaction (8,9) along with improved health outcomes have been reported for these services (10–13).

Even though pharmaceutical care services' clinical, humanistic and economic benefits are widely recognised, there is no universally accepted definition for these services (7). Moullin et al. (2013) proposed a definition to encompass the full range of activities, services, and programmes offered by community pharmacists. They described a professional pharmacy service as an '*an action or set of actions undertaken in or organised by a pharmacy, delivered by a pharmacist or other health practitioner, who applies their specialised health knowledge personally or via an intermediary, with a patient/client, population or other health professional, to optimise the process of care, with the aim to improve health outcomes and the value of healthcare*' (7). Benrimoj et al. (14) classified community pharmacy services according to their complexity, the changes needed within the pharmacy for their implementation, and the level of pharmacist responsibility they require. At the time, the authors recognised the limitations of the model in its capacity to categorise services, such as dose administration aids.

In Spain, with the support of the Ministry of Health, the Pharmaceutical Care Forum was established in 2004. Some five years later, in 2009, the Community Pharmacy Pharmaceutical Care Forum

(FORO-AF) was created. This forum defined community pharmacy services as '*healthcare activities provided by pharmacists in community pharmacies involve using their professional expertise to prevent diseases and enhance the health of both the population and individual patients. These services include managing medicines and medical devices while actively optimising treatment processes and outcomes. These activities are designed to align with the broader objectives of the healthcare system but maintain their distinct identity. They are defined by specific goals, procedures, and documentation frameworks. This structured approach allows for their evaluation and appropriate remuneration, ensuring these services are universal, continuous, and sustainable*' (15). The FORO-AF also introduced in 2011 a national classification system for professional pharmaceutical services (16). In 2024, the classification was updated, dividing services into two main categories: community-focussed services, such as health education and disease prevention, and pharmaceutical care services, like the minor ailment service (see Figure 1) (17).

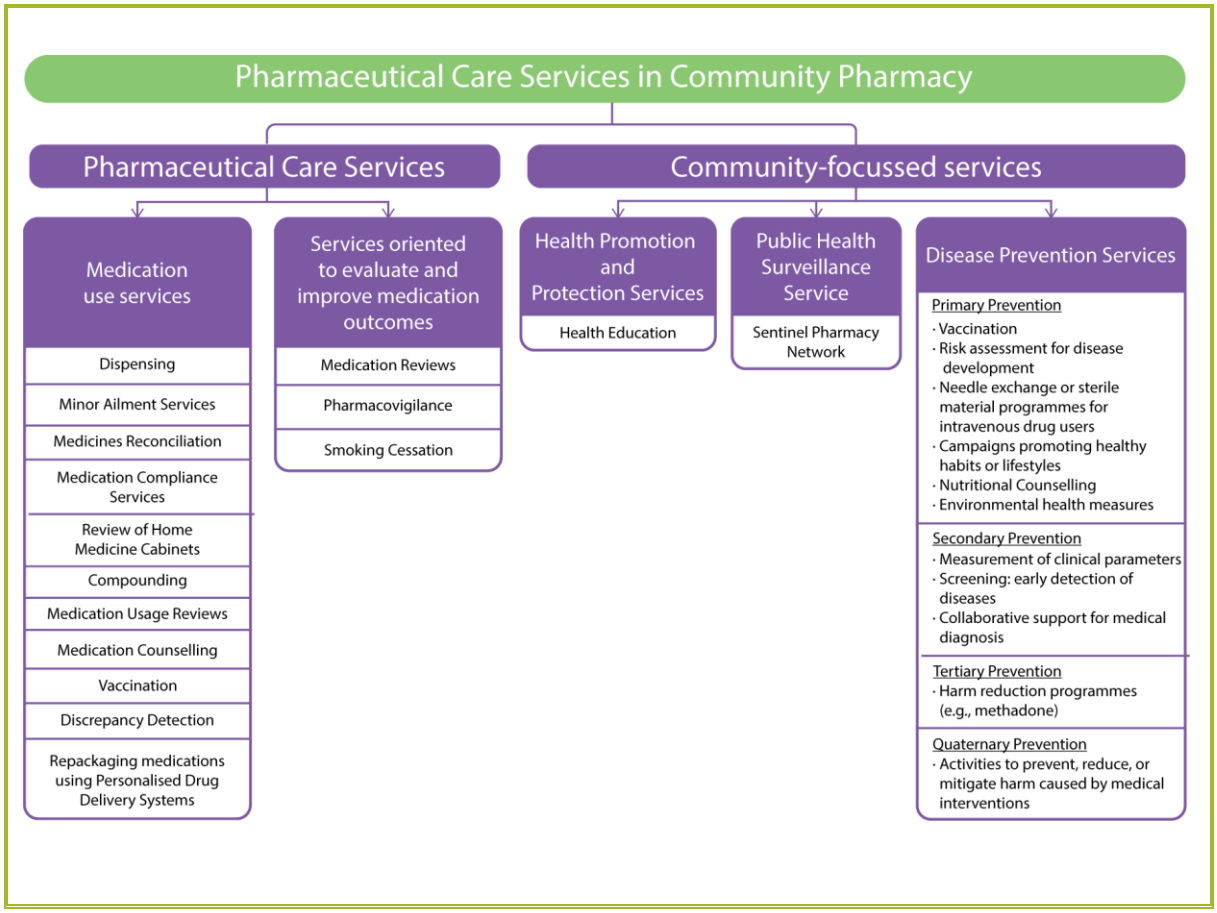

Fig. 1: The FORO-AF 2024 classification for professional pharmaceutical services (adapted from FORO-AF (17))

Minor Ailment Services

Minor ailments, such as sore throats, cold sores, and common colds, are typically self-limiting or uncomplicated conditions that can often be diagnosed and managed without any medical intervention (18,19). For many patients, self-medication is the first choice of treatment when managing these ailments (20). However, while self-medication can be convenient, it carries risks when undertaken without consulting professional guidance (12,21). These risks include incorrect diagnosis, inappropriate drug selection and use, delays in seeking medical advice when needed, adverse reactions, and medication interactions (22,23). Furthermore, some patients typically are reported to prioritise effectiveness when choosing medicines, while healthcare professionals also

consider the safety of the selected treatment (12). Therefore, professional guidance by healthcare professionals when treating a minor ailment presents the opportunity to turn self-medication into responsible self-medication (21).

Despite the prevalence of self-medication, many patients still seek medical consultations for minor ailments. In the United Kingdom, for example, the demand for emergency department care is rising faster than the population is growing, with studies suggesting that between 15% and 40% of emergency department visits are for non-urgent conditions (24,25). These visits create a significant financial and workload strain on general medical practices and emergency departments (12,26–28). To address these challenges, improve timely access to care, and promote responsible self-medication, several countries have introduced 'minor ailment services' (27,29,30). These services enable community pharmacists to assess, treat, and, when necessary, refer patients with minor ailments to other healthcare providers (15,31). Pharmacists, as part of the service, also provide lifestyle advice and counsel the patients on their selected treatment's composition, usage, benefits, potential risks, and side effects, considering the patient's medical history and ailment (13,21).

International minor ailment services

The United Kingdom was a pioneer in launching government-funded, nationwide minor ailment service initiatives, collectively known as 'Pharmacy First'. This initiative came from the National Health Service (NHS) Plan, published in July 2000, which outlined reforms to enhance the NHS (32). The plan encouraged greater collaboration between community pharmacies and the NHS to improve accessibility, patient care and make services more patient centred. This proposal ultimately led to a new pharmacy contract in 2005 (33). While the Pharmacy First service was introduced across all four UK nations (England, Scotland, Wales, and Northern Ireland) its specifications and funding models varied between them (31,34–37). Scotland was the first country in the United Kingdom to introduce a

national 'Minor Ailment Service' in 2006, building the foundations for the launch of '*Pharmacy First Scotland'* in July 2020 (31,38). This new initiative aimed to improve access to primary care, encourage patients to visit pharmacies as their first point of contact, and, in doing so, expand pharmacists' role in community healthcare while easing pressure on GPs (39). Unlike the 'Minor Ailment Service', which was limited to certain groups (such as individuals under 16, over 60, 16, pregnant, medically exempt, or on low incomes), '*Pharmacy First Scotland'* is a universal service available to all patients. Introduced as a core NHS Scotland service (meaning that it must be provided by every Scottish community pharmacy), it allows individuals to consult pharmacists for advice, receive treatment recommendations and, when necessary, be referred to another healthcare professional (40,41). On average, nearly 14% of customers visiting Scottish pharmacies seek advice on healthcare, with pharmacies providing approximately 2,100 advice-only consultations per hour (42). However, evaluations of the service indicate that in most cases, treatment was the primary outcome (n=424, 95.1%) of the consultation, followed by advice (n=103, 23.1%) and referrals (n=9, 2.0%) (42). Treatment includes both over-the-counter medications, listed within an approved formulary developed by representatives of all 14 Scottish NHS Health Boards and other key stakeholders, and prescription medications, supplied under a Patient Group Direction (43). The drug formulary underpinning the '*Pharmacy First Scotland*' service is reviewed and updated every six months and all recommendations and treatments provided are recorded in the patient's medication record (38). A Patient Group Direction is a legal document that allows community pharmacists to prescribe selected medications in defined clinical situations on an individual basis. The document states the dosing instructions and duration of treatment (44). As medicines are dispensed free of charge in Scotland, patients can access this service at no cost (31). Patient satisfaction and service utilisation have also been reported as high, with four out of five people rating their overall experience as completely satisfactory (42). The service's accessibility has also been identified as particularly beneficial for individuals who otherwise struggle to access alternative care due to barriers such as appointment

requirements, inconsistent staffing, and unfamiliar settings (42). Additionally, the service has contributed to reducing demand on general practice and emergency services. When patients participating in the evaluation were asked what they would have done if the Pharmacy First service had been unavailable, 41.0% stated they would have visited their general practitioner (GP), 26.5% would have called NHS 24 (a free national healthcare telephone service that provides urgent healthcare advice and treatment) and 7.8% would have attended accident and emergency services (A&E). Based on this data, it is estimated that community pharmacies could be diverting over 52,700 instances of treatment away from other Scottish NHS services each week (42).

The '*Pharmacy First England'* initiative expands the previous minor illness component of the Community Pharmacist Consultation Service, allowing pharmacists to manage certain conditions under Patient Group Directions (45,46). This initiative was launched in January 2024 as part of the NHS Community Pharmacy Contractual Framework (45,46). It is one of nine NHS England advanced services that pharmacy owners can choose to provide, provided they meet the requirements set by the Secretary of State Directions (45). If offered, the service must be available throughout the pharmacy's full opening hours (46). This initiative stems from a £645 million investment outlined in the Delivery Plan for Recovering Access to Primary Care (47). Patients can access the '*Standard Pharmacy First England'* service for all minor ailments via referral from other NHS services, such as GPs or emergency helplines. Within this branch of the service, pharmacists can provide self-care advice, sell over-the-counter medications (not covered by the NHS), or refer patients to GPs, out-of-hours services, locally commissioned pharmacy services, or other relevant healthcare providers (46). For the '*Advanced Pharmacy First England*' service, community pharmacists can prescribe for seven acute conditions: sinusitis, sore throat, acute otitis media, infected insect bites, impetigo, shingles, and uncomplicated urinary tract infections. Eligibility is determined by age and sex-specific gateway criteria, and prescriptions follow Patient Group Direction protocols and clinical pathways (46,48,49). Unlike the '*Standard Pharmacy First'* service, patients can access this service both via self-referral and

referral from other NHS services. All consultations for the advanced service are recorded in the pharmacy's clinical system, and the pharmacy must notify the patient's GP practice on the day of service or the following working day (46). No evaluations of the '*Pharmacy First England'* model have been completed yet. However, ongoing research is assessing its impact and implementation across England, its effects on prescription volume, GP consultations, A&E, and hospital use, equity of access, and costs for different patient groups (50).

In Wales, this scheme was launched in September 2013 as part of the Clinical Community Pharmacy Service and follows a 'Community Pharmacy First' approach to provided responsible healthcare (51,52). It enables patients to receive treatment, advice, and, if needed, referrals to other healthcare providers for 27 conditions. The service is available to Welsh residents registered with a GP and to visitors staying in Wales for at least 24 hours the pharmacy consultation (53). To access the service, patients must register with a single community pharmacy at a time. If a patient chooses not to register, the pharmacist can offer advice but cannot supply medication (54). These individuals can access the service through self-referral, a referral from pharmacy staff, or a healthcare provider (51,54). The service includes over-the-counter medication and prescription medication available for the pharmacist to prescribe via a Patient Group Direction. However, these documents must be authorised by the pharmacy's local health board to be legally valid (55). As in Scotland, all prescriptions, including those issued under this scheme, are free of charge and pharmacists must adhere to an agreed formulary (54,56). Consultation details are recorded in the local 'Choose Pharmacy' system, and a summary is automatically sent to the patient's GP after each entry (51,57). An evaluation in Wales have shown that over 80% of people using the service reported they would have visited their GP, an out-of-hours service, or A&E if the minor ailment service had not been available (52).

A similar service has been implemented in Northern Ireland since March 2022, replacing the previous minor ailments service that had been in place since 2005 (58) . Patients over the age of three months (with potential age restrictions for specific treatments) and registered with a GP practice can access

care for 19 acute conditions presenting in the pharmacy (59). This service is divided into four components: '*Pharmacy First for Everyday Health Conditions*', '*Pharmacy First for Emergency Hormonal Contraception*', '*Pharmacy First for Urinary Tract Infections*', and '*Pharmacy First for Sore Throat*' (which includes throat swabs to diagnose the cause of the sore throat). Additionally, there is a pilot for Pharmacy First for the Treatment of Shingles (60). The service can be accessed through self-referral, referral by a pharmacist at the pharmacy, or a referral from a GP practice or out-of-hours service (59). As with other UK schemes, pharmacists in Northern Ireland can provide advice, treatment (limited to medicines on the Pharmacy First formulary), and/or referral for these acute conditions (61). However, in Northern Ireland, when receiving treatment, patients are eligible for a maximum of two products (61). Furthermore, Pharmacy First for Everyday Health Conditions does not seem to have been evaluated yet, with evaluations currently available only for Pharmacy First for Urinary Tract Infections and Pharmacy First for Sore Throat, as pilot studies were conducted before implementation for these services (62,63).

Canada's publicly funded health care system operates through 13 provincial and territorial health insurance plans (64). Canada has taken a similar approach to the United Kingdom with respect to minor ailment services, with 11 of its 13 provinces and territories permitting pharmacists to prescribe for these conditions, while only Nunavut and the Northwest Territories do not currently allow this practice (65). Alberta led the way in 2007, becoming the first province to grant pharmacists prescribing authority, followed by Nova Scotia in 2011 and Saskatchewan shortly thereafter, when minor ailments were added as an expanded aspect of pharmacy practice (66,67). In 2014, Manitoba, New Brunswick and Prince Edward Island also implemented the same measure (68). Pharmacists in Canada are required to assess each patient, make a prescribing decision, create a follow-up plan if necessary, and notify the primary care provider if a prescription is issued (69). While the service is available in most regions, and similarly to the UK, the number and type of minor ailments covered vary by territory (65,70,71). For instance, pharmacists in Alberta are authorised to treat under the

scheme 52 conditions, while those in Yukon Territory are only permitted to treat 21 (65). In both cases, pharmacists are only authorised to prescribe when they are confident in their own ability to assess and prescribe (65). Additionally, the service is restricted to a defined formulary of medications that pharmacists are permitted to prescribe (31,69). Patients can either actively request the service or receive it when pharmacists identify a need during symptom assessments (69). A 2015 evaluation of the service in 90 Saskatchewan community pharmacies found that patients were generally satisfied with the results. Around 80.8% of patients reported significant or complete improvement in their condition, and only 5.6% felt a GP would have provided better care (67). A smaller, more recent cross-sectional study conducted in 11 community pharmacies in Quebec found an average of 18 consultations per pharmacy per day. Furthermore, In the week after the consultation, almost 20% of patients said they had avoided going to the emergency department as a result of the minor ailment consultation in the pharmacy (72). Overall, the introduction of this service in Canada has improved patient access to timely and cost-effective care, eased pressure on primary care facilities, reduced wait times, and increased patient satisfaction (73,74).

Spanish minor ailment service

The international terminology surrounding these minor ailment services appears to vary significantly, with terms such as 'over-the-counter counselling', 'recommendation of non-prescription medicines', 'recommendation of over-the-counter drugs', 'pharmacist evaluation and prescription service', 'common ailments service' (31,75–77). In Spain, the term '*pharmaceutical indication service'* (or '*servicio de indicación farmacéutica*' in Spanish), was introduced in 1997 by Herrera Carranza eta al and has since become the standard Spanish term for describing the service (78). In this thesis, we will use the term 'minor ailment service' to promote broader understanding and alignment with global terminology.

The FORO-AF describes this service as the '*pharmaceutical care service designed to address specific health issues, available to patients or caregivers who visit the pharmacy in search of the most suitable remedy for their condition*'. This was updated in 2024 to include the treatment of physiological conditions, such as contraception (17). The role of the pharmacist within the minor ailment service in Spain, similarly to other countries, involves assessing the situation when the patient presenting the minor ailment and deciding whether to treat, refer, or provide advice. Only non-prescription medications are used to manage these minor ailments as currently there is no authorisation for pharmacist prescribing or the use of Patient Group Directions (12,17). At present, there are also no nationally approved or funded community pharmacy minor ailments services (79). Therefore, the minor ailment service requires the patient to cover the full cost of the over-the-counter medication.

The objectives of this service include (17):

1. Determining whether the health issue is a self-limiting minor ailment.
2. Assessing whether the pharmacist can address the special physiological condition presented by the patient.
3. Recommending the most appropriate solution for the health problem and, if necessary, selecting a medication, product, or medical device, ensuring the patient understands how to use it.
4. Resolving any queries from the patient or caregiver and addressing any information gaps regarding the health issue or prescribed therapy.
5. Improving the patient's quality of life.
6. Identifying whether the health problem is a negative medication result.
7. Preventing negative medication outcomes by identifying and resolving drug-related problems.
8. Identifying additional needs and offering other community pharmacy services if required.

The service follows five steps: patient interview, information evaluation, intervention, professional action, and documentation of the process (see Figure 2). Interviews are conducted either at the pharmacy counter or in a private consultation room (ZAP). During this interview, the pharmacist is directed to describe the service's objectives, procedures, and benefits, ensuring that the patient fully understands the process. The pharmacist then gathers essential information about the patient's medications, allergies, physiological state (e.g., pregnancy, breastfeeding), and health conditions so they can recommend appropriate advice and/or treatment. The pharmacist must also identify any 'red flags', a term first used in the 1980s which describes signs or symptoms that suggest a potentially serious underlying condition (80,81). These indicators help the community pharmacists decide whether further evaluation, referral, or treatment is needed for the ailment, preventing misdiagnosis and potentially ensuring timely intervention for serious health issues (81).

If a caregiver is seeking treatment or advice for a patient, they must provide sufficient information for the pharmacist to proceed to the pharmacy intervention stage. This pharmacist intervention may include recommending over-the-counter treatments, offering lifestyle advice, or referring the patient to another healthcare professional. All aspects of the process are then documented, including the patient's details, the reason for the consultation, the recommended solutions, and any known health outcomes. However, unlike in other countries, there is no official platform to record this, nor any requirement for the pharmacist to share this information with the patient's GP (15). While two software programs (SEFAC eXPERT® (82) and Nodofarma asistencial© (83)) are available for pharmacists to document the service, they are not integrated into the wider healthcare system.

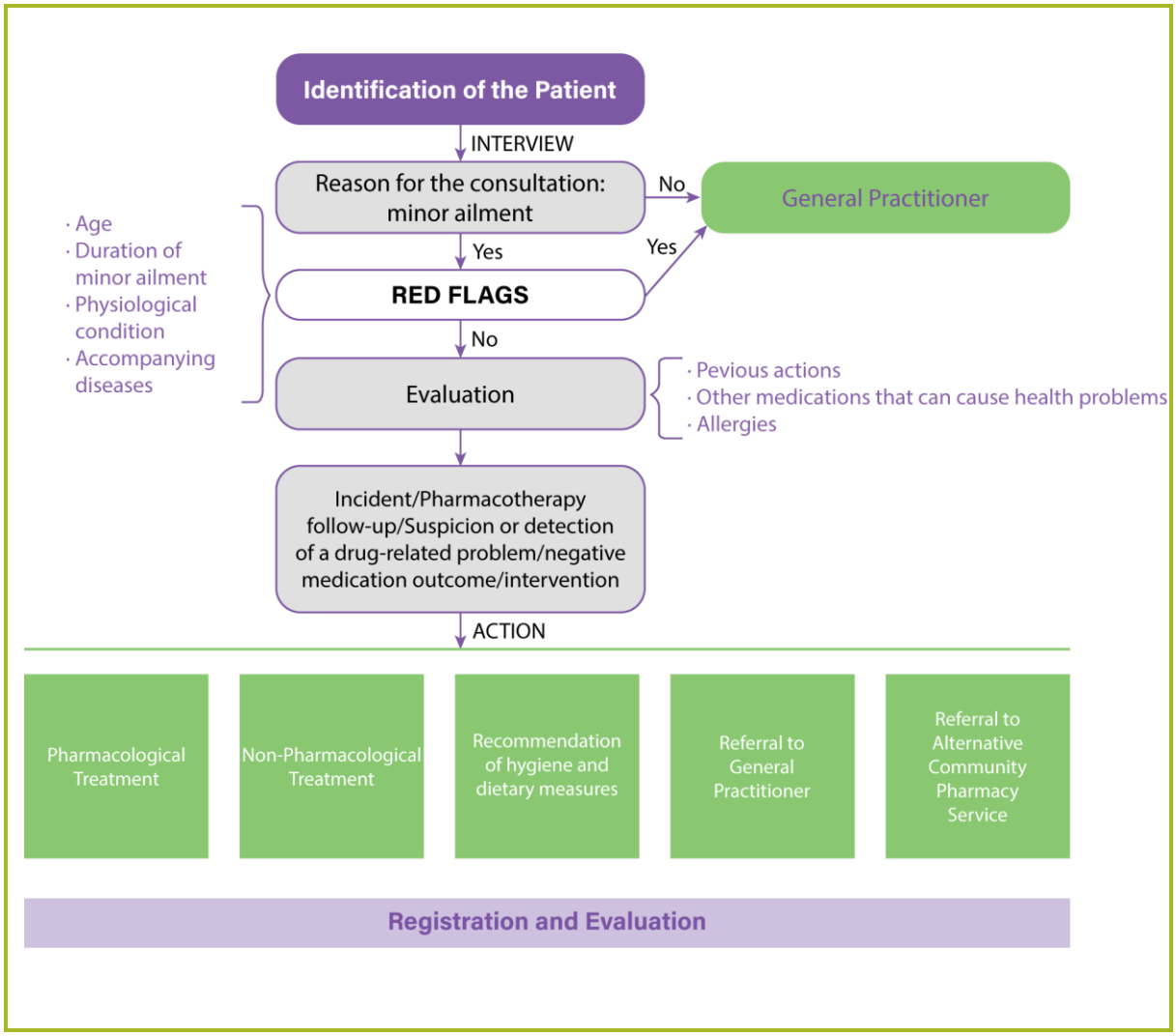

Fig. 2: Spanish minor ailment service procedure diagram. From FORO-AF (17)

Community pharmacies in Spain spend between 9% (84) and 16% (85) of their time handling non-prescription medications. However, the time dedicated to providing this service in a structured minor ailments format remains unknown.

Minor ailments research in Spain (INDICA+PRO Study)

INDICA+PRO was a national, two-phase study conducted in Spanish community pharmacies to assess the impact and implementation of a Minor Ailment Service (13,86). In its first phase, a six-month cluster-randomised controlled trial evaluated the clinical, economic, and humanistic outcomes of the service using the FORO-AF definition and process and compared them to usual care in community pharmacy and GP surgeries (13,17). It involved a collaborative co-design methodology, bringing together GPs, community pharmacists, patient representatives, and local health administrators. An evidence-based study research protocol, along with standardised service protocols, was developed following a systematic literature review and consensus meetings. This was conducted by the University of Granada's Pharmaceutical Care Research Group (GIAF-UGR) in collaboration with the 'Spanish Society of Clinical, Family and Community Pharmacy' (SEFAC), the 'Spanish Society of Primary Care Physicians' (SEMERGEN), the 'Spanish Society of Family and Community Medicine' (SemFyC), and aligned with the FORO-AF guidelines (12,13).

The trial was conducted in the Valencia region of eastern Spain, following a one-month pilot phase carried out to optimise methodologies and protocols. The 27 participating pharmacies were randomly assigned to either a control (n=14) or an intervention group (n=13). Pharmacists received training focussed on best practices, communication skills, and the standardised minor ailment service procedures. External change agents provided ongoing support to ensure adherence to protocols and address operational challenges. In the intervention group, pharmacists delivered the protocolised minor ailment service for 12 predefined minor ailments, while the control group continued with usual care practices. The intervention-group pharmacists used the protocols to carry out assessments and risk evaluations for 886 patients presenting minor ailments (323 patients in the intervention pharmacies and 423 in the control pharmacies). Based on their evaluation, the pharmacists then determined the most appropriate course of action, which could be either, (1) referring the patient to

another healthcare professional, (2) recommending a non-prescription medication, products or medical devices, and/or (3) suggesting non-pharmacological treatments (12,13).

Outcomes of the first phase were analysed using multiple logistic regression with an intention-to-treat approach. The study also evaluated clinical, economic, and humanistic impacts through cost-utility analyses, measuring effectiveness in quality-adjusted life years (QALYs). Sensitivity analyses, including bootstrapping and sub-analyses, were conducted to ensure the robustness of findings. In this first phase, the results showed that the service significantly improved the detection of conditions requiring diagnosis and treatment by a GP. In the control pharmacies, 7.4% (n=24) of cases were detected, compared to 3.9% (n=19) in the intervention pharmacies, with a p-value of 0.029. As patients were able to request a medication for treating an ailment directly, this allowed them to access the service in this way, rather than simply reporting a minor ailment. This approach led to significant changes in the treatments requested by patients. The community pharmacists in the intervention group modified over twice as many treatments (12.6%, n=11) compared to the control group (5.1%, n=8). It was also estimated that the minor ailment service could reduce 20.8 million National Health Service appointments nationwide, including GP and emergency department visits. It was estimated that Spain's National Health Service could save approximately 1,185.9 million euros annually. The outcomes demonstrated increased patient safety compared to usual care and confirmed the cost-effectiveness of the service (12,13).

Despite the evidence generated within this study supporting the service's cost-effectiveness and potential for substantial healthcare savings, government policies had yet to establish a formal model for implementing the service across Spain's publicly funded, decentralised healthcare system. With the aim of achieving a broader implementation of the service and sustaining the clinical, humanistic and economic outcomes observed in the first phase of the INDICA+PRO study, the second phase of the study was developed and launched in 2020 (12,13,86,87). This phase aimed to evaluate the

implementation of the service in the daily practice of Spanish community pharmacies through a type 3 hybrid design effectiveness-implementation trial.

Implementation science

Although the generation of evidence of a service's efficacy and effectiveness is both necessary and important, it does not guarantee its adoption in community pharmacies. Instead, integrating services into community pharmacy practice often comes with its own set of challenges (88,89). As a result, the field of pharmacy has begun to adopt implementation science, defined as *'the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services and care'* (90).

Nilsen et al (91) identified five categories of theories, models, and frameworks commonly used in implementation science (Figure 3):

1. Process models, which outline the steps involved in translating research into practice (e.g., Knowledge-to-Action Model (92))
2. Classic theories, originating from fields outside implementation science which can be applied to understand or explain aspects of implementation (e.g., Theory of Diffusion (93))
3. Implementation theories, developed by implementation researchers to provide insight into implementation processes (e.g., Normalisation Process Theory (94))
4. Evaluation frameworks, which identify the aspects of implementation that can be used to evaluate the success of the implementation process (e.g., RE-AIM (95))
5. Determinant frameworks, which list classes of determinants, or independent variables, that influence implementation outcomes, such as acceptability, adoption, appropriateness,

feasibility, fidelity, cost, penetration, and sustainability of innovations (e.g., the Consolidated Framework for Implementation Research (CFIR)).

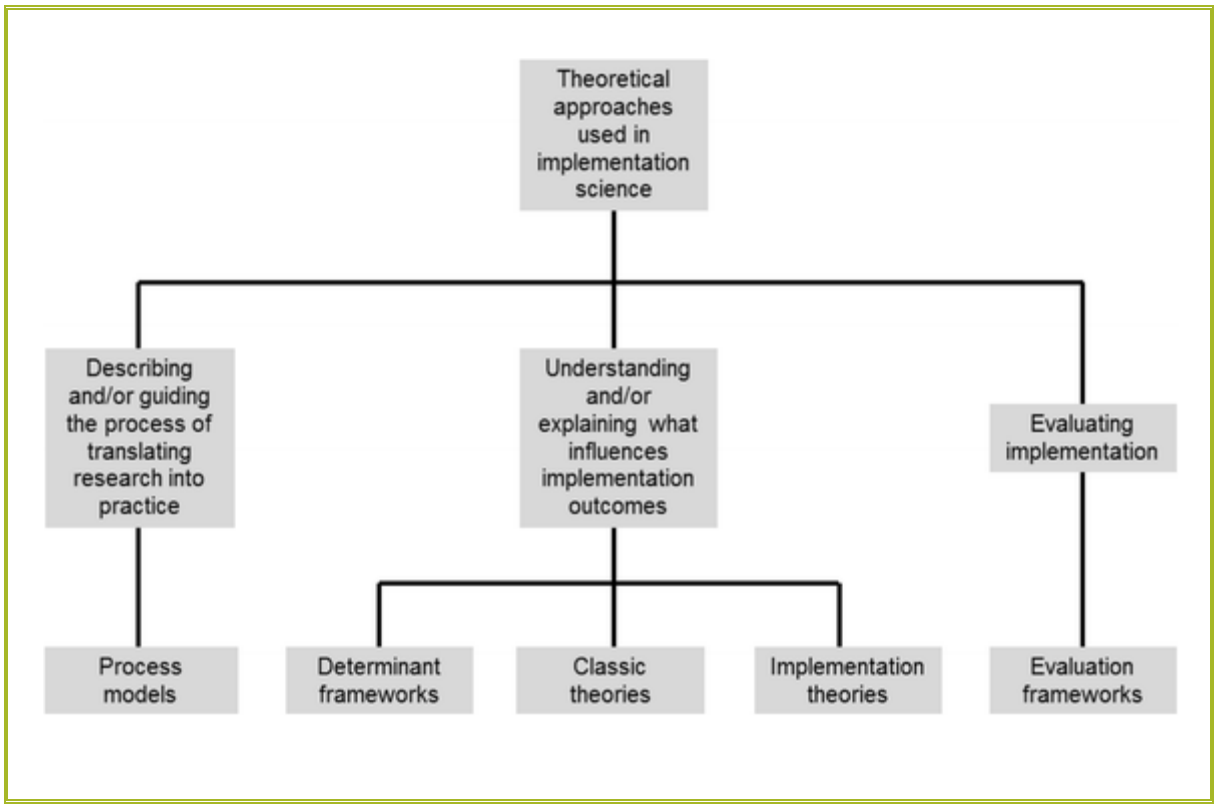

Fig. 3: Three aims of the use of theoretical approaches in implementation science and the five categories of theories, models and frameworks. From Nilsen et al. (91)

Translating research findings into practice is complex and non-linear, involving multiple stages, activities, and steps. To navigate this complexity effectively, active, systematic, and intentional approaches to implementation are needed (2). Therefore, a fundamental principle of implementation science research is the use of theory to understand, guide and evaluate these processes. In the context of community pharmacy, the Framework for the Implementation of Services in Pharmacy (FISpH) model (Figure 4) provides a theoretical framework for guiding research when implementing community pharmacy services. It provides a structured approach to evaluating both the implementation process and its outcomes. The framework is organised into five distinct phases

(preceded by development or discovery of the innovation being implemented), each supported by specific indicators. These indicators help inform decisions on service adoption, guide the adaptation of implementation strategies, and set measurable targets for future evaluation (96,97).

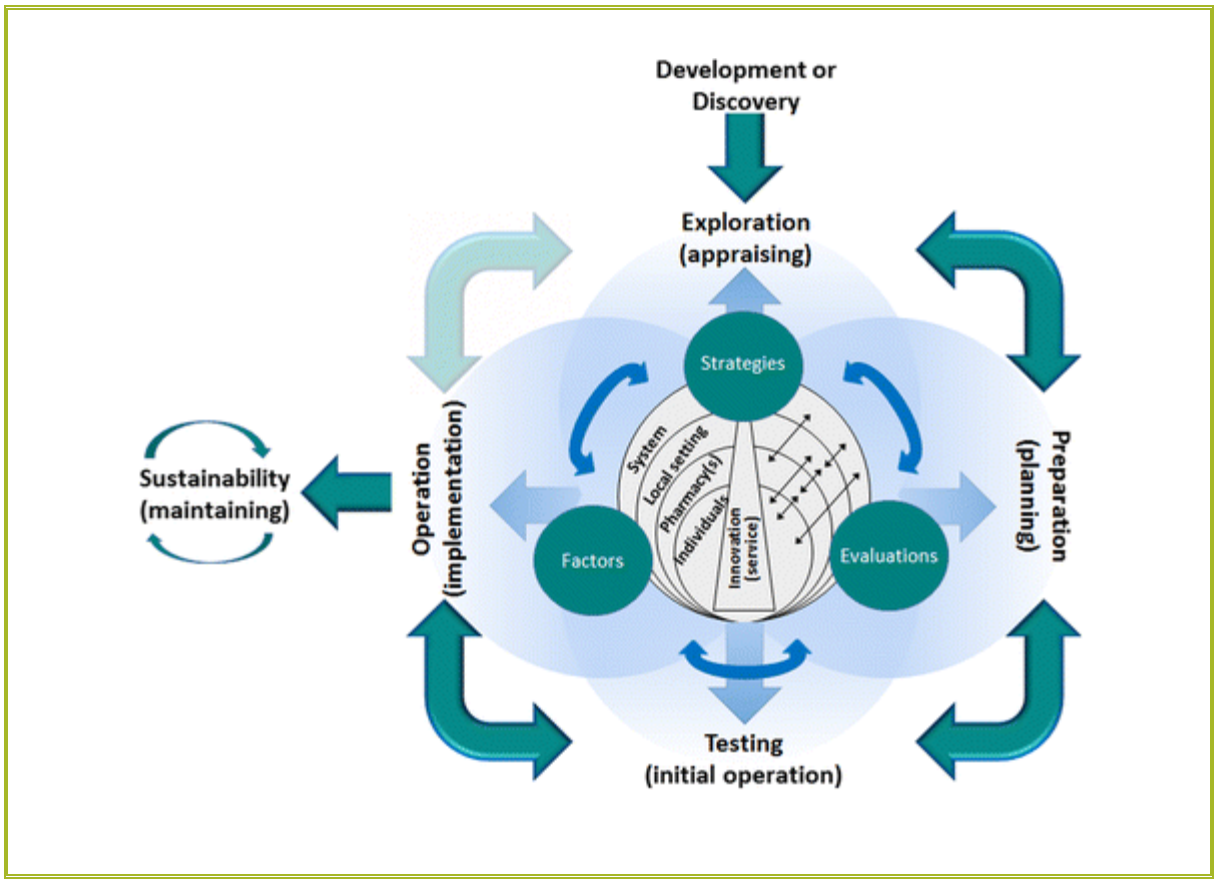

Fig. 4: Framework for the Implementation of Services in Pharmacy (FISpH). From Moullin et al. (96)

This framework can be applied within implementation trials, which evaluate healthcare interventions in pragmatic, real-world contexts, aiming to improve the uptake of these in practice. These trials often measure behaviours like adoption and fidelity, assuming the clinical intervention's effectiveness without assessing patient-level outcomes (98,99). Therefore, Curran et al. proposed blending clinical effectiveness and implementation trial designs to accelerate real-world application of the evidence-based practices being implemented. This approach, called 'effectiveness-implementation hybrid

designs', evaluates both clinical effectiveness and implementation within the same study. There are three types, represented in Figure 5: (1) Type 1: tests effectiveness while gathering implementation data; (2) Type 2: tests both clinical effectiveness and implementation with equal emphasis; (3) Type 3: tests implementation while monitoring patients' clinical outcomes (98). A systematic review from 2023 identified, between 2000 and 2021, 80 published trials categorised either as pure implementation trials or hybrid trials. Pure implementation trials were the most common, accounting for 55 studies (68.8%), followed by Type II hybrid trials with 15 studies (18.8%) and Type III hybrid trials with 10 studies (12.5%) (100).

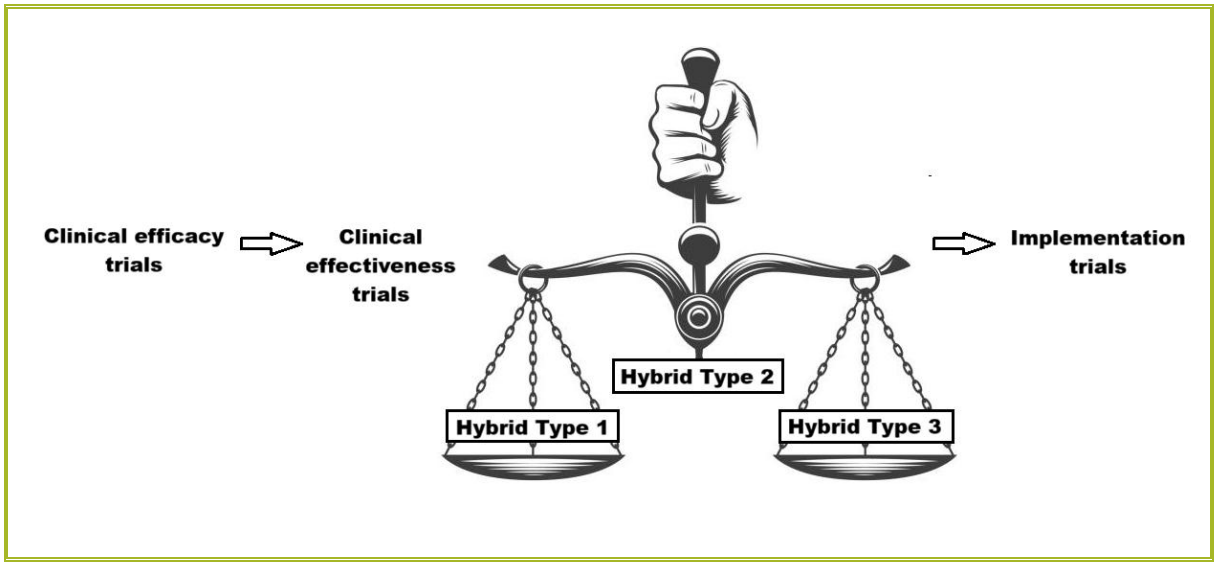

Fig. 5: Research pipeline (adapted from Curran et al. (98))

Implementation determinants

Determinants can appear across several levels or domains, including the innovation itself, individuals, inner and outer settings, the implementation process, and the wider system (97,101). When these determinants positively moderate the implementation process, they are known as enablers or facilitators (102). However, when these determinants negatively affect implementation outcomes,

they are known as barriers, obstacles, or challenges (103–105). Additionally, the implementation process appears to be influenced and further complicated by multilevel factors, causal relationships, and intricate interdependencies between these determinants. As a result, some implementation researchers have made a distinction between barriers and their underlying causes (Figure 6) (97,89).

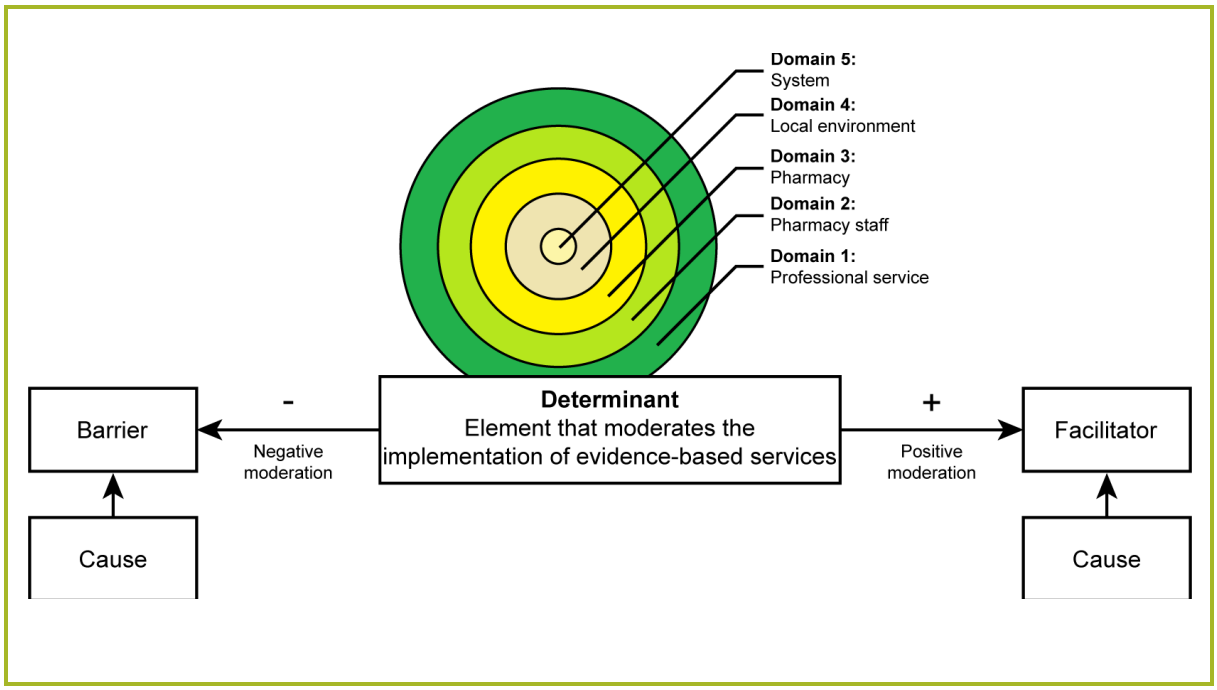

Fig. 6: Determinants and their causes involved in the implementation process and outcomes of a professional service (adapted from Garcia-Cardenas, et. al. (97))

The CFIR, first published in 2009, organised its 37 determinants, referred to as constructs within the framework, into five major domains that influence the implementation of healthcare and other innovations. These domains were: 1) intervention characteristics, 2) outer setting, 3) inner setting, 4) characteristics of individuals, and 5) process of implementation (106). The framework was well-established and widely used, with a 2015 literature review identifying that the CFIR was applied across diverse study objectives, contexts, methodologies and levels of analysis (107). In 2022, the framework underwent a revision following a survey of implementation researchers who had used it in their projects. This update aimed to address concerns about its complexity, as only 16% of respondents

considered it user-friendly for non-researchers, while 58% also deemed it overly complicated (108). Furthermore, although the large number of constructs was frequently mentioned as a source of difficulty, many users also pointed out gaps in the framework, with nearly all respondents providing feedback on revising or expanding its domains and constructs. In response, existing domains and constructs were reevaluated, with updates including the addition, removal, or reorganisation of constructs. Names and definitions were updated to increase the framework's relevance to a broader range of innovations and settings (108). The revised CFIR now includes 48 constructs and 19 subconstructs, organised into five domains, one of which includes two subdomains. These domains are: 1) innovation, 2) outer setting, 3) inner setting, 4) individuals, and 5) implementation process (108).

Implementation strategies

Failure to address determinants that negatively impact implementation often results in increased difficulty to effectively implement community pharmacy services, leading to suboptimal patient care, resource wastage, and poor health outcomes (109,110). Consequently, the development implementation strategies targeted to address barriers has been suggested as an effective approach to facilitating successful implementation (103,111–113). These strategies are defined by the Cochrane Effective Practice and Organisation of Care (EPOC) taxonomy (114) as '*interventions designed to bring about changes in healthcare organisations, the behaviour of healthcare professionals or the use of health services by healthcare recipients*' (p.1-2).

Developing better methods for designing and targeting implementation strategies to determinants, improving how these strategies are tracked and reported, and conducting more research on their effectiveness (92,103,115–120) have been highlighted as key areas to focus on for increasing their effectiveness for improving health outcomes. Successfully designing and targeting effective

implementation strategies requires a thorough understanding of the determinants affecting implementation outcomes and a well-informed assessment of a strategy's expected effectiveness in a specific context (121,122). Tailoring strategies is one such approach used to enhance their effectiveness and involves selecting and applying implementation strategies to address barriers prior to beginning the implementation process (101,103,115,123). Meanwhile, the design of 'targeted' implementation strategies could be used to refer to the process of designing implementing strategies during ongoing research projects, even if they were unplanned (124,125). The identification of determinants and the development of targeted implementation strategies is usually carried out by a formally appointed individual with specialised training, known as a 'change agent' (106). Other denominations for these individuals include 'coaches', 'knowledge brokers', 'outreach visitors', 'practice enhancement assistants', 'implementers', 'boundary spanners', 'practice facilitators', 'practice change facilitators' and 'facilitators' (87,126–129). As well as systematically evaluating determinants for developing targeted strategies, a change agent's role typically involves providing guidance and support to individuals and teams responsible for adopting the innovation. This includes assessing and addressing the characteristics of the innovation, the needs of its intended recipients, and the context in which the implementation will occur (106,130,131). This role can be either internal, external, or a combination of both within the organisation seeking to implement a change (127,131). In Spain, both external and mixed change agents have been used to implement community pharmacy services. In several studies, external agents were employed by local pharmacy boards or councils, while mixed agents were volunteers from community pharmacy societies. Typically, these external change agents offered ongoing, personalised support to pharmacists, both on-site and virtually, as they implemented community pharmacy services. In contrast, volunteer agents provided more limited support, including virtual monitoring of local pharmacies and on-site monitoring within their own pharmacy (13,132,133).

In order to increase the success of their implementation strategies, change agents should be adequately trained in implementation processes to develop the necessary skills for their role (134,135). The i-PARIHS determinant framework describes a facilitation pathway for change agents, comprising of three levels: novice, experienced, and expert. While beginner change agents may effectively support locally focused implementation projects, they often require guidance from more experienced agents to address complex or challenging determinants and contextual factors, suggesting that change agents' knowledge and skills develop over time (134,136). Another effective approach can be to equip change agents with practical tools that support work in facilitating organisational change. For this, resources such as handbooks (137,138), determinant assessment tools (102), time tracking log sheets (139), implementation strategy taxonomies (140–143), and strategy selection resources (144) have been published.

One such implementation strategy taxonomy was developed by Dogherty et al (141). This taxonomy encompasses 11 groupings of activity with 46 specified activities and actions related to facilitation carried out by both local and external change agents within a research project implementing guidelines for clinical care. Another strategy taxonomy is the Expert Recommendations for Implementing Change (ERIC), which organises 73 discrete implementation strategies into nine categories. Similar to the CFIR, researchers have proposed modifications to this framework; however, no updates have been made to date (145–147). Instead, concept mapping has been utilised to characterise relationships among implementation strategies and organise them into nine categories (148). Figure 7 illustrates the concept mapping process, showing how the 73 implementation strategies were organised. Each strategy is represented by a numbered dot, with dots grouped based on their conceptual similarity. Strategies located closer together were frequently sorted into the same group during the mapping process, while those positioned farther apart were rarely grouped together. Dotted lines on the figure highlight areas where two smaller clusters were merged into a larger one due to their shared conceptual themes. Additionally, specific strategies (48, 58, and 62)

were reassigned from their original clusters to neighbouring ones, as these better reflected their conceptual alignment.

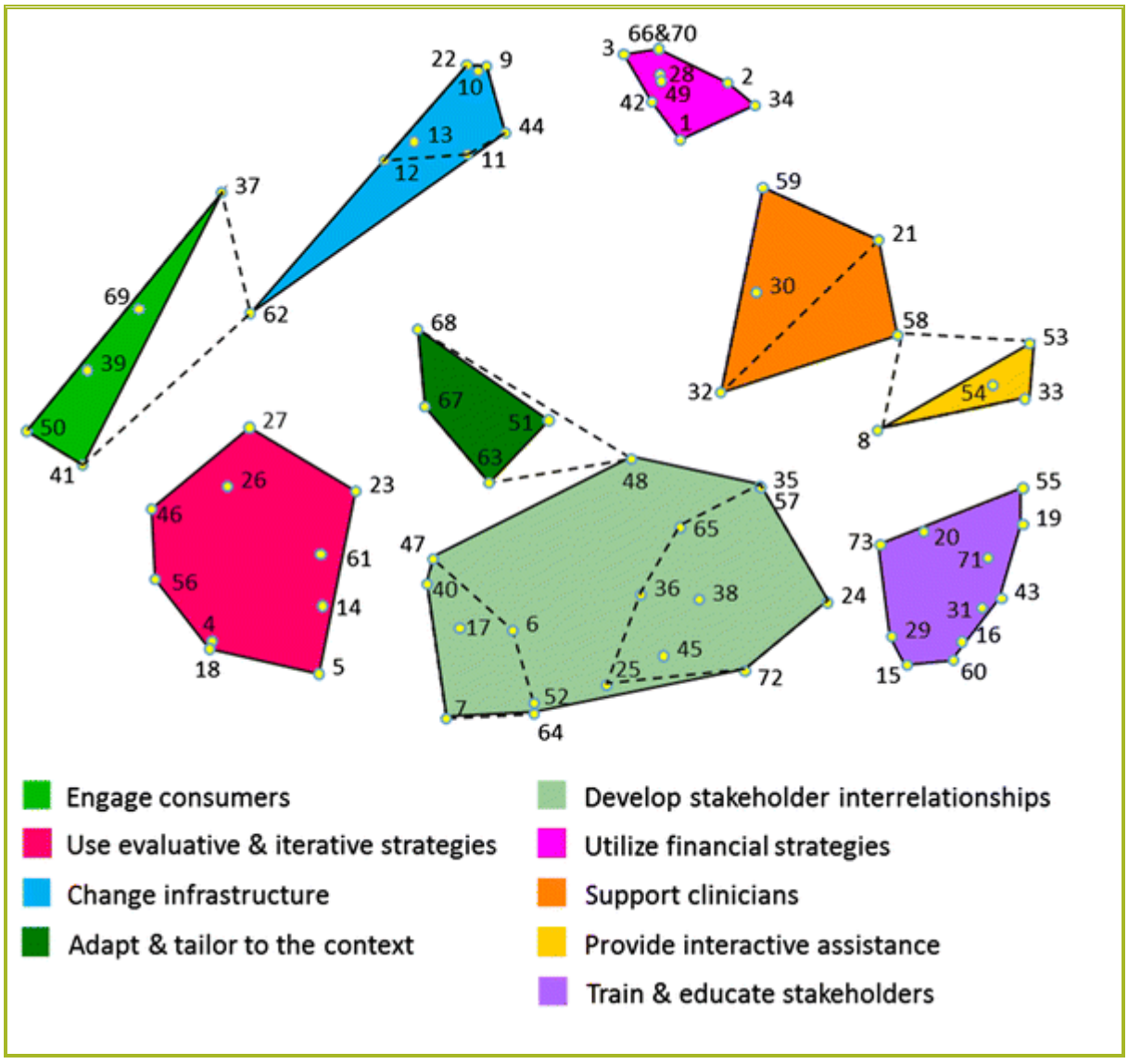

Fig. 7: Point and cluster map of 73 ERIC strategies. From Waltz et al. (148)

A tool derived from the ERIC taxonomy is the Consolidated Framework for Implementation Research-Expert Recommendations for Implementing Change (CFIR-ERIC) matching tool (144). This resource can be used by change agents as a starting point for developing targeted implementation strategies by allowing them to select barriers and receive suggestions for expert-recommended implementation

strategies. One research team investigating thermal imaging and burn wound depth used the tool to develop and operationalise recommended implementation strategies. Despite some persistent barriers, the researchers successfully implemented the imager, achieving significant patient engagement with over 70% reach and more than 80% in both effectiveness and adoption rates (149). In another study on cirrhosis care, researchers used surveys to compare the actual use of implementation strategies with those recommended by the matching tool. The findings revealed an alignment between the tool's recommended strategies and their effectiveness, suggesting the matching tool's validity and practical utility (150). Other research studies have primarily focussed on exploring the potential application of these strategies in future research projects, indicating the ongoing potential of this methodological approach (151–158).

However, there is limited real-world guidance for change agents to select the most effective implementation strategies for the determinants they identify, especially when the contextual factors and the timeframe are taken into consideration (144,150,159,160). For instance, one study found that the CFIR-ERIC matching tool was not user-friendly or accurate within their community context. Additionally, they noted that the tool's output, which presents a list of potential strategies with percentages of agreement, made it challenging for users to determine how many strategies to select and which ones would be most effective in addressing the identified barriers (161). It is also uncertain whether the barrier-implementation strategy recommendations from tools like the CFIR-ERIC matching tool effectively translate into real-world outcomes across the broader healthcare sector (150,159,160).

JUSTIFICATION AND OBJECTIVES

Despite significant progress, there is a gap in understanding how to effectively design, target, and evaluate implementation strategies in healthcare. This is especially valid for community pharmacies, which remain a relatively understudied setting, and even more so when implementing minor ailment services (2,162,163). This limited understanding presents a real challenge for the successful adoption of evidence-based practices in healthcare, as insufficiently understood barriers to implementation and poorly targeted strategies could risk resource waste at key implementation stages.

Given this context, the main objective of this thesis was identifying effective implementation strategies operationalised by change agents to reduce or overcome implementation barriers, or determinants, identified during the process of implementing a community pharmacy service.

To address the main objective, the following specific objectives were pursued:

1. To conduct a systematic review of international literature to map the relationship between barriers in health service implementation and the strategies used to address them, to evaluate and quantify the effectiveness of these barrier-strategy combinations.

2. To identify and categorise the determinants faced by pharmacists and their pharmacies during the implementation of a minor ailment service, as reported by change agents.

3. To identify the implementation strategies used by change agents during a minor ailment service implementation study and assess their effectiveness in overcoming their targeted barriers.

4. To develop guidance on selecting effective implementation strategies targeted to specific determinants when implementing services in community pharmacy settings.

METHODOLOGY

To address the objectives of this thesis, a mixed methods approach was adopted. A systematic review of the literature was undertaken followed by an effectiveness-implementation hybrid study.

Systematic review

To achieve the objective systematic review of international literature, the Cochrane methodology was used and the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) were followed (164–166) Five databases were searched up until May 2024: PubMed, Scopus, Web of Science, PsycINFO, and the Cochrane Library. The search strategy included MeSH terms and keywords related to negative determinants (or barriers), implementation strategies, and healthcare professionals. The search queries can be found in Appendix 1. Peer-reviewed articles addressing the effectiveness of implementation strategies to overcome negative determinants (barriers) to healthcare innovation were included. Publication types such as letters to the editor, protocols, commentaries, editorials, and conference abstracts were excluded. No language filters or date limitations were applied during the search and screening stages. Eligible papers included:

1. Original research focusing on the implementation of innovations among practising healthcare providers.
2. Papers reporting report a link between negative determinants to implementation strategies and their outcomes

Exclusion criteria included studies that focussed solely on the de-implementation of innovations, described only the process before implementation, or addressed strategies linked to barriers prior to innovation implementation, without discussing or linking outcomes.

Records identified from each database were imported into Zotero® 6.0.36 reference management software, where duplicates were removed by comparing digital object identifier (DOI), article title, author names, publication year, and journal name. The remaining records were imported into Rayyan® web-based software. Initial screening based on titles and abstracts was conducted by one researcher, who removed irrelevant records. This process was over-inclusive. A full-text review of the remaining articles was undertaken. Any resulting ambiguities or discrepancies from the screening or full-text review were resolved through discussions between the research team.

Data extraction and analysis

A standardised data extraction form using Microsoft® Excel® for Microsoft 365 (version 2411, compilation 16.0.18227.20082) was developed and piloted. The following data were extracted from each eligible full-text article: the study aim, the country of the study, the healthcare professionals involved and their practice setting, the methods used for collecting data on barriers and implementation strategies, the conceptual framework or model employed to assess barriers and strategies, and the established link between determinants, implementation strategies, and outcomes. After extraction, the determinants and implementation strategies were coded by one researcher using the CFIR 2.0 (101) and ERIC taxonomies (140,148). A randomly selected 10% sample of the database was double coded by a second researcher, and any discrepancies in coding were resolved through consensus between the two researchers. The outcome of interest was the effectiveness of the implementation strategy in addressing a determinant. This effectiveness was reported either qualitatively or quantitatively. For studies with qualitative results, effectiveness was determined directly from the text. For quantitative results, when only descriptive analyses were conducted without further statistical analysis, effectiveness was assessed based on the author's subjective judgment, as indicated in the text. Examples of this assessment can be found in Appendix 2.

To visualise the data, R 4.4.0 and RStudio 2024.09.0 Build 375 were used. For each barrier-strategy combination, the strategy outcome proportion was calculated as the ratio of successful outcomes to total outcomes. The resulting values ranged from 0.00 to 1.00, where 0.00 indicated 100% effective (red), 0.50 indicated 100% partially effective (orange), and 1.00 indicated 100% ineffective (green). Values between these points represented mixed outcomes, displayed as a gradient from red to orange to green.

INDICA+PRO Implementation Study

Study design

The overall study adopted a pragmatic approach using a hybrid type 3 effectiveness-implementation design (98). This thesis provides the results of the implementation components and their impact. This research focussed on the implementation of a minor ailment service in community pharmacies across Spain, from October 2020 to September 2023.

Community pharmacies recruitment and allocation

Pharmacies in each province were informed and invited to participate in the study by their local pharmacy board or SEFAC. The pharmacy boards in Castellon, Guipuzcoa, Madrid, Malaga, Valencia and Valladolid invited their members to participate in the study via email and/or circular letters. In the remaining provinces, SEFAC managed the invitation process by distributing an informative bulletin to all its members.

In provinces where pharmacy boards had more than 25 participating pharmacies, the participating pharmacies were randomly divided into two groups. One group received training, support, and follow-up from ECAs, with each ECA supporting a maximum of 25 pharmacies. The other group was

supported by CCAs (Figure 8). During the study, some pharmacies experienced a change in their assigned change agent due to rotation among the agents.

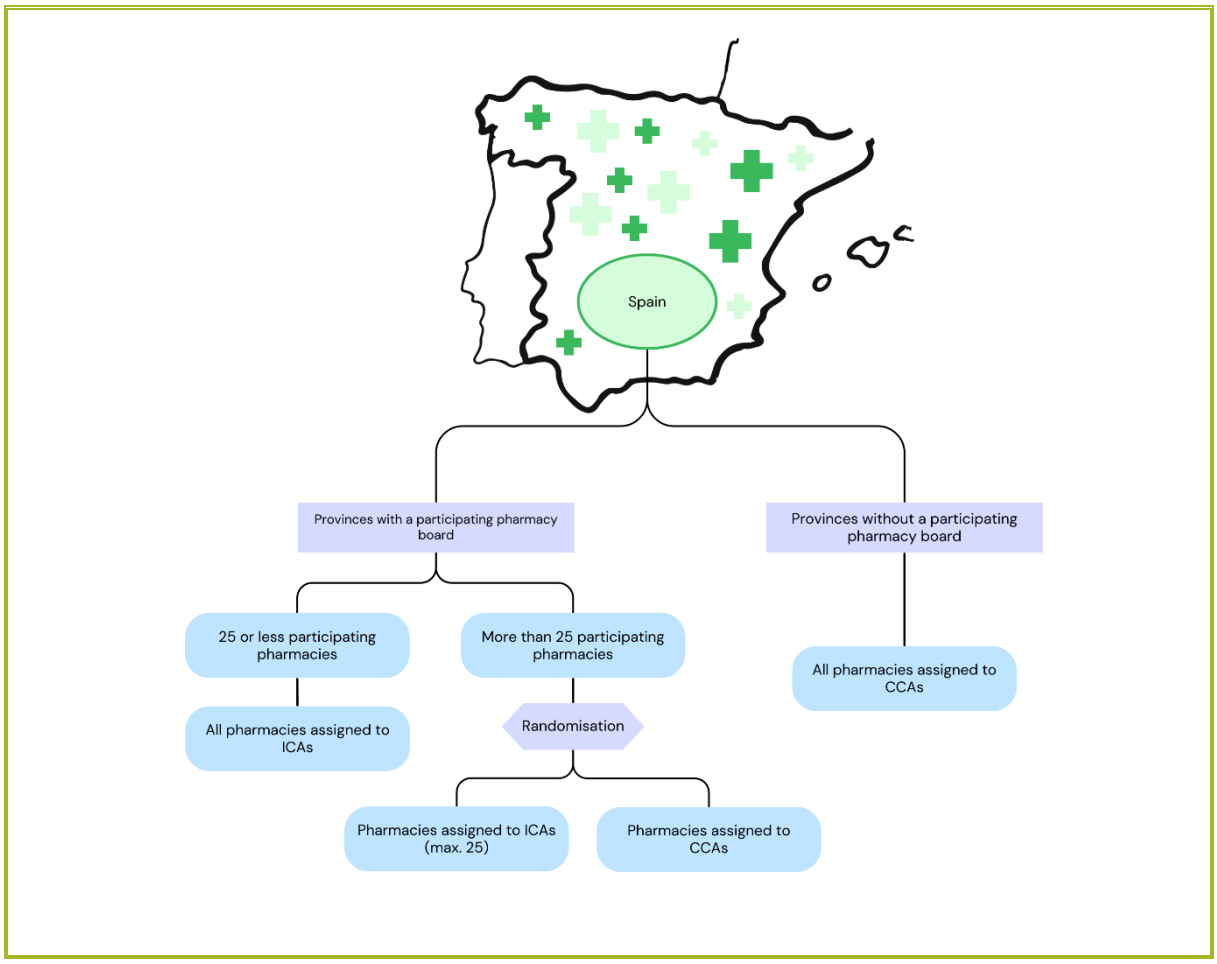

Fig. 8: Allocation of community pharmacies to change agents

Patients

Patients eligible for the study were those who visited participating community pharmacies to seek advice about one of the included minor ailments or any additional minor ailments listed in the BotPlus® catalogue, or to request medication for treating these conditions. The inclusion and exclusion criteria are outlined below:

Inclusion Criteria:

Patients aged 18 years or older, or caregivers/guardians of children under 18 years, who visited participating pharmacies to consult about or request treatment for a minor ailment.

Exclusion Criteria:

Patients who did not provide informed consent to participate in the study.

Change agents

The implementation of the minor ailment service was facilitated by change agents. These agents were divided into two categories: external change agents (ECAs) and combined change agents (CCAs). The ECAs were based in provinces with a participating pharmacy board and were contracted by these boards to provide regular follow-up to pharmacists. This follow-up occurred at least monthly and was conducted both in person and through telematic methods. The CCAs operated in provinces without a participating pharmacy board. These agents were volunteers recruited through the SEFAC organisation, and their follow-up with pharmacists, while continuous, was less intensive. CCAs primarily relied on telephone calls, emails, instant messaging platforms, and videoconferencing to maintain communication.

Implementation approach

The minor ailment service was implemented in community pharmacies following the structured procedure outlined by the FORO-AF. This process consisted of five steps: patient interview, information evaluation, intervention, professional action, and documentation (see Figure 2) (17).

Clinical protocols for the service had been previously developed and published by GIAF-UGR in collaboration with SEFAC, SEMERGEN, and SemFyC (167,168). These protocols provided guidance on 31 minor ailments, including their causes, non-pharmacological and pharmacological treatments, and referral criteria. Published by Ocaña Arenas et al., the protocols were later expanded in 2022 to include six additional ailments, increasing the total to 37 protocols (Table 1) (168,167,169). Both the procedure and the protocols were integrated into the SEFAC eXPERT® platform, available at www.sefacexpert.org (see Appendix 3 and Appendix 4) (82).

Table 1: Minor ailments included in the INDICA+PRO Implementation study

Respiratory ailments		**11**	Diarrhoea	**23**	Urticaria
1	Nasal congestion	**12**	Constipation	**Neurological ailments**	
2	Cold and flu	**13**	Vomiting	**24**	Stress
3	Cough	**Dermatological ailments**		**25**	Insomnia
Moderate pain		**14**	Acne	**Sensory ailments**	
4	Headache	**15**	Mouth ulcers	**26**	Red eye
5	Joint and back pain	**16**	Dermatitis	**27**	Dry eye
6	Dental pain	**17**	Skin wounds	**Genitourinary system ailments**	
7	Sore throat	**18**	Cold sores	**28**	Vaginitis
8	Dysmenorrhea	**19**	Hyperhidrosis	**29**	Fever
Digestive ailments		**20**	Insect bites	**Other ailments**	
9	Heartburn	**21**	Athlete's foot	**30**	Haemorrhoids
10	Flatulence	**22**	Burns	**31**	Varicose veins

Additional minor ailments (included in 2022)					
32	Pressure ulcers (dermatological ailments)	**34**	Ear wax (sensory ailments)	**36**	Vaginosis (genitourinary system ailments)
33	Low mood (neurological ailments)	**35**	Cystitis (genitourinary system ailments)	**37**	Asthenia (other ailments)

The minor ailment service record data were entered through the SEFAC eXPERT® platform (82). Pharmacists selected one of the included minor ailments and entered the patient's clinical details. Pharmacists also had the option of selecting any additional minor ailment included in the BotPlus® medicines and non-prescription pharmacy products catalogue (170). The time required to complete the record was automatically tracked by the platform. Patient follow-ups by the pharmacists were conducted 10 days later, either in person at the pharmacy or via a telephone call. During the follow-up, patients were asked about the progress of their ailment, rated on a Likert scale from 0 (no improvement) to 10 (completely resolved). Additional information was collected on whether the patient had sought help again for the same ailment, the date the ailment was resolved, and their satisfaction with the pharmacy service, rated on a Likert scale from 0 (not at all satisfied) to 10 (completely satisfied). As part of the follow-up, patients were also asked to assess their overall health status, considering all their health conditions. This was measured on a scale from 0 (worst imaginable health) to 100 (best imaginable health). The intervention is described using Template for Intervention Description and Replication (TIDieR) (171) checklist and was structured into two elements:

1. Implementation approach between the research group and the change agents.
2. Implementation approach between the change agent and the pharmacist.

Implementation intervention between the research group and the change agents

The implementation intervention involved collaboration between the research group, consisting of pharmacists with varying levels of expertise, and change agents during implementation. The implementation intervention consisted of various components:

- Change agent training was carried out and supported by tools such as handbooks (137,138), determinant assessment tools (102), time tracking log sheets (139), implementation strategy taxonomies (140–143), and resources for selecting strategies (144).
- Training materials included the FISpH theoretical framework (96), the Global Implementation Society's guide (138), the CFIR website (172), and relevant implementation science publications (97,140,141,148).
- Specialised training focussed on responsibilities such as identifying determinants, their causes and designing implementation strategies
- Key concepts included, best practices, and communication strategies, alongside information on the INDICA+PRO implementation study, clinical guidelines, GP referral criteria, and recording minor ailment consultations using the SEFAC eXPERT® platform.
- Using the eCRD on the SEFAC eXPERT® platform.

Initial training included 18 hours for ECAs and 12 hours for CCAs, with monthly follow-up training. Monthly meetings were held with the research group to assess progress to provide ongoing training, with a member of the research group available for guidance. Training occurred in official venues or online, lasting throughout the study.

The intervention was not personalised or adapted to individual needs of the change agents, though modifications were made to accommodate changes in the type of change agents involved. Adherence or fidelity to the intervention was not assessed. For more information, the TIDieR checklist for the

intervention between the research group and the change agents is available in Appendix 5.

Implementation intervention between the change agent and the pharmacist

The intervention focussed on the relationship between the change agent and the pharmacist. The intervention took place in pharmacies (for ECAs), via telephone, emails, instant messaging, and videoconferencing. Both ECAs and CCA (pharmacists), delivered the intervention. ECAs, based in provinces with participating pharmacy boards, provided regular follow-up, while CCAs worked in provinces without such boards and were volunteers recruited through the SEFAC organisation.

A change agent guide was used and made available through the SEFAC eXPERT® platform (82) to document and categorise information about determinants within pharmacies and design relevant strategies. This guide, which was adapted to the community pharmacy context and translated into Spanish, incorporated the CFIR (106) and Dogherty (141) taxonomies. Change agents used this specialised guide and platform to record encountered determinants, and the strategies employed to address them. This guide is available in Appendix 6.

The intervention was revised in 2021 to integrate updated CFIR (106) and Dogherty (141) taxonomies and included the outcome of whether each determinant was successfully addressed. However, intervention adherence or fidelity was not assessed. For additional information, the TIDieR checklist for the intervention between the change agent and the pharmacist is available in Appendix 7.

Data collection

Data collection took place from March 2020 to September 2023 via on-site verbal face-to-face interactions with participating pharmacists or remote methods including telephone calls, videoconferences, and instant messaging services. During these interactions, change agents sought to identify barriers, their causes, and the relationships between them, while designing and operationalising strategies to address these issues. The data collection process followed four stages:

1. Identifying the determinant
2. Identifying the cause or causes of the determinant
3. Designing an implementation strategy (discrete) or strategies (multifaceted) to address this cause(s) and determinant
4. Identifying the strategy or strategies outcome ('effective', 'ineffective' or 'in process') after addressing the cause(s) and the determinant.

Determinants were classified into the adapted and translated CFIR 2009 taxonomy (Appendix 8), and implementation strategies were categorised according to the adapted and translated Dogherty classification (Appendix 9). This implementation data was then recorded on the eCRD hosted on the SEFAC eXPERT® platform (82). The original eCRD was divided into two versions: a basic one for CCAs and a more advanced version for ECAs. Neither of these had the capability to collect data on the CFIR determinant and Dogherty strategy classifications. This feature was added later in the study, along with merging both ECAs and CCAs into a single system, which will now be referred to as the 'updated eCRD'. With the updated eCRD in place, if a follow-up with the pharmacist was needed to determine the Dogherty implementation strategy's outcome, change agents could revisit the pending cases and mark them as 'effective' or 'ineffective' accordingly. This process is outlined in Figure 9.

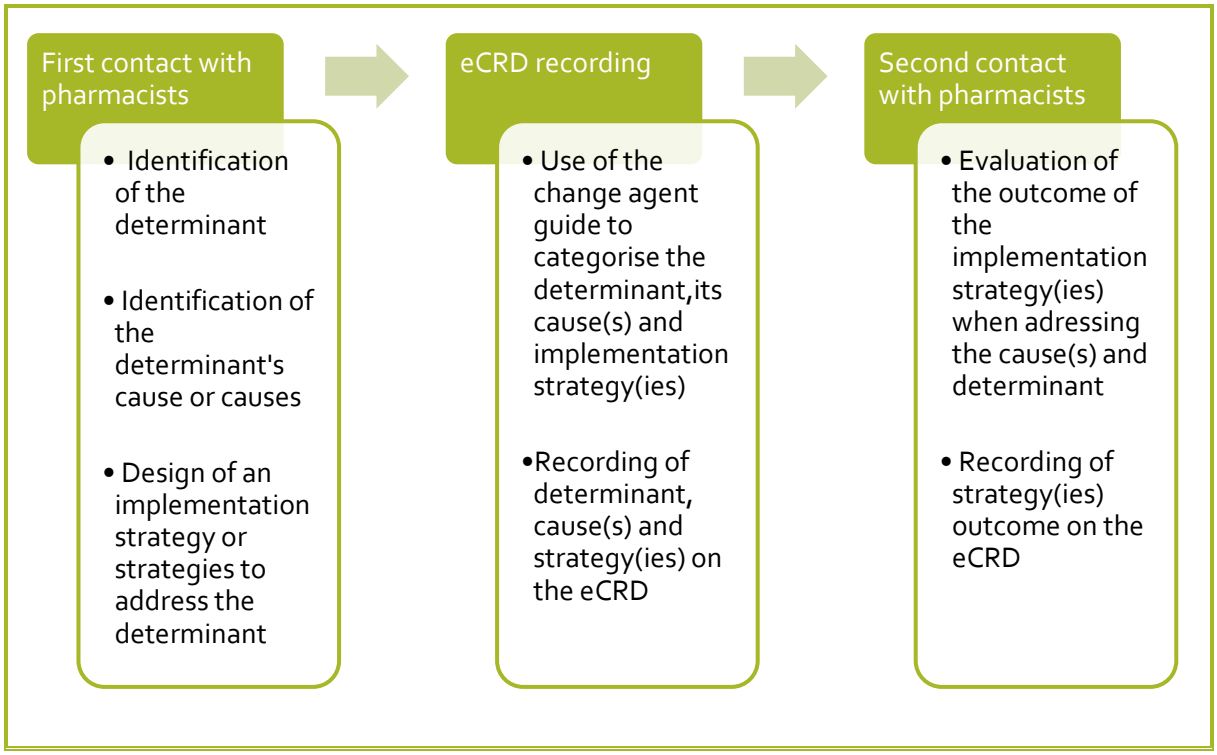

Fig. 9: Data collection process

Study implementation variables

Change agents recorded data collected in the eCRD using its pre-established list of determinants and strategies. If necessary, they could add new items if none were deemed applicable. The eCRD also allowed for the recording of additional qualitative data on the determinants and implementation strategies and included fields for the date of the visit and specifying whether the determinant applied to the entire pharmacy or to a specific pharmacist. To ensure data validity, a member of the research team continuously reviewed eCRD entries, providing feedback to the change agents. After the study concluded, this researcher validated the change agent's coding by reviewing the qualitative data in the database, reclassifying entries when necessary. The study outcome variables are listed in Table 2.

Table 2: Study outcome variables (adapted from Graham et al (86))

Variable	Type
General data	
Selection of the pharmacy where the determinant was identified	Categorical (nominal)
Date on which the determinant was identified	Numerical (continuous)
Minutes spent with the pharmacist	Numerical (continuous)
Type of contact with pharmacist (visit/telephone/email/WhatsApp®/videocall/other)	Categorical (nominal)
Information about the determinant	
Selection of whether it is a barrier or a facilitator	Categorical (binary)
Selection of whether the determinant applied to an individual pharmacist or to the pharmacy as a whole	Categorical (binary)
Determinant classification according to the adapted CFIR 2009 **(106)** (n=63, see Appendix 8)	Categorical (nominal)
Description of the determinant	Qualitative
Information about the cause(s) of the determinant	
Cause classification according to the adapted CFIR 2009 **(106)** (n=63, see Appendix 8)	Categorical (nominal)
Description of the cause	Qualitative
Information about the implementation strategy	
Strategy classification according to the adapted Dogherty et al taxonomy **(141)** (n=58, see Appendix 9)	Categorical (nominal)
Description of the strategy	Qualitative
Status of the strategy/s (not started/in progress/completed)	Categorical (nominal)
Selection of whether the strategy solved or reinforced the cause (unsuccessful/successful).	Categorical (binary)
Selection of whether the strategy solved the barrier or reinforced the facilitator (pending/yes/no)	Categorical (nominal)

Data analysis

The data were analysed using Microsoft® Excel® for Microsoft 365 MSO (version 2411 compilation 16.0.18227.20082) and R v4.2.2 with RStudio 2022.12.0 build 353.7.

If a qualitative description by the ECA or CCA included more than one determinant, each relationship was duplicated and re-coded separately. When the researcher identified a cause that had not yet been coded, it was added as a new relationship and coded accordingly. In some instances, the cause was described as 'multifactorial'. In these cases, the researcher read the text following the term 'multifactorial', coded the relevant parts, and duplicated the relationships as needed. Causes were removed if their descriptions were identical to those of their associated determinants, meaning they were essentially determinants without a cause. For example, if 'relative advantage' was identified as a determinant but there was not enough qualitative data to decide whether it should be classified as 'tangible' or 'not tangible', the entry was deleted and marked as 'missing data'. The change agents were contacted for clarification where necessary.

The data for results was analysed by considering determinants linked to one or more causes, each of which was connected to one or more strategies. This approach was later modified to study the relationship between targeted implementation strategies and determinants, analysing the data with a single determinant linked to a single cause and strategy. This required duplicating the determinant as needed, potentially multiple times if there were numerous strategies.

The dataset was segregated into three distinct groups, one representing determinant-implementation strategy links characterised by the successful resolution of determinants by the implementation strategy ('*strategy effective*'), another representing cases where the implementation strategies proved ineffective ('*strategy ineffective*'), and a third including instances with implementation strategies designated as pending ('*strategy in process*') or featuring missing data.

The sequences of each change agent's data entries were translated into flows or transitions between nodes (i.e. determinants and strategies). Sankey diagrams were selected on the basis that they allow

for the visual representation of large amounts of data organised into multiple stages or variables, alongside data on flow volumes (48). The diagrams document and illustrate the relationship between the primary determinants (barriers), the secondary determinants (causes) and the implementation strategy categories. The bandwidth of the depicted flows is directly proportional to the frequency of relationships between the two determinant domains and the strategy categories. Data were processed using R version 4.3.2 and RStudio version 2023.12.0 Build 369.

Ethical considerations

The data was collected as part of a study protocol approved by the Research Ethics Committee of Granada (CEI-Granada) on the 5th of February 2020, under the code 0090-N-20. This protocol was also registered and published on ClinicalTrials.gov with ID NCT05247333 on the 18th of February 2022. The CEI-Granada approval was updated and reapproved in 2023.

To ensure compliance with data protection regulations, all information obtained in the study was encrypted following the Organic Law 3/2018 of 5 December on Data Protection and Guarantee of Digital Rights, as well as the Regulation 2016/679 of 27 April 2016 on the protection of natural persons regarding the processing of personal data and the free movement of such data. All collected data was anonymised through a coding process that randomly assigned numbers to the information. This data was securely stored in the SEFAC eXPERT® platform's designated repository, ensuring its protection and exclusive access to authorised personnel (82,86).

RESULTS

Objective 1: Mapping the relationship between barriers and strategies in international research

The systematic review search identified 7,024 articles. Following the removal of duplicates and screening by title and abstract, 505 full-text articles were selected. After applying the inclusion and exclusion criteria to these articles, 454 were excluded, resulting in a total of 51 articles for analysis (Figure 10: PRISMA 2020 flow diagram).

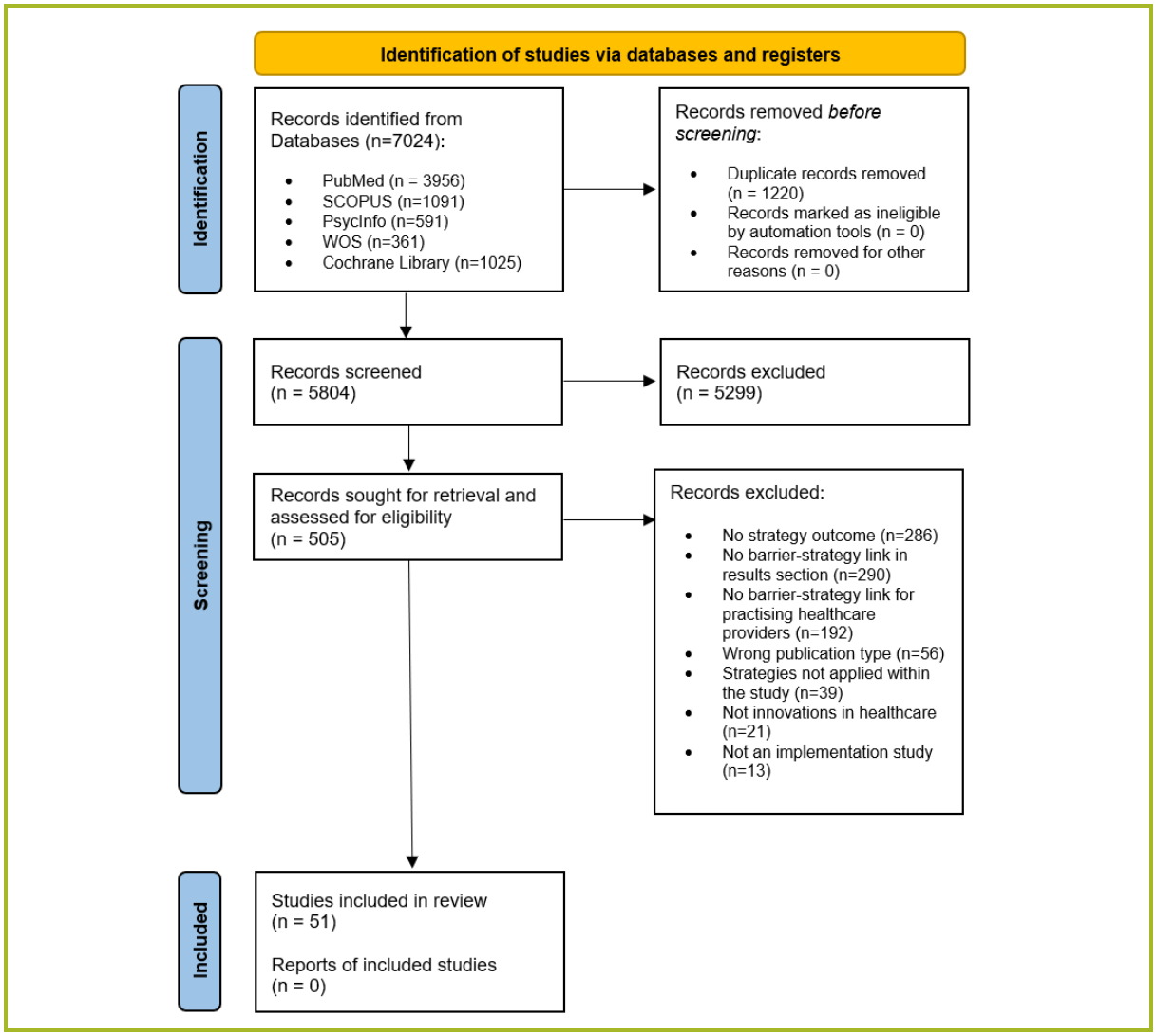

Fig. 10: PRISMA 2020 flow diagram for systematic reviews

Most of the identified implementation studies took place North America (43.1%, n=22) (173–194) and in Oceania (21.6%, n=11) (195–205). The most frequent setting for these studies was major hospitals, accounting for 22 studies (43.1%). This was followed by a combination of different healthcare environments, such as district hospitals and surgical units (n=9, 17.6%). Within these settings, most studies identified barriers, or negative determinants, faced by several healthcare disciplines, with only 13 studies (25.5%) (180,182,188,195,200,206–213) specifically focussed on a single type of healthcare worker, such as nurses, pharmacists, or GPs.

An overview of the implementation characteristics of the articles identified in the review are presented in Table 3. Almost 70% (66.7%, n=34) did not use a determinant framework or strategy taxonomy when reporting barriers and operationalised strategies. However, when a framework or taxonomy for determinants was used, the PARIHS framework was the most common (11.8%, n=6) (180,181,186,193,198,214), followed by the CFIR (9.8%, n=5) (185,187,189,215,216). The only two taxonomies employed when reporting implementation strategies were ERIC and Knowledge Translation (KT) strategies, which were used in three studies (5.9%) (190,194,216) and one study (2.0%) (200), respectively.

Table 3: Overview of implementation characteristics identified in the systematic review

Framework used for barrier assessment	**Studies, n (%)**
No Framework	36 (70.6%)
PARIHS	6 (11.8%)
CFIR	5 (9.8%)
Mixed Frameworks	2 (3.9%)
QUERI	1 (2.0%)
TDF	1 (2.0%)
Framework used for strategy assessment	
No Framework	47 (92.2%)
ERIC	3 (5.9%)
TDF	1 (2.0%)
Outcome assessment[1]	
Qualitative	36 (70.6%)
Quantitative	15 (29.4%)

In total, 555 barrier-strategy relationships were found, with 244 being unique, meaning they were not repeated within the same study or across other studies. Of these, 398 (71.7%) barriers were successfully addressed by their strategies, 99 (17.8%) were partially effective, and 58 (10.5%) were ineffective. On average, each article identified 10.7 relationships (SD = 10.3) between barriers and strategies.

[1] Outcome classification is based on the reporting style of the result, categorised as either qualitative or quantitative.

Identified discrete barriers and strategies

The CFIR 2.0 (108) and ERIC (140) taxonomies were used to classify identified barriers and strategies that either did not originally use a framework or used a different one, to enable analysis. Barriers were identified across all domains (or major categories) of the CFIR 2.0 framework. In total, 36 out of the 48 CFIR individual constructs were matched to the data. For strategies, 40 of ERIC's 73 individual strategies were identified at least once, spanning all eight ERIC major categories. Tables 4 and 5 present the frequency and distribution of the top 50% CFIR constructs and ERIC strategies, respectively (Tables 4 and 5). The full tables are available in Appendices 10 and 11.

Table 4 - CFIR 2.0 (108) framework coding distribution identified in the systematic review (top 75%)

Barrier	n (%)
Innovation deliverers: capability	122 (22.0)
Innovation deliverers: opportunity	73 (13.2)
Available resources	58 (10.5)
Work infrastructure	37 (6.7)
Innovation deliverers: motivation	33 (5.9)
Innovation complexity	25 (4.5)
Innovation evidence-base	17 (3.1)
Innovation design	16 (2.9)
Other implementation support	14 (2.5)
Access to knowledge & information	13 (2.3)
Compatibility	12 (2.2)

Table 5 - ERIC (140) framework coding distribution identified in the systematic review (top 75%)

Implementation strategy	**n (%)**
Conduct educational meetings	102 (18.4)
Promote adaptability	54 (9.7)
Develop and organise quality monitoring systems	41 (7.4)
Mandate change	39 (7.0)
Develop and implement tools for quality monitoring	38 (6.8)
Facilitation	38 (6.8)
Build a coalition	28 (5.0)
Develop educational materials	20 (3.6)
Create new clinical teams	18 (3.2)
Promote network weaving	16 (2.9)
Organize clinician implementation team meetings	15 (2.7)
Revise professional roles	14 (2.5)
Audit and provide feedback	14 (2.5)
Remind clinicians	14 (2.5)

Evaluation of barrier-strategy relationships

The most common barrier, regardless of strategy effectiveness, was '*innovation deliverer's capability*' (defined as 'interpersonal competence, knowledge, and skills needed to fulfil the role of deliverer') (n=122). This barrier was frequently addressed by operationalising strategies such as '*develop and organise quality monitoring systems*' (defined as 'develop and organise systems and procedures that monitor clinical processes and/or outcomes for the purpose of quality assurance and improvement') (n=13), '*develop educational materials*' ('develop and format manuals, toolkits, and other supporting materials in ways that make it easier for stakeholders to learn about the innovation and for clinicians to learn how to deliver the clinical innovation') (n=7), and '*develop and implement tools for quality monitoring*' ('develop, test, and introduce into quality-monitoring systems the appropriate language, protocols, algorithms, standards, and measures that are often specific to the innovation') (n=7) to overcome it.

Almost 60% (n=142) of the barrier-strategy relationships were unique, occurring only once within all the included studies. The most frequently identified strategy-barrier relationship was the implementation strategy '*conduct educational meetings*' targeted towards the barrier '*innovation deliverer's capability*' (n=50, 9.0%). The strategy '*conduct educational meetings*' was also used to address other barriers, including '*innovation deliverers: motivation*' ('commitment of the individual delivering the innovation to fulfilling the role') (n=11), '*available resources*' ('resources are available to implement and deliver the innovation') (n=8), '*innovation evidence-base*' (' evidence supporting the innovation's effectiveness') (n=6), and '*innovation deliverers: opportunity*' (' availability, scope, and power needed by the individual delivering the innovation to fulfil the role') (n=6). Other commonly observed relationships between barriers and strategies, irrespective of their outcome, included '*available resources*' linked to '*develop and implement tools for quality monitoring*' (n=12), '*innovation deliverers: opportunity*' addressed by '*promote adaptability*' ('identification of the ways the innovation can be tailored to meet local needs and clarification of which elements of the innovation must be maintained to preserve fidelity') (n=12) and '*mandate change*' ('have leadership declare the innovation a priority and commit to its implementation') (n=11) strategies.

Evaluation of strategy effectiveness

The strategies, their associated barriers, and outcome values (where n > 1) are summarised in Figure 11. (For complete data set see Appendix 12). 'Partial effectiveness' was either stated by the author or reported a mix of effective and ineffective outcomes across several studies. Studies marked as 'effective' or 'ineffective' were clearly identified as such by the study's authors. Overall, the most frequently identified effective implementation strategies were '*conduct educational meetings*' ('hold meetings for stakeholders to teach them about the clinical innovation') (n=58), '*promote adaptability*' (n=39), '*mandate change*' (n=34, 9.0%), and '*develop and implement tools for quality monitoring*' (n=22).

'*Mandate change*' demonstrated the highest success rate, identified as effective for 87.2% of the barriers. '*Develop and implement tools for quality monitoring*' had a successful outcome for 57.9% of the barriers it addressed, while '*conduct educational meetings*' was effective in 56.9% of cases.

Among the successful relationships, the link between the implementation strategy '*facilitation*' ('process of interactive problem solving and support that occurs in a context of a recognised need for improvement and a supportive interpersonal relationship') and the barrier '*innovation deliverers: opportunity*' was identified eight times, with all instances marked as effective (n=8). The same success rate was observed for the relationships between '*develop educational materials*' and '*innovation deliverers: capability*' (n=7), and '*mandate change*' and '*work infrastructure*' (n=7). Other relationships with high frequencies, but slightly lower success rates included '*promote adaptability*' and '*innovation deliverers: opportunity*' (n=12), as well as '*mandate change*' and '*innovation deliverers: opportunity*' (n=11).

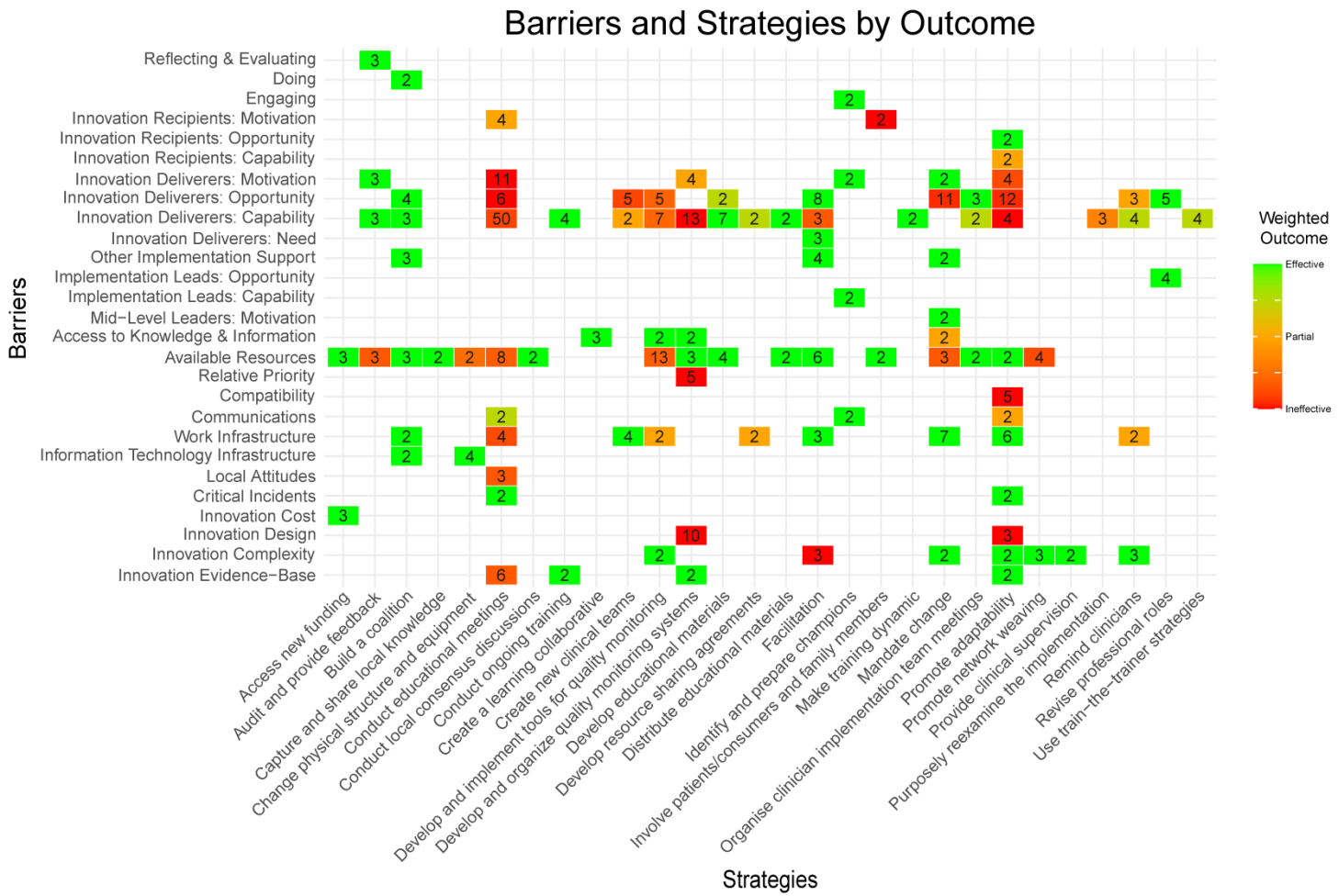

Fig. 11: Heatmap of barriers and implementation strategies by outcome proportions[2]

[2] The numbers show relationship counts, while colours indicate effectiveness: green (100% effective), red (100% ineffective), and shades in between for mixed results

Objective 2: Identifying implementation determinants during the implementation of a minor ailment service in community pharmacy

Overview of INDICA+PRO Implementation change agents

A total of 12 ECAs and 28 CCAs participated in the INDICA+PRO Implementation study. These individuals were located across 45 Spanish provinces (Figure 12), to assist pharmacists in implementing and delivering the minor ailment service.

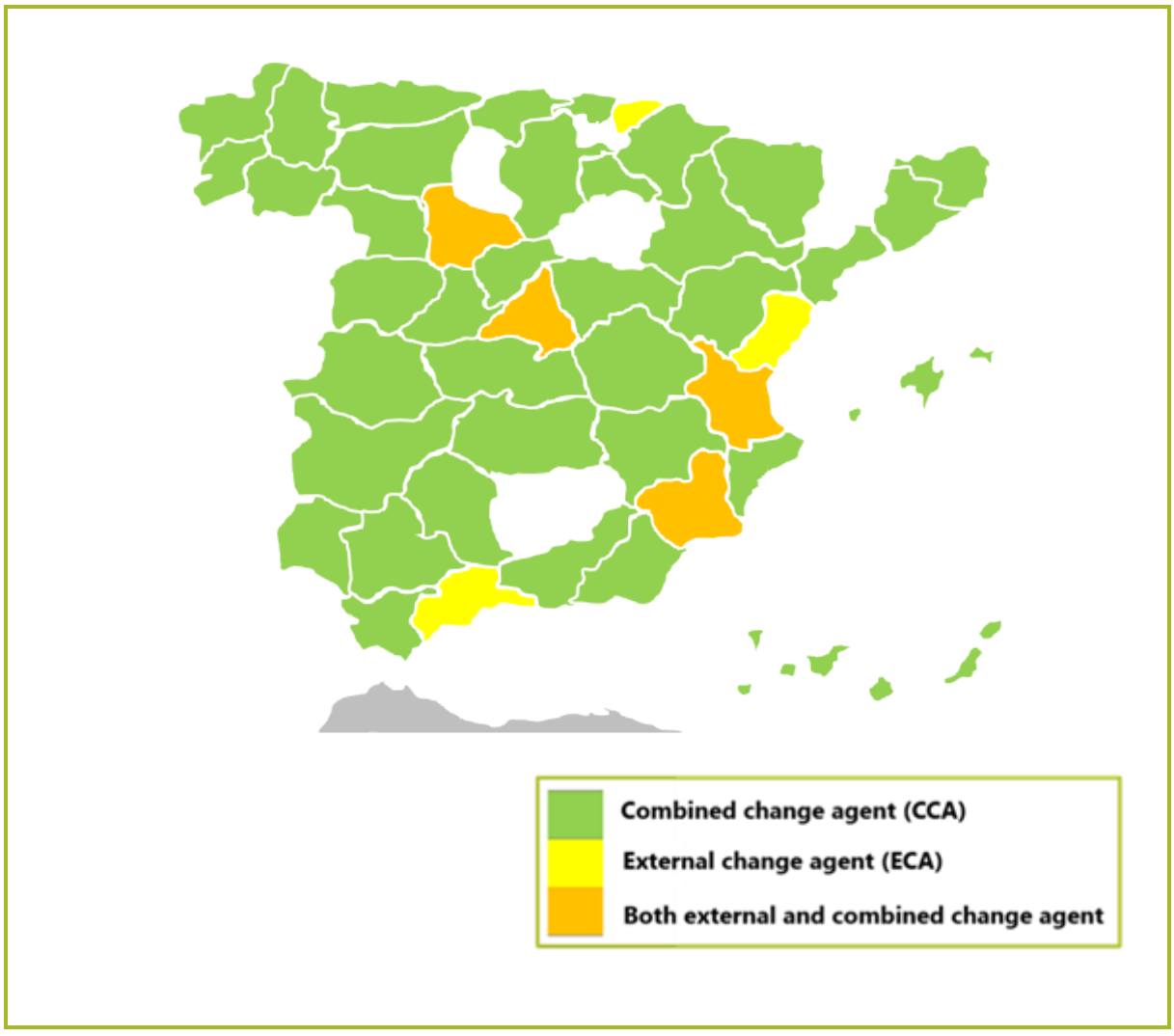

Fig. 12: Change agent distribution during the implementation of a minor ailment service (adapted from Graham et al (86))[3]

[3] The provinces represented in white did not participate in the INDICA+PRO Implementation study

Determinants

Determinants were identified by change agents through face-to-face visits, telephone calls, emails, WhatsApp® instant messaging, videocalls, and other informal approaches. Overall, email was the most frequently used method of communication between change agents and pharmacy participants, accounting for 45.1% (n=1913) of all contacts made by change agents. This was followed by WhatsApp® instant messaging (20.9%, n=886) (Table 6). Analysis by group revealed that ECAs predominantly relied on email, which accounted for 59.2% (n=1901) of their identified determinants, with phone calls being the second most used method at 15.4% (n=495). In contrast, CCAs most frequently used WhatsApp® messaging, which represented 58.6% (n=603) of their identified determinants, followed by telephone calls at 23.1% (n=238) (Table 6). When contacting participating pharmacists to identify determinants, the average duration across all communication methods was 21.2 minutes (SD = 33.6). ECAs reported an average interaction time of 20.6 minutes (SD = 33.7), while CCAs averaged 23.1 minutes (SD = 33.3). Communications categorised as '*other*' and '*face-to-face visit*' had the longest average durations, while WhatsApp® instant messaging was the shortest (Table 6).

Table 6: Determinant identification methods and duration during the implementation of a minor ailment service (adapted from Graham et al (86))

Type	External change agents (n=12)	Combined change agents (n=28)	Total (n=40)	Average duration (min) of determinant identification (SD)
Email	1901 (59.2%)	12 (1.2%)	1913 (45.1%)	10.4 (20.3)
Telephone	495 (15.4%)	238 (23.1%)	733 (17.3%)	14.8 (18.3)
Face-to-face visit	391 (12.2%)	44 (4.3%)	435 (10.3%)	79.4 (42.3)
WhatsApp®	283 (8.8%)	603 (58.6%)	886 (20.9%)	6.4 (5.7)
Videocall	128 (4.0%)	132 (12.8%)	260 (6.1%)	66.4 (32.8)
Other[4]	12 (0.4%)	0 (0.0%)	12 (0.3%)	156.3 (56.3)
Total	3210 (100%)	1029 (100%)	4239 (100%)	

Among the 40 ECAs and CCAs included in the study, 25 recorded at least one determinant associated with the implementation of the minor ailment service (Table 7). The remaining 15, who recorded no determinants during the study, were all CCAs.

Over the course of the study, change agents identified and recorded 4,239 determinants in the eCRD. Over 75% (n=3210) of these determinants were identified by the 12 ECAs, while the 28 CCAs identified 24.3% (n=1029). Due to the original eCRD design of the SEFAC eXPERT® platform, 79.6% of all the records made by CCAs had no available information regarding the nature of the determinant, i.e.

[4] Communications made through training or informal settings

whether it was a barrier or a facilitator. However, the available data revealed that facilitators, or positive determinants, were more common (n=2029, 47.9%) than barriers, or negative determinants (n=1391, 32.8%). Furthermore, ECAs mostly identified and recorded facilitators (61.7%, n=1981), whereas CCAs mostly identified barriers (15.7%, n=162) (Table 7).

Table 7: Number and type of recorded determinants per change agent and province during the implementation of a minor ailment service (adapted from Graham et al (86)) [5, 6]

Type	ECA		CCA		Total
	n (%)	No. of recorded determinants (no. pharmacies)	n (%)	No. of recorded determinants (no. pharmacies)	n (%)
Barrier	1229 (38.3)	*Madrid: 1930 (55)* *Guipuzcoa: 725 (26)* *Castellón: 177 (11)* *Castile and León: 155 (21)* *Valencia: 146 (46)* *Murcia: 71 (23)* *Malaga: 6 (25)*	162 (15.7)	*Andalusia: 442 (12)* *Cantabria: 221 (9)* *Alicante: 142 (24)* *Las Palmas: 50 (8)* *Tarragona: 49 (10)* *Murcia: 41 (23)* *Asturias: 21 (22)* *Santa Cruz de Tenerife: 12 (10)* *Aragón, La Rioja and Navarre: 10 (13)* *Madrid: 9 (55)* *Balearic Islands: 8 (10)* *Valencia: 5 (46)* *Barcelona: 3 (20)*	1391 (32.8)
Facilitator	1981 (61.7)		48 (4.7)		2029 (47.9)
Total	3210 (100)		1029 (100)		4239[7] (100)

Of the 543 records in the updated eCRD (which had the capacity to record determinant and strategy classification), the majority of determinants identified by change agents were associated with the '*characteristics of individuals*' domain (n=193, 35.7%). This domain refers to the actions and behaviours of individuals within organisations and their impact on the success the innovation. The second most

[5] ECA: external change agents; CCA: combined change agent

[6] Change agents that did record any determinants have been excluded from the table

[7] Missing data included in total. See methodology for more information.

frequently cited category was '*process*' (n=165, 30.5%), which includes the activities involved in carrying out implementation efforts effectively (Figure 13).

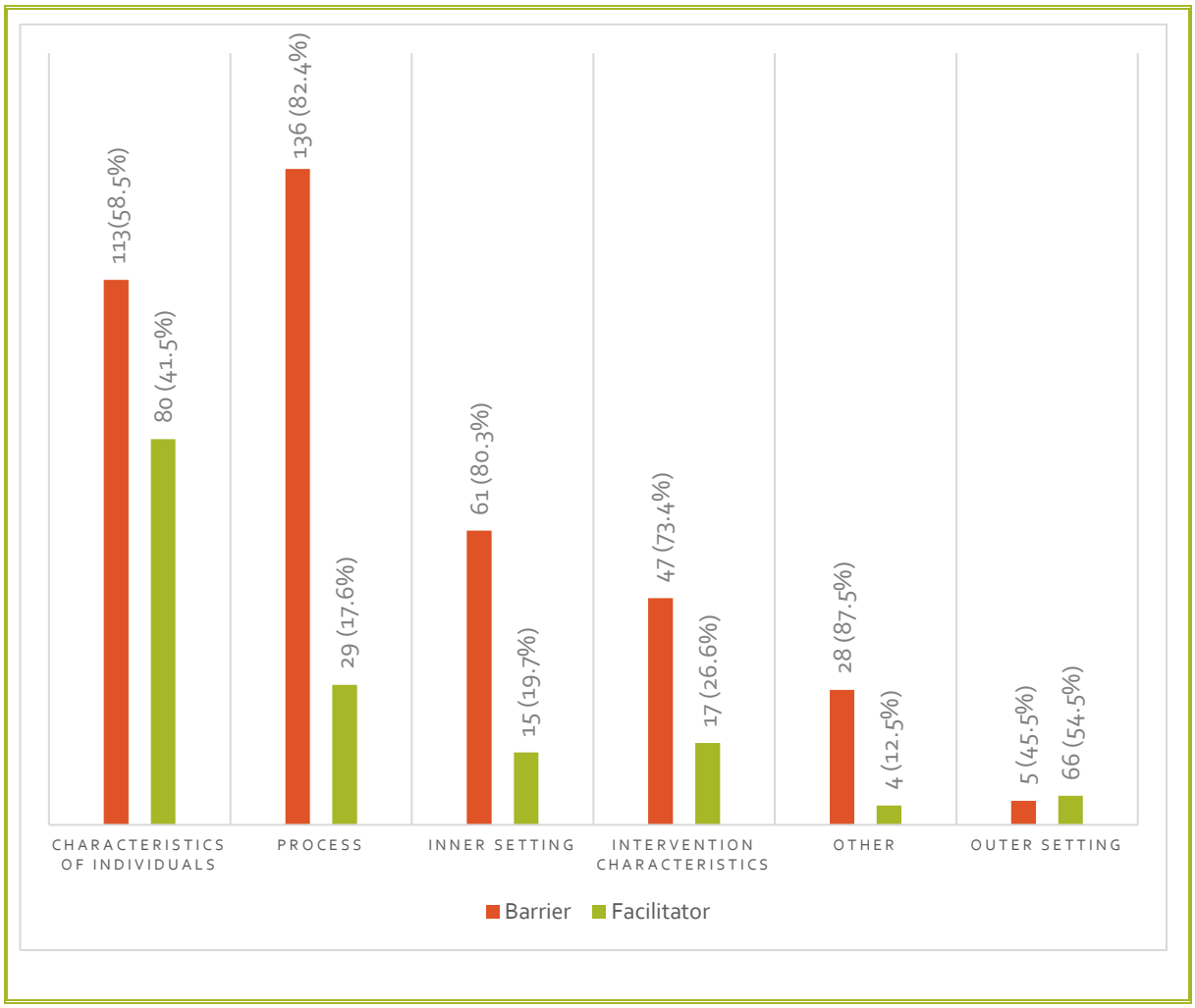

Fig. 13: Determinant distribution by domain during the implementation of a minor ailment service [8]

Table 8 shows that over 60% of the identified barriers in the study were linked to '*process*' and '*characteristics of individuals*'. However, '*characteristics of individuals*' was also the most common facilitator domain, making up 53.0% of identified facilitators, while '*process*' accounted for only 19.2%.

[8] % represents the domain, with barriers and facilitators totalling 100%

Table 8: Determinant distribution by domain during the implementation of a minor ailment service (106)

Domain	Barrier		Facilitator		Total	
	n	%	n	%	n	%
Characteristics of individuals	113	29.0	80	53.0	193	35.7
Process	136	34.9	29	19.2	165	30.5
Inner setting	61	15.6	15	9.9	76	14.0
Intervention characteristics	47	12.1	17	11.3	64	11.8
Other	28	7.2	4	2.6	32	5.9
Outer setting	5	1.3	6	4.0	11	2.0
Total	390	100	151	100	541	100

The study identified within the 543 updated eCRD records '*engaging (innovation recipients)*' (process domain) as the most common determinant (25.9%, n=140), followed by '*knowledge and beliefs (enthusiasm)*' (characteristics of individuals domain) (14.4%, n=78). '*Engaging (innovation recipients)* involves engaging recipients of the innovation through strategies like social marketing, education, role modelling, and training. The determinant '*knowledge and beliefs (enthusiasm)*' refers to individuals' attitudes toward and their enthusiasm for using the innovation.

The determinant '*engaging (innovation recipients)*' (process domain) was the most frequently cited barrier (34.1%, n=133), followed by '*complexity (behavioural change)*' (intervention characteristics domain) (10.8%, n=42). The latter refers to the perceived difficulty of the innovation, particularly in terms of behaviour change.

When studying facilitators for the implementation of the minor ailment service, the most common determinants were '*knowledge and beliefs (enthusiasm)*' (35.1%, n=53) and '*knowledge and beliefs (rationale for adopting the service)*' (characteristics of individuals domain) (11.9%, n=18). These

categories relate to individuals' enthusiasm for the innovation and their understanding of the reasoning behind it.

Certain categories were identified solely as barriers, with no instances where they were also identified as facilitators. These included '*knowledge & beliefs (patient communication skills)*' (characteristics of individuals domain), '*implementation climate (learning climate)*' (inner setting domain), and '*implementation climate (compatibility)*' (inner setting domain). The first refers to the pharmacist's skill in patient communication, while the others relate to the work environment: a climate where leaders acknowledge fallibility and encourage collaboration, where team members feel valued and safe to try new methods, and where the innovation aligns with individuals' values, norms, perceived risks, and needs, as well as with existing workflows and systems. Other categories were identified only as facilitators, including '*engaging (opinion leaders)*' (process domain), '*engaging (change agents)*' (process domain), and '*cosmopolitanism (other delivering organisations)*' (outer setting domain). These refer to involving individuals who influence their colleagues' attitudes (opinion leaders), those who facilitate innovation decisions (change agents), and the degree to which an organisation is connected to external organisations like other community pharmacies. For further details, see Table 9 and Appendix 13, with full definitions available in the 2009 CFIR Constructs website (217).

Table 9: Distribution of determinant and domain identification during the implementation of a minor ailment service (top 75%) (106) [9]

Determinant	Barrier		Facilitator		Total	
	n	%	n	%	n	%
Engaging (innovation recipients) - Process	133	34.1	7	4.6	140	25.9
Knowledge and beliefs (enthusiasm) - Individuals	25	6.4	53	35.1	78	14.4
Complexity (behavioural change) - Intervention	42	10.8	16	10.6	58	10.7
Knowledge & beliefs (SEFAC eXPERT® skills) - Individuals	39	10.0	1	0.7	40	7.4
Knowledge and beliefs (rationale for adopting the service) - Individuals	14	3.6	18	11.9	32	5.9
Readiness for implementation (available resources) – Inner	28	7.2	1	0.7	29	5.4
Quality - *Other*	18	4.6	1	0.7	19	3.5
Knowledge & beliefs (interest in the service) - *Individuals*	12	3.1	6	4.0	18	3.3

Objective 3: Identifying and assessing the effectiveness of implementation strategies during the implementation of a minor ailment service in community pharmacy

To address the identified determinants, implementation strategies were developed and operationalised, coded according to the adapted Dogherty et al. taxonomy (141), and detailed in Table 10. Among the 543 updated eCRD records with known implementation strategy classifications, a total of 1,389 discrete implementation strategies were recorded. The most operationalised discrete implementation strategy was '*providing skills training'* (n=144, 10.4%), followed by '*providing resources/tools for change*' (n=,131, 9.4%) and '*walkthrough'* (n=104, 7.5%).

[9] Domain names have been shortened for clarity: Intervention (Intervention characteristics), Outer (Outer setting), Inner (Inner setting), individuals (Characteristics of individuals), and process (process)

The most frequently used implementation strategy group was '*leading and managing change*' (strategy focussed on team building and group dynamics while also providing project-specific support, including resources and tools for change), accounting for 485 instances (34.9%). This was followed by '*monitoring progress and ongoing implementation*' (assisting with problem-solving and providing ongoing support) with 324 instances (23.3%). Within these groups, the most common subgroups were '*administrative and project-specific support*' (i.e. assistance tailored to the INDICA+PRO project's needs) (n=209) *and* '*providing support*' (guiding, encouraging, and assisting innovation deliverers to stay focussed, motivated, and on track) (n=209), respectively. Additional details are provided in Appendix 14.

Table 10: Distribution of implementation strategy groups and subgroups and discrete strategies during the implementation of a minor ailment service (top 50%) (141)

Implementation strategy group	Implementation strategy subgroup	n (%)	Discrete implementation strategies	n (%)
Leading and managing change	Administrative and project-specific support	209 (15.0%)	Providing skills training	144 (10.4%)
			Remainder[10]	65 (4.6%)
	Knowledge and data management Knowledge and data management	135 (9.7%)	Providing resources/tools for change	131 (9.4%)
			Remainder	4 (0.3%)
	Fostering team-building/group dynamics	81 (5.8%)	Enabling group development	44 (3.2%)
			Remainder	37 (2.6%)
	Recognising the importance of context	56 (4.0%)	Helping to build in the structures/processes to support staff and help them overcome obstacles	29 (2.1%)

[10] 'Remainder' refers to the other 50% of individual implementation strategies within the implementation strategy subgroup.

			Remainder	27 (1.9%)
Monitoring progress and ongoing implementation	Project management	4 (0.3%)	Advocating for resources and change	2 (0.1%)
			Establishing and allocating roles/delegating responsibilities	2 (0.1%)
	Providing support	209 (15.0%)	Providing ongoing support/reassurance and constructive feedback	52 (3.7%)
			Maintaining momentum and enthusiasm	49 (3.5%)
			Being available as needed	45 (3.2%)
			Remainder	63 (4.6%)
	Problem-solving	82 (5.9%)	Networking	44 (3.2%)
			Remainder	38 (2.8%)
	Effective communication	33 (2.4%)	Keeping group members informed	16 (1.2%)
			Providing regular communication (emails, phone calls)	16 (1.2%)
			Acting as a liaison	1 (1.2%)
Planning for change	Increasing awareness	180 (13.0%)	Emphasising enhanced patient outcomes as opposed to poor practice as reason for change	60 (4.3%)
			Highlighting a need for practice change	43 (3.1%)
			Remainder	77 (5.6%)
	Developing a plan	100 (7.2%)	Goal-setting and assisting with development of an action plan	83 (6.0%)
			Remainder	17 (1.2%)
Other	Other	277 (19.9%)	Walkthrough	104 (7.5%)
			Other	60 (4.3%)
			Remainder	113 (8.1%)
Evaluating change	Assessment	23 (1.7%)	Performing/assisting with evaluation	12 (0.9%)
			Remainder	11 (0.8%)

Out of 1,389 discrete implementation strategies recorded by the study's change agents, 1,135 (81.7%) were used as part of 368 multifaceted groups (i.e., groups of individual strategies applied simultaneously to address a determinant), while the remaining 254 (18.3%) were applied individually. Multifaceted groups were more likely to have a recorded outcome (72.3% compared to 59.4%). However, their success rate was lower at 68.0% (n=85) compared to 86.8% (n=131) for individual strategies (Table 11).

Table 11: Implementation strategy effectiveness in overcoming targeted barriers during the implementation of a minor ailment service

Type	Completed		In process/missing data	Total groups	Total discrete strategies within the groups
	Effective	Ineffective			
Individual groups	131	20	103	254	254
Multifaceted groups	181	85	102	368	1135

Objective 4: Choosing effective targeted implementation strategies during the implementation of a minor ailment service in community pharmacy

Change agents documented 4,343 individual relationships between determinants, their underlying causes, and corresponding implementation strategies on the updated eCRD platform. Of these, 1,681 strategies were found to be effective in addressing their associated causes and determinants, while 835 were ineffective. Additionally, there were 1,827 cases where data was missing (Table 12). These

relationships were categorised into barrier-cause-implementation strategies (n=4,236, 97.5%) and facilitator-cause-implementation strategies (n = 107, 2.5%).

Table 12: effectiveness of implementation strategies during the implementation of a minor ailment service

Determinant-cause-strategy relationships - n (%)	Strategies	n (%)
4343 (100)	Effective	1681 (38.7)
	Ineffective	835 (19.3)
	Missing	1827 (42.0)

Within these relationships, the most frequently identified barrier domain was '*intervention characteristics'* (i.e. aspects of the innovation being implemented), accounting for 43.5% (n=1,843) of the recorded barriers. In contrast, the most common facilitator domain was '*characteristics of individuals'*, (i.e. aspects of the individuals delivering the innovation) identified 57 times (53.3%). The most common cause domain for all determinants (both barriers and facilitators) was '*characteristics of individuals'*, with this domain causing 3,069 (72.5%) barriers, and 41 (38.3%) facilitators. When addressing barriers, the most used implementation strategy category was '*other'*, documented 1,808 times (42.7%). For reinforcing facilitators, the leading strategy category was '*monitoring progress and ongoing implementation*' (assisting with problem-solving and providing ongoing support), operationalised in 44 cases (41.1%).

Strategies targeted towards barriers

Since 97.5% of the determinant-cause-strategy relationships were related to barriers. The primary relationship observed between the barrier, cause, and strategy domains involved *'intervention characteristics'*, *'characteristics of the individuals involved'*, and *'other'*, respectively (Table 13). This association accounted for 21.6% (n=915) of the total data. Moreover, nearly half of this relationship (n=435, 27.2% of the effective strategy group) resulted in favourable outcomes, or instances where the implementation strategy successfully addressed the identified determinants. Another frequent relationship for effective strategies, identified in 345 instances (21.5% of the effective strategy group), was the relationship between the barrier and cause domains *'intervention characteristics'* and the strategy category *'other'*. Similarly, for the barrier and cause domains *'intervention characteristics'*, the implementation strategy *'planning for change'* (i.e., increasing pharmacists' awareness of a need for change and assisting with developing a plan for implementation) was identified 110 times (6.9% of the effective strategy group).

In contrast, among the group of ineffective implementation strategies, the most common relationship between the barrier, cause, and strategy category was *'process of implementation'* (i.e., formal and informal activities of the implementation process), *'characteristics of the individuals involved'*, and *'planning for change'*. This combination represented 22.7% (n=189) of the unsuccessful associations. Additionally, an alternative relationship involving these two barrier-cause domains and the strategy *'leading and managing change'* (i.e., fostering team building and group dynamics and providing project-specific support such as resources and tools for change) was observed 126 times (15.1%). For more information on the distribution of implementation strategies targeted at barriers, see Appendix 15.

Table 13: Distribution of effective implementation strategies targeted at barriers (top 75%)

Barrier	Cause	Strategy	Frequency	
			n	%
Intervention characteristics	Characteristics of the individuals involved	Other	915	21.60
Process of implementation	Characteristics of the individuals involved	Planning for change	436	10.29
Intervention characteristics	Intervention characteristics	Other	348	8.22
Characteristics of the individuals involved	Characteristics of the individuals involved	Other	294	6.94
Process of implementation	Characteristics of the individuals involved	Leading and managing change	269	6.35
Characteristics of the individuals involved	Characteristics of the individuals involved	Planning for change	213	5.03
Intervention characteristics	Characteristics of the individuals involved	Planning for change	203	4.79
Characteristics of the individuals involved	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	156	3.68
Intervention characteristics	Intervention characteristics	Planning for change	122	2.88
Process of implementation	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	116	2.74
Process of implementation	Characteristics of the individuals involved	Other	106	2.50

Sankey diagrams

Within the dataset, the group representing instances with successful resolution of barriers comprised 1602 relationships, while the group where operationalised strategies failed to overcome the determinants was represented by 833 relationships. Additionally, the group including instances with implementation strategies categorised as pending or featuring missing data points constituted 1801 data points. Sankey diagrams were generated for the first two groups (Figures 16 and 17), outlining the individual strategies employed in the *'others'* category. Sankey diagrams with more detailed results are available in Appendix 16.

A substantial proportion of change agents used strategies that successfully overcame barriers within the *'intervention characteristics'* domain (Figure 14). These barriers were mainly linked to a cause, either within the same group or included in the *'characteristics of individuals'* domain, as evidenced by the comparatively thicker transitions leading to these domains. The strategy category *'other'* emerged as a recurring implementation strategy, successfully operationalised to overcome these barriers and their causes, as is visible by both denser transitions leading to this specific node and the node diameter. After examining the transition flows' and nodes' widths, it can be identified that *'walkthrough'* (i.e., guidance through the minor ailment service consultation) and *'technical assistance'* (i.e., troubleshooting technical issues encountered within the online platform) were the two most frequently used implementation strategies.

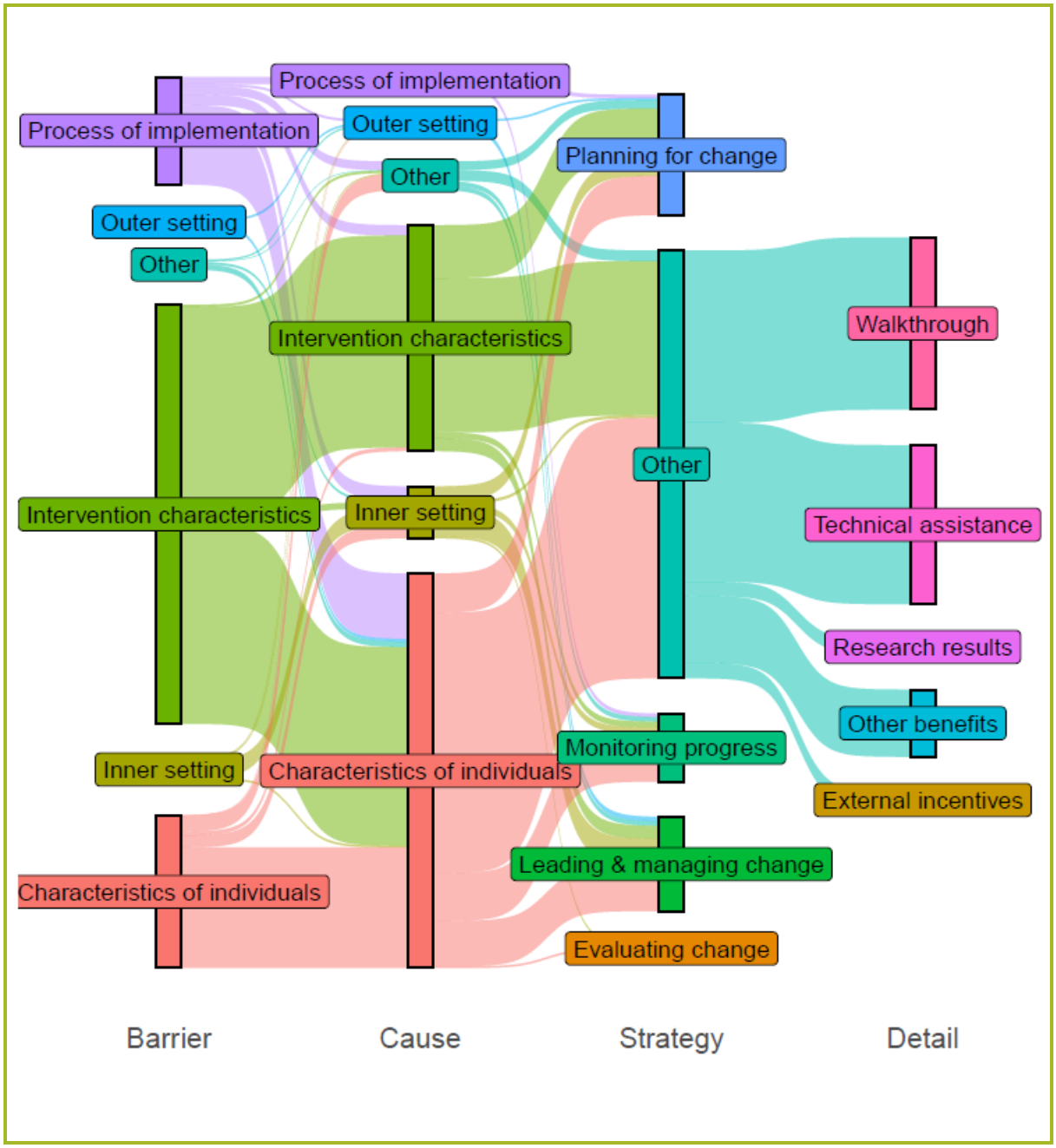

Fig. 14: Sankey diagram for effective barrier-cause-implementation strategy relationships

Within the group of implementation strategies that were found to be ineffective, the barriers characterised by the broadest nodes were *'process of implementation'* and *'characteristics of the individuals involved'* (Figure 15). By analysing the broader flow transitions, it can be identified that both domains were predominantly linked to the cause domain *'characteristics of the individuals*

involved'. When analysing the linked implementation strategies, by looking at the transitions associated with this cause domain (*characteristics of the individuals involved*) it becomes apparent that the strategy categories *'planning for change'* and *'leading and managing change'* were commonly operationalised to overcome it. Additionally, these two implementation strategy categories were characterised by the broadest nodes.

When examining the individual strategies categorised under *'other'*, all the nodes exhibit widths that closely resemble each other. However, upon analysing the flow width, it becomes apparent that *'research results'* (i.e., communication of results from external studies) and *'other benefits'* (i.e., highlighting further advantages associated with the innovation) are the predominant implementation strategies within this category.

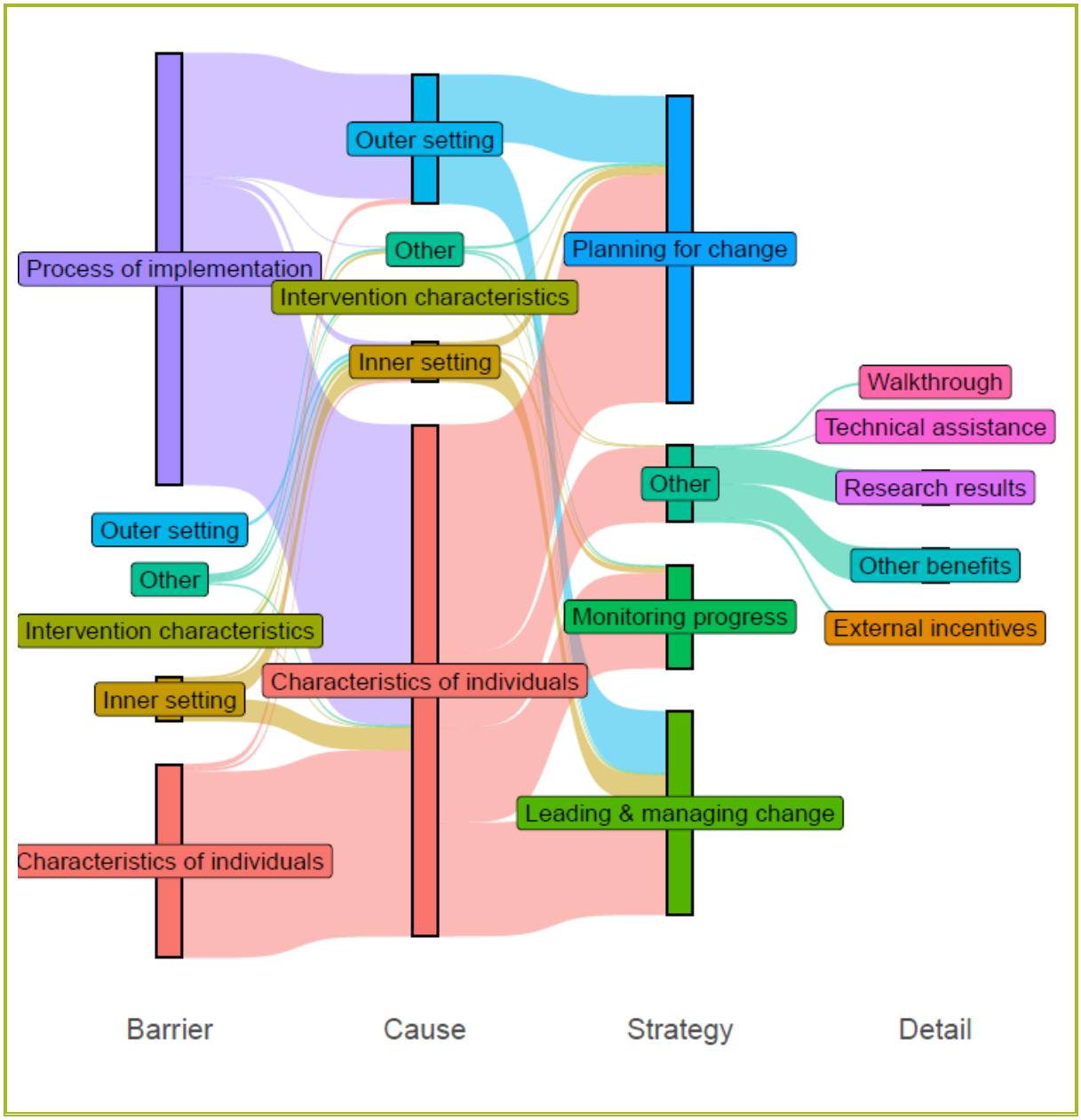

Fig. 15: Sankey diagram for ineffective barrier-cause-implementation strategy relationships

Strategies targeted towards facilitators

The primary relationship observed between the facilitator, cause, and strategy domains involved *'characteristics of the individuals involved'*, *'process of implementation'*, and *'monitoring progress and ongoing implementation'*. The second most common relationship was similar, but with the facilitator

and cause domains swapped. Together, these associations accounted for 18.6% (n=20) of the total data. Another common relationship for facilitators, identified in nine occasions (8.4%), also involved the facilitator *'characteristics of the individuals involved'* and the *'process of implementation'*. However, in this case, it was linked to the strategy *'leading and managing change'*.

Nearly all (n=79) of the relationships identified for facilitators resulted in favourable outcomes, with the facilitator being reinforced. The only two relationships associated with ineffective strategies involved the facilitator *'characteristics of the individuals involved'*, the cause *'characteristics of the individuals involved'* and the strategy *'planning for change'*, and the facilitator *'characteristics of the individuals involved'*, the cause *'inner setting'* and the strategy *'planning for change'*, with one instance each. For a detailed analysis of effective implementation strategies targeted at facilitators, refer to Appendix 17.

Sankey diagrams

Within the dataset, the group representing relationships with successful reinforcement of facilitators was made up of 79 data points, while the group where operationalised strategies failed to overcome the determinants consisted of two data points. The group including instances with implementation strategies categorised as pending or featuring missing data points accounted for 26 data points. Sankey diagrams were generated for the first two groups (Figures 18 and 19). More detailed Sankey diagrams are available in Appendix 18.

Most facilitators within the *'characteristics of individuals'* domain (Figure 16) were reinforced. These facilitators were primarily linked to a cause, either within the same group or within the *'process of implementation'* domain, as indicated by the thicker transitions leading to these domains. The strategy categories *'monitoring progress and ongoing implementation'* and *'leading and managing change'* were recurring implementation strategies that were successfully operationalised by the

change agents to reinforce these facilitators and their causes. This can be observed by the denser transitions leading to this node and by the node's diameter. The two relationships between facilitators, their causes, and ineffective implementation strategies are illustrated in Figure 17.

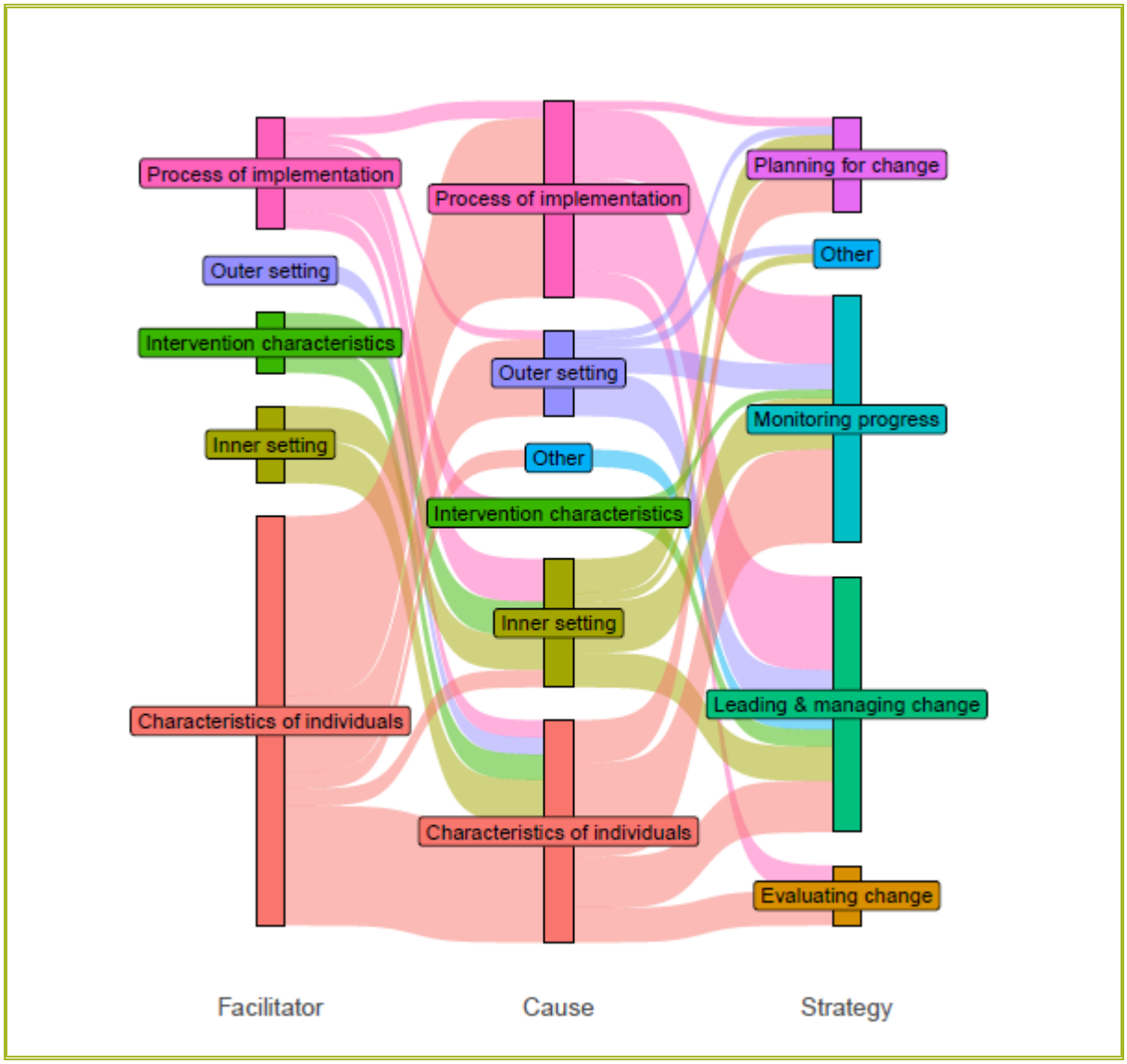

Fig. 16: Sankey diagram for effective facilitator-cause-implementation strategy relationships

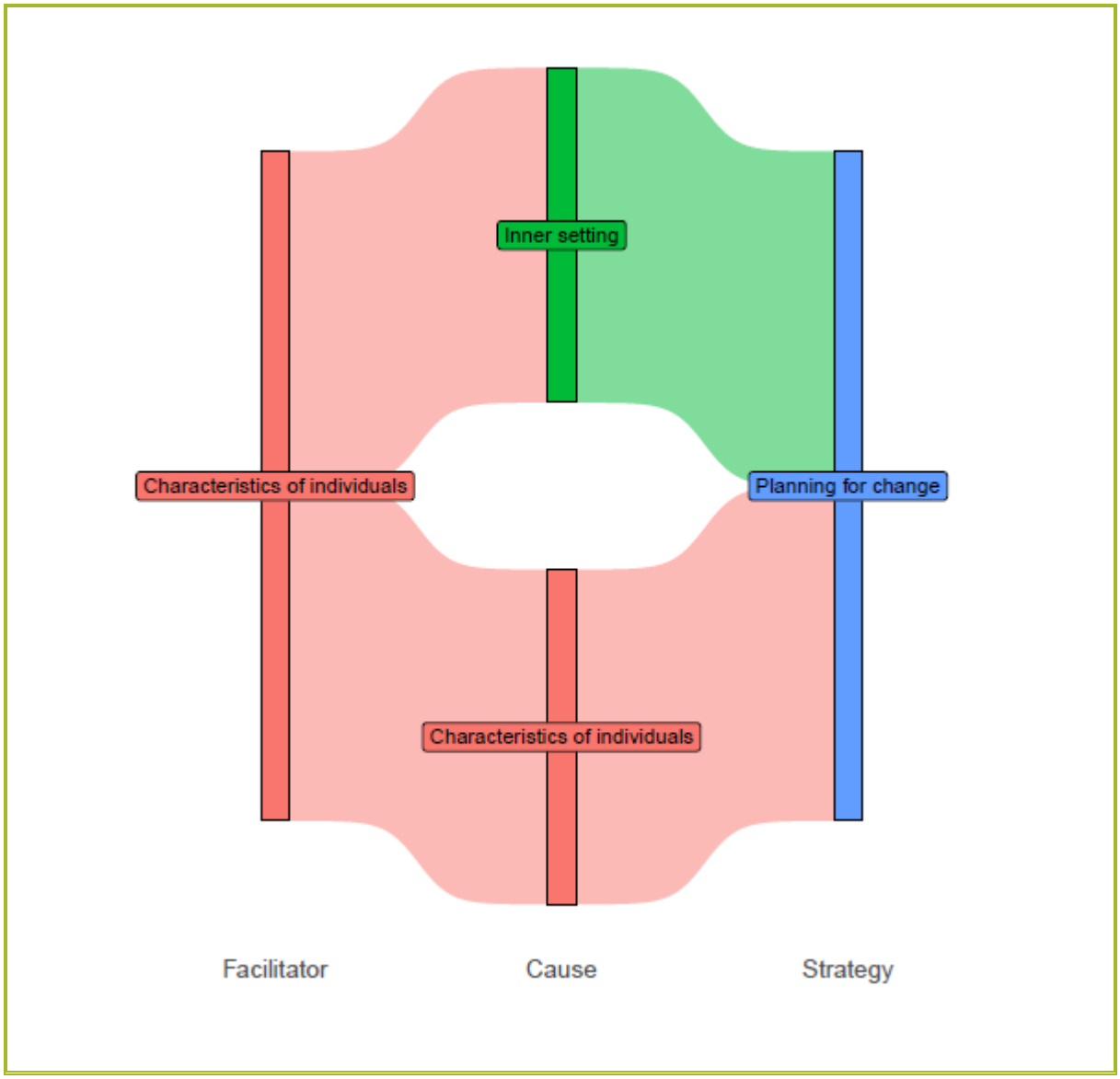

Fig. 17: Sankey diagram for ineffective facilitator-cause-implementation strategy relationships

DISCUSSION

This study explored the barriers to implementing a minor ailment service in Spain (12,218). Although a previously undertaken cluster randomised controlled trial showed that the service improves patient safety and is cost-effective, it has not yet been adopted as government policy (12,13,38,46). In contrast, similar services in other countries are already government-supported (41,46,54,58,69). If the Spanish government does adopt the service as policy, a structured implementation programme will be essential for nationwide adoption.

Given that implementing evidence-based practices is a complex, multi-step process, it was decided to further investigate how the minor ailment service might be introduced at a national basis effectively. Successful implementation depends on a range of factors, including adequate support, appropriate remuneration, a clear understanding of the barriers involved, from barriers linked to the service itself to those related to providers, and the use of targeted implementation strategies (106,101,97,219). This research was the first in Spain to study implementation strategies identified and operationalised by change agents. Twelve of these change agents were employed by the pharmacy board and 28 were SEFAC volunteers.

Over a three-year research period, the study aimed to identify and address determinants affecting the implementation of this community pharmacy service through the design and use of targeted implementation strategies. Few published studies explore how real-world barriers can be addressed with strategies, particularly in healthcare. Those that do tend to focus on specific innovations or narrowly defined settings (154,161,194). This nationwide study saw change agents identify and address 4,239 real-world determinants during the implementation process, overcoming barriers, reinforcing facilitators, addressing their causes, and ultimately enabling service implementation. This research highlighted the importance of implementation strategies that are both theoretically sound and practical for real-world implementation challenges, shifting the focus from conceptual

discussions to practical implementation strategies. The targeted approach was guided by theory-based methods, including standardised taxonomies for determinants and implementation strategies, training for change agents, continuous monitoring by the research team, and a digital platform for data collection (82,106,108,140,141). Innovative visual tools, Sankey diagrams, developed during the study provided a previously unexplored method to strengthen timely information flow to the field work aiding decision-making for change agents. These tools assisted the selection of implementation strategies targeted to determinants, creating a strong evidence base for future implementation efforts to scale up and sustain minor ailment and other community pharmacy services. This research also has the potential to offer broader implications for healthcare policy and practice. It offers policymakers baseline data on determinants and strategies for implementing healthcare services. It also includes recommendations on how to optimise the role of change agents involved in healthcare implementation. The research demonstrates how implementation in healthcare can be better supported through theory-informed research applied to the real world. Future studies should evaluate the long-term sustainability of the developed Sankey diagram tools and explore their applicability to other community pharmacy and healthcare services, further expanding the evidence base for targeted implementation approaches.

Objective 1: Mapping the relationship between barriers and strategies in international research

The systematic review identified 555 barriers, each linked to an individual implementation strategy and corresponding outcome. The research was mostly conducted in developed countries, with studies set in large, complex environments like hospitals rather than smaller settings such as general medical practitioner's surgeries or community pharmacies. These complex environments settings often involved multiple healthcare disciplines instead of focussing on single professions like pharmacists.

On average, each article revealed 10.7 relationships, with 71.7% of barriers effectively overcome by their targeted strategies. The most common barrier was the '*innovation deliverer's capability*', and the implementation strategy with the highest success rate was '*mandate change*'. The deliverer's lack of competence, knowledge, and skills ('*innovation deliverer's capability*') could be due to the innovation itself or to insufficient preparation prior to implementation. However, this barrier may also be frequently reported because it could be relatively easy to address with strategies such as developing educational materials. Leadership involvement via the strategy '*mandate change*' was widely used and highly effective, resolving nearly 90% of its linked barriers. This suggests that securing leadership support should be a priority both before and during implementation. The heatmap developed in this study provides a clear visual representation of barrier-strategy relationships and their success rates. This makes it easier to interpret trends and identify areas for improvement when designing implementation strategies. It is recommended that other authors adopt this approach.

Most studies did not use determinant frameworks or strategy taxonomies when reporting identified barriers and operationalised strategies, thus not meeting standard reporting recommendations (220,221). After coding all the identified barriers and strategies to the CFIR 2.0 framework (108) and ERIC taxonomy (140), a wide range of categories from both taxonomies were identified (36 out of 48 CFIR constructs, and 40 out of 73 ERIC strategies), validating the development of the CFIR-ERIC strategy selection tool and suggesting that these frameworks are useful for studying implementation (144). The dataset revealed a total of 3,504 possible barrier-strategy combinations. However, 311 relationships were identical, indicating a tendency to report on familiar implementation strategies or the common use of similar strategies for similar barriers. Potentially, even across different settings, services, programmes or countries, common barriers may still arise and be addressed using similar strategies. However there remained many potential combinations missing, raising questions about whether some strategies are overlooked or considered unviable. However, there was wider variation in the strategies applied than in barriers identified, with the most common strategy appearing 58

times, compared to the most common barrier, which was reported 122 times. It is possible that while certain barriers are consistently recognised, diverse strategies are applied. Furthermore, several differences were identified when comparing the findings of the review with the CFIR-ERIC selection tool. For example, while the tool suggested that the implementation strategy '*build a coalition*' is effective in addressing barriers related to partnerships and connections, we did not find evidence of that relationship in the international published data. This may be attributable to many factors, including implementation researchers not following published guidance when selecting strategies, or that that they favour certain implementation strategies based on local expertise, preferences, or contextual constraints. Another possible explanation is that the tool was developed using the CFIR 2009 framework (106), which does not incorporate several CFIR 2.0 categories used in the review, such as '*Innovation Deliverer's Capability'* (106,108). If this is the case, as more researchers adopt the CFIR 2.0 framework, these barriers may become more commonly represented in implementation findings. It is also possible, as Balis et al. suggest, that some implementation strategies may not work well in certain settings, even with tailored definitions and examples (161). Different strategies may be needed for the implementation of different evidence-based practices, innovations or services. The '*build a coalition'* strategy could depend heavily on context and require input from multiple levels of healthcare professionals. Since coalition-building involves recruiting and maintaining relationships with implementation partners, its application may be more complex than the tool suggests. A further possibility is that because implementation efforts often involve multifaceted implementation strategies, it may be that *'build a coalition'* might have been used as part of a larger plan but not reported by the implementation researchers.

Of the strategies reported, 99 (17.8%) were only partially effective, while 58 (10.5%) were ineffective, though ineffective strategies may be underreported as there a general tendency to report positive outcomes. Although the strategies identified in the review led to a 71.7% overall improvement in overcoming implementation barriers, some of the most mentioned strategies, such as developing and

implementing tools for quality monitoring and conducting educational meetings, did not achieve a high effectiveness rate when addressing those barriers. This could suggest that while these strategies are frequently beneficial, their effectiveness can be somewhat inconsistent likely due to the varying contexts within healthcare settings. It is challenging to determine if they performed better in specific settings, as the papers were spread across diverse and different types of healthcare environments. Interestingly, the CFIR-ERIC selection tool suggests these common strategies as effective in all settings, particularly for addressing issues such as evaluating implementation and improving access to knowledge and information. However, they were not applied in the studies to tackle the specific barriers identified by the tool, which may have impacted their overall effectiveness. An effective strategy identified in the review was facilitation. However, facilitation is a broad strategy that includes several types of support from change agents, so details on specific strategies or actions withing facilitation may have been lost in reporting (127,131,200). Selective reporting or publication bias may have also led to only the effective applications being documented, masking instances where strategies were less effective.

Objective 2: Identifying implementation determinants

The research had a high participation rate, with all but five provinces in Spain, highlighting, amongst other factors the interest of the professional bodies and individual pharmacy owners and pharmacist employees in a minor ailment service. It was interesting to note that seven pharmacy boards invested resources through the employment of ECA whilst others did not and, therefore, the need arose for the sponsor of the study, SEFAC, to seek volunteers. Although in some provinces due to the number of participant pharmacies both type of change agents were utilised.

Communication methods used by the change agents for identifying implementation determinants varied and included face-to-face visits, phone calls, emails, WhatsApp® messages, video calls and informal chats. Due to the COVID-19 pandemic, ECAs shifted from planned on-site visits to remote support using communication methods such as video calls and emails. CCAs similarly adapted this practice. Email was overall the most frequently used method (45.1%). ECAs (employed professionals hired by pharmacy boards) tended to use formal communication (e.g. email and phone calls), whereas CCAs, who concurrently undertook full time community pharmacy work, favoured instant messaging platforms like WhatsApp®. These differences likely influenced the quality and depth of interactions with pharmacists as well as the depth of their implementation support and interventions. Since ECAs were predicted to carry out more in-person visits than CCAs, their contact time was also expected to be longer. However, the total contact time for ECAs and CCAs was almost identical. The COVID-19 pandemic may have contributed to this, limiting the frequency of face-to-face visits.

Among the study's 40 change agents, 25 identified determinants that influenced the implementation of the minor ailment service. A total of 4,239 determinants were identified, with more than 75% reported by ECAs. This was expected, as ECAs were specifically contracted to provide support, whereas CCAs participated voluntarily. It is possible that CCAs identified similar numbers of determinants but did not report them as consistently due to differences in role expectations. This may have also been influenced by the difference in training and commitment between the two groups of change agents. ECAs received extensive training on implementation processes, while CCAs, balancing volunteer roles with regular pharmacy duties, received less training. There was considerable variability within each group (ECAs compared to ECAs, and CCAs compared to CCAs) in the number of recorded determinants. For example, the highest-recording ECA documented over 1,000 determinants, while the lowest ECA recorded just six. Change agents employed full-time to support the service's implementation (ECAs) as expected, recorded more determinants than their part-time counterparts. For instance, three full-time ECAs from two provinces accounted for over

60% of the total determinants identified in the study (n=2655, 62.6%). Personality traits may have also contributed to effective facilitation. Traits such as empathy, curiosity, commitment, and critical thinking, along with skills in relationship-building, process improvement, knowledge transfer, and evaluation, are reported to support the implementation of evidence-based practices (222,223). These individual characteristics, along with the change agents' work commitments, could explain differences within and between the two groups of change agents. To improve consistency and effectiveness in future studies, employing full-time change agents and providing standardised training is recommended.

Most identified determinants were facilitators (47.9%) rather than barriers (32.8%). These determinants were classified using the CFIR 2009 framework, with the largest proportion of these determinants falling under the *'characteristics of individuals*' domain (35.7%), followed by *'process of implementation*' (30.5%). When the CFIR 2009 framework was updated to CFIR 2.0, its developers found that only 16% of non-researchers found the CFIR framework easy to use, with implementation science researchers having fewer difficulties (101). In this research, no issues were encountered with the CFIR 2009 taxonomy when being used by both the research group and the change agents. The development of a change agent guide specifically for this research was seen to contribute to an understanding within the change agents. By providing specific examples of determinants for the change agents, it made the framework more accessible to these non-researchers. This approach (providing specific examples of determinants to increase its accessibility) is recommended for future implementation studies to address this usability challenge.

Some determinant categories were identified only as barriers, such as the pharmacists' patient communication skills and aspects of the work environment, including the learning climate and compatibility with existing workflows. Others were identified only as facilitators, for example, engaging opinion leaders, change agents, and external organisations as part of the implementation

process. Interestingly, these determinants identified as barriers were largely outside the research team's control, whereas the facilitators were factors that the team could manage. This suggests that the implementation success depends not only on the change agents but also how effectively the research team engages indirectly with these determinants.

The determinant '*engaging (innovation recipients)*' was frequently cited as a barrier, although it ranked seventh among facilitators behind determinants such as '*knowledge and beliefs (enthusiasm)*' and '*knowledge and beliefs (rationale for adopting the service)'*. At first glance, patient engagement in the service appears to depend on factors outside pharmacists' control, namely, patients' readiness, perceived value of the innovation, past experiences, cultural attitudes towards healthcare innovations, and even trust or privacy concerns. Characteristics inherent to the innovation itself, such as cumbersome sign-up processes or a lack of co-design with the target audience may also be considered to hinder patient engagement. However, an analysis of this barrier revealed that it was almost always linked or caused by issues within the *'characteristics of individuals'* domain. For example, a lack of confidence or essential skills, such as communication and IT ability, often led pharmacists to hesitate in signing up patients. This domain (*'characteristics of individuals'*) was also the most frequently identified determinant in implementing the innovation, aligning with findings from the literature review in Objective 1. This suggests that addressing individual-level factors early in implementation and during training could help overcome these determinants, potentially improving early uptake of the innovation. Furthermore, identifying the root causes of determinants is essential, as isolated issues could be more difficult to address without a full understanding of their origins. This may eliminate the need to address both the determinant and its cause separately. Training including skills to overcome barriers can be seen to be essential. For example, if knowledgeable and enthusiastic pharmacists struggle to engage innovation recipients due to a lack of communication skills for building strong relationships with their patients, then adopting a strategy that increases engagement by patients may not be enough to overcome communication barriers

associated with pharmacist. Future research should explore whether addressing single causes is the most effective approach to overcoming determinants. Such insights could lead to more efficient implementation strategies in future research.

Objective 3: Identifying and assessing the effectiveness of implementation strategies

Implementation strategies for addressing identified determinants were developed and categorised using the adapted Dogherty et al. taxonomy (141). This decision to use Dogherty et al rather than the ERIC taxonomy was made on the basis that ERIC does not include any strategies linked to behavioural change (i.e. motivating, empowering, etc.), limiting itself to broader strategies such as *'facilitation'* and '*conducting educational meetings'*. The ERIC taxonomy was considered within this research as too broad for use in community pharmacy. Many of implementation strategies included in this taxonomy involved actions beyond the change agent's control, such as securing funding, introducing payments, or changing laws. Others were irrelevant to smaller organisations, such as involving executive boards or relocating service sites.

For the 543 barriers and facilitators recorded on the 'updated' eCRD platform, 1,389 implementation strategies were documented. The predominant strategy group was '*leading and managing change'*, accounting for 485 instances (34.9%) indicating that here was a strong focus on actively guiding and supporting the implementation process, rather than just planning for change, creating awareness, or evaluating progress. This suggests that the pharmacies and pharmacists through volunteering in participating in the study and, importantly, delivering the innovation, were already on board with the innovation, so gaining buy-in was not the change agents' main challenge when facilitating its implementation. Instead, the priority lay in providing practical, hands-on support. The most frequently used implementation strategies, '*providing skills training'* (10.4%), '*providing resources/tools*

for change' (9.4%), and '*walkthrough'* (7.5%), were all focussed on individual-level support suggesting an emphasis on practical guidance for those delivering the service, rather than broader organisational strategies like networking and external incentives. While ERIC strategies typically focus on higher-level, system-wide changes, the approach aligned more with Dogherty's taxonomy. This taxonomy appears to have been a good fit for small enterprises like the community pharmacy context. Community pharmacies often operate as independent businesses or small teams, meaning top-down organisational change strategies (like external incentives or policy shifts) may not have been as practical or immediately relevant.

Some implementation researchers use 'blended strategies' to introduce new innovations. These involve multiple discrete strategies that target different levels and barriers to change, which are then presented as a structured or branded implementation approach (224). In this study, blended strategies were not used because facilitation was carried out by change agents, not the research team. Within this study, change agents could use either individual (discrete) implementation strategies or combine two or more discrete strategies into strategy groups directed towards a specific determinant (multifaceted strategy). Change agents combined 1,135 discrete strategies into 368 multifaceted strategies. Multifaceted strategies were found to have a higher likelihood of outcomes than individual strategies for overcoming their determinant (72.3% compared to 59.4%). A 2014 literature review found no evidence that combining strategies is more effective than using individual strategies (225). However, this lack of evidence may be due to the target group of the review (patients rather than healthcare providers). A later review of systematic reviews, examining healthcare providers, also found no evidence that multi-faceted implementation strategies were more effective than single strategies (226). However, several researchers challenged this conclusion, arguing that changes in practice or policy are rarely straightforward or purely rational, and questioned the usefulness of viewing implementation strategies as either single or multi-faceted (227–230). Despite this debate, in this research, individual strategies were more effective (86.8%) than multifaceted

strategies (68.0%). This could be attributed to differences in the complexity of the barriers addressed. Individual strategies might have been applied to more straightforward problems, making them more effective. In contrast, combined strategies may have been used for more complex challenges, reducing their success rate. Another possibility is that change agents using a single strategy had a clearer understanding of the determinant, allowing them to address it more directly. Additionally, coordinating multiple strategies at once could have stretched the change agent's resources, limiting their impact, or caused confusion when evaluating their effectiveness. There may also be a recording bias, where ineffective strategies were left undocumented. These findings highlight the need to assess strategies and barriers carefully, depending on the implementation setting, before deciding between a multifaceted or individual approach. Change agents should consider and be trained in the complexity of the barriers and how well they understand it before deciding on a strategy.

Objective 4: Choosing effective targeted implementation strategies

This study has addressed how change agents select, design and use implementation strategies to overcome determinants, a process often seen and reported as a 'black box' due to limited detailed reporting (221,231–233). The INDICA+PRO Implementation change agents recorded 4,343 individual links between determinants, causes and strategies using the updated eCRD platform. Of these, 1,681 strategies effectively addressed barriers and reinforced facilitators, while 835 were ineffective. An additional 1,827 entries were either still pending or lacked data for the researchers to assess an outcome.

The data showed that the most frequent links involved the barrier '*intervention characteristics'*, the cause '*characteristics of individuals involved'* and the strategy labelled '*other'*, as well as the facilitator '*characteristics of the individuals involved'*, the cause '*process of implementation'* and '*monitoring progress and ongoing implementation'*. Over 70% of the determinant causes identified related to

individual characteristics of the pharmacists implementing the minor ailment service. This finding implies that the training for change agents should focus on recognising pharmacists' personal traits, allowing them to recognise and target these characteristics earlier in the implementation process and select targeted strategies more appropriately.

Although many studies describe broad implementation strategies, such as general facilitation, support, and collaboration with opinion leaders or champions as important for implementation, the impact of these in real world studies must be balanced with working directly with delivers of service. These broad strategies may be effective for setting the holistic environment (150,234,235). The literature and this study's findings highlight the central role of change agents and training in implementation rather than broad implementation strategies (200,235,236). For instance, one of the most effective training strategies used by the change agents was guiding service providers through a minor ailment service consultation, offering a '*walkthrough'* of the process. This hands-on approach allowed the pharmacists to engage directly with the service, ask questions in real time, and gain confidence in delivering the consultation. Future training for change agents should focus on 'train-the-trainer' sessions, ensuring they are well-prepared to offer continued support to the pharmacists they mentor. This strategy is suggested by the ERIC taxonomy and could include developing interactive case studies, role-playing exercises, live demonstrations, and adapting to various learning styles (140). Additionally, providing IT support during implementation is essential, particularly when introducing new technologies and processes. Beyond basic IT troubleshooting, change agents should be trained to explain complex systems simply and recognise when additional IT resources or external help is necessary. There is also potential to use profile matching techniques to select internal champions or leaders by assigning people with the right traits to key roles, which could help reduce barriers related to the implementation process (106,108). Assessing qualities such as leadership, empathy, and communication skills would also enable the research team to deliver tailored training for change agents in order to strengthen these abilities.

An innovative aspect of this study was the use of Sankey diagrams to illustrate the relationships between determinants and the strategies chosen, providing for immediate feedback to the change agents. The diagrams provide a visual summary of complex processes without requiring advanced data analysis skills, assisting change agents, who often work in qualitative environments, to implement strategies more efficiently (237–239). The diagrams can also be designed to be interactive, which would enable real time graphics. Users would be able to adjust the diagram's level of analysis, ranging from broad domains and categories to more specific subcategories, individual determinants, and strategies, by zooming in or clicking on different elements of the Sankey diagram. Therefore, it is recommended that future research reconfigure the tool developed in this research into an interactive format, which would allow users better understand the links between individual determinants and strategies

The Sankey diagram tool also proved valuable for the research team to track change agent's strategies and activities. Rather than relying on a static set of diagrams, future studies could focus on developing dynamic, locally adapted visual tools that evolve in real time as the implementation process unfolds. These diagrams should not be predefined but instead grow organically from the when change agents begin recording their determinant identification and implementation strategy. The diagrams could be continuously shared with other change agents, providing a living implementation knowledge base. This would enable change agents working in the same implementation project to quickly reference what others have designed when addressing barriers, and quickly visualise what has worked, and what has not, potentially accelerating the effectiveness of implementation efforts.

Study limitations

Systematic Review

A major limitation of the review was the inconsistent terminology used to describe barriers and implementation strategies across studies. The lack of a standard language made it difficult to refine search criteria and led to the inclusion of many papers that fell outside the review's scope. Standardised taxonomies would simplify future reviews and improve study comparability. The broad categories in the CFIR 2.0 framework and ERIC taxonomy also posed problems when coding barriers and strategies. Some categories of strategies, particularly those related to behaviour change in small healthcare settings such as community pharmacies, were too general. Consequently, strategies were often coded under broad terms like 'facilitation', which reduced specificity. Expanding taxonomy categories to capture the differences between strategies more accurately would improve classification. Another issue was the limited quantitative data on the effectiveness of implementation strategies. Most studies relied on qualitative subjective assessments rather than objective measurements, introducing potential bias. Future research should include more rigorous quantitative evaluations to ensure that outcomes are supported by reliable evidence. The review may also have been affected by positive publication bias, with many studies reporting only effective or partially effective strategies. This may have led to an overestimation of effectiveness. In addition, many of the successful relationships were identified only once in the included studies, which further limits the reliability of the conclusions. More transparent reporting of all outcomes, including strategies that are less effective, is needed for a balanced view of implementation strategies and their impact.

INDICA+PRO study

High turnover among change agents presented a significant challenge. Many CCAs were volunteers balancing their facilitator roles with other work, and frequent personnel changes disrupted ECA employment in some regions. More stable staffing or structured commitments for change agents could improve consistency in future studies. Another limitation of this study was data loss caused by the original eCRD platform, which lacked the ability to classify determinants and implementation strategies during data entry. The platform functionality varied depending on the change agent accessing it and this led to significant data loss for the research team, limiting the information available for integration into the Sankey diagrams. Determinants were recorded for only 94 pharmacies on the updated eCRD platform, despite the study covering 45 Spanish provinces. Additionally, the launch of a new updated platform into the SEFAC eXPERT® system was significantly delayed, which prevented widespread use by change agents earlier in the study. In future studies, incorporating implementation taxonomies to recording platforms from the outset would enable real-time generation of Sankey diagrams to track progress more effectively.

The study encountered problems with existing implementation taxonomies. Neither the CFIR 2009 framework nor the Dogherty taxonomy were designed for community pharmacy services, so an extra domain (‘*other*’) had to be added to cover missing determinants and implementation strategies. Many strategies used by change agents did not fit within Dogherty’s taxonomy, highlighting the need for expanding strategy categorisation, clearer definitions and coding guidelines. The team had to create their own descriptions, which require further validation. Future work should refine and expand these taxonomies for use in various healthcare settings. A limitation of using the updated CFIR 2.0 framework was that it was published after the updated eCRD platform had been approved. As a result, the most up-to-date taxonomy could not be applied. Data quality depended on the skills of individual change agents, which led to inconsistencies and potential bias. Although the research team provided

training and feedback, variability in coding remained. Ongoing training and standardised guidelines may help reduce these issues.

CONCLUSIONS

This study, which includes a systematic review and was undertaken within a type 3 hybrid design effectiveness-implementation trial of a minor ailment service, has:

1. Designed, targeted, and evaluated implementation strategies in healthcare, especially in community pharmacy, where implementation research is limited. requires a structured, evidence-based approach (2,97,162,163).

2. Mapped barriers and implementation strategies in the literature across healthcare settings, identifying inconsistency in their reporting as a major issue. Differences in the way strategies are described and their effectiveness measured, make cross-study comparisons difficult. The use of standardised frameworks like the CFIR (106) and ERIC (140) would improve reporting quality allowing comparison between international studies in diverse settings.

3. The study identified 4,239 real-world implementation determinants in community pharmacy, with the most common barriers relating to the characteristics of the pharmacists implementing the service, and the process of implementation itself. Many barriers that seemed external, such as patient engagement in the minor ailment service, were linked to pharmacist-level factors like confidence and communication skills. Understanding these causal relationships is critical for designing targeted implementation strategies.

4. The study recorded 1,389 real-world implementation strategies, with '*leading and managing change*' being the most common. Practical hands-on strategies, such as skills training and walkthroughs, were particularly effective for pharmacists delivering the service. These findings highlight change agent training recommendations, such as 'train-the-trainer', and assessing their skills and personalities to maximise change agents' impact.

5. The study evaluated the effectiveness of implementation strategies when addressing targeted barriers identified during the implementation of a minor ailment service. Findings showed that 71.7% of barriers were successfully addressed, with individual strategies (86.8%) outperforming multifaceted approaches (68.0%). The study has highlighted the need for change agents to clearly identify and classify barriers and their causes before selecting implementation strategies.

6. The innovative concept of Sankey diagrams to visually track how implementation strategies address targeted barriers was introduced, simplifying understanding for change agents, who may not have research training, to easily analyse large amounts of implementation data. These diagrams can help change agents select strategies targeted to real-world barriers. Future developments could make the tool interactive and integrate real-time local data, making them even more valuable when applied to implementation research across different healthcare settings.

7. While both ECAs and CCAs supported the implementation of the service, the data suggests that the ECA's formal employment, structured training, and dedicated time meant that they could identify more determinants and offer pharmacists more consistent support. CCAs brought useful experience and knowledge of daily pharmacy work, however, their voluntary involvement and full-time pharmacy duties appeared to limit their capacity to engage fully

with the implementation process. Employing full-time, trained change agents with protected time is likely to lead to more consistent engagement and better implementation outcomes.

8. Frameworks like the CFIR and Dogherty helped organise the classification of determinants and strategies, but both were developed with larger healthcare settings in mind. Their categories often lacked detail or were not applicable small, independent settings like community pharmacies. This suggests existing frameworks need to be adjusted or extended to reflect the reality of small teams, with clearer definitions and examples relevant to practice.

By addressing the challenge of poorly understood implementation barriers and ineffective strategies, this research lays the foundations for improving implementation in community pharmacies, as well as in other healthcare settings. Additionally, it offers an innovative tool that can be adapted to future implementation researchers' individual implementation contexts and settings. These findings contribute to more targeted, effective, evidence-based design of implementation strategies by change agents, potentially reducing inefficiencies in implementation research.

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APPENDICES

Appendix 1: Systematic review queries

PubMed

("Implement*" [tiab] OR "Knowledge translation"[tiab] OR "EBP"[tiab] OR "Evidence based practice"[tiab] OR Organizational Innovation[mh] OR Diffusion of Innovation[mh] OR "Quality Improvement"[mh] OR "Guideline Adherence"[Mh]) AND ("Barrier*"[tiab] OR "Determinant*"[tiab] OR "Facilitator*"[tiab] OR "Mediator*"[tiab] OR "Enabler*"[tiab] OR "Moderator*"[tiab] OR "Implementation factor*"[tiab] OR "Obstacle*"[tiab] OR "Construct*"[tiab] OR "Theoretical domains framework"[tiab] OR "Consolidated framework"[tiab] OR "CFIR"[tiab] OR "COM-B"[tiab]) AND ("Implementation strateg*"[tiab] OR "Implementation intervention*"[tiab] OR "Facilitation"[tiab] OR "Change agent*"[tiab] OR "Coach*"[tiab] OR "Knowledge broker*"[tiab] OR "Behaviour change technique*"[tiab] OR "BCT"[tiab] OR "BCTs"[tiab] OR "Behaviour Change Wheel"[tiab] OR "Behaviour change intervention*"[tiab] OR "ERIC"[tiab] OR "Targeted strateg*"[tiab] OR "Targeted intervention*"[tiab] OR "Tailored intervention*"[tiab] OR "Tailored strateg*"[tiab] OR "Tailoring intervention*"[tiab] OR "Tailoring strateg*"[tiab] OR "Tailored implement*"[tiab] OR "Intervention map*"[tiab] OR "Facilitating implement*"[tiab] OR "Facilitated implement*"[tiab] OR "QUERI"[tiab] OR "Overcome barrier*"[tiab] OR "Overcoming barrier*"[tiab] OR "Effective strateg*"[tiab]) AND ("Health care"[tiab] OR "Healthcare"[tiab] OR "Health service*"[tiab] OR "Primary care"[tiab] OR "Health system"[tiab] OR Health Personnel[mh] OR Health Plan Implementation[mh] OR "Clinical Protocols"[Mh] OR "Practice Guidelines as Topic"[mh] OR "Evidence-Based Practice"[mh])

Scopus

(TITLE-ABS-KEY ("Implement*") OR TITLE-ABS-KEY ("Knowledge translation") OR TITLE-ABS-KEY ("EBP") OR TITLE-ABS-KEY ("Evidence based practice") OR TITLE-ABS-KEY ("Organizational Innovation") OR TITLE-ABS-KEY ("Diffusion of Innovation") OR TITLE-ABS-KEY ("Quality Improvement") OR TITLE-ABS-KEY ("Guideline Adherence")) AND (TITLE-ABS-KEY ("Barrier*") OR TITLE-ABS-KEY ("Determinant*") OR TITLE-ABS-KEY ("Facilitator*") OR TITLE-ABS-KEY ("Mediator*") OR TITLE-ABS-KEY ("Enabler*") OR TITLE-ABS-KEY ("Moderator*") OR TITLE-ABS-KEY ("Implementation factor*") OR TITLE-ABS-KEY ("Obstacle*") OR TITLE-ABS-KEY ("Construct*") OR TITLE-ABS-KEY (" Theoretical domains framework ") OR TITLE-ABS-KEY (" Consolidated framework ") OR TITLE-ABS-KEY (" CFIR ") OR TITLE-ABS-KEY (" COM-B ")) AND (TITLE-ABS-KEY ("Implementation strategy") OR TITLE-ABS-KEY ("Implementation strategies") OR TITLE-ABS-KEY ("Implementation intervention*") OR TITLE-ABS-KEY ("Facilitation") OR TITLE-ABS-KEY ("Change agent*") OR TITLE-ABS-KEY ("Coach*") OR TITLE-ABS-KEY ("Knowledge broker*") OR TITLE-ABS-KEY ("Behaviour change technique*") OR TITLE-ABS-KEY ("BCT") OR TITLE-ABS-KEY ("BCTs") OR TITLE-ABS-KEY ("Behaviour Change Wheel") OR TITLE-ABS-KEY ("Behaviour change intervention*") OR TITLE-ABS-KEY ("ERIC") OR TITLE-ABS-KEY ("Targeted strateg*") OR TITLE-ABS-KEY ("Targeted intervention*") OR TITLE-ABS-KEY ("Tailored intervention*") OR TITLE-ABS-KEY ("Tailored strateg*") OR TITLE-ABS-KEY ("Tailoring intervention*") OR TITLE-ABS-KEY ("Tailoring strateg*") OR TITLE-ABS-KEY ("Tailored implement*") OR TITLE-ABS-KEY ("Intervention map*") OR TITLE-ABS-KEY ("Facilitating implement*") OR TITLE-ABS-KEY ("Facilitated implement*") OR TITLE-ABS-KEY ("QUERI") OR TITLE-ABS-KEY ("Overcome barrier*") OR TITLE-ABS-KEY ("Overcoming barrier*") OR TITLE-ABS-KEY ("Effective strateg*")) AND (TITLE-ABS-KEY ("Health care") OR TITLE-ABS-KEY ("Healthcare") OR TITLE-ABS-KEY ("Health service*") OR TITLE-ABS-KEY ("Primary care") OR TITLE-ABS-KEY ("Health system") OR TITLE-ABS-KEY ("Health Personnel")

OR TITLE-ABS-KEY ("Health Plan Implementation") OR TITLE-ABS-KEY ("Clinical Protocols") OR TITLE-ABS-KEY ("Practice Guidelines") OR TITLE-ABS-KEY ("Evidence-Based Practice")) AND NOT INDEX (medline)

Web of Science

(TS=("Implement*") OR TS=("Knowledge translation") OR TS=("EBP") OR TS=("Evidence based practice") OR TS=("Organizational Innovation") OR TS=("Diffusion of Innovation") OR TS=("Quality Improvement") OR TS=("Guideline Adherence")) AND (TS=("Barrier*") OR TS=("Determinant*") OR TS=("Facilitator*") OR TS=("Mediator*") OR TS=("Enabler*") OR TS=("Moderator*") OR TS=("Implementation factor*") OR TS=("Obstacle*") OR TS=("Construct*") OR TS=("Theoretical domains framework") OR TS=("Consolidated framework") OR TS=("CFIR") OR TS=("COM-B")) AND (TS=("Implementation strategy") OR TS=("Implementation strategies") OR TS=("Implementation intervention*") OR TS=("Facilitation") OR TS=("Change agent*") OR TS=("Coach*") OR TS=("Knowledge broker*") OR TS=("Behaviour change technique*") OR TS=("BCT") OR TS=("BCTs") OR TS=("Behaviour Change Wheel") OR TS=("Behaviour change intervention*") OR TS=("ERIC") OR TS=("Targeted strateg*") OR TS=("Targeted intervention*") OR TS=("Tailored intervention*") OR TS=("Tailored strateg*") OR TS=("Tailoring intervention*") OR TS=("Tailoring strateg*") OR TS=("Tailored implement*") OR TS=("Intervention map*") OR TS=("Facilitating implement*") OR TS=("Facilitated implement*") OR TS=("QUERI") OR TS=("Overcome barrier*") OR TS=("Overcoming barrier*") OR TS=("Effective strateg*")) AND (TS=("Health care") OR TS=("Healthcare") OR TS=("Health service*") OR TS=("Primary care") OR TS=("Health system") OR TS=("Health Personnel") OR TS=("Health Plan Implementation") OR TS=("Clinical Protocols") OR TS=("Practice Guidelines") OR TS=("Evidence-Based Practice"))

PSYCINFO

(su("Implement") OR su("Implementation") OR su("Knowledge translation") OR su("EBP") OR su("Evidence based practice") OR su("Organization innovation") OR su("Diffusion of Innovation") OR su("Quality Improvement") OR su("Guideline Adherence")) AND (su("Barrier") OR su("Barriers") OR su("Determinant") OR su("Determinants") OR su("Facilitator") OR su("Facilitators") OR su("Mediator") OR su("Mediators") OR su("Enabler") OR su("Enablers") OR su("Moderator") OR su("Moderators") OR su("Implementation factor") OR su("Implementation factors") OR su("Obstacle") OR su("Obstacles") OR su("Construct") OR su("Constructs") OR su("Theoretical domains framework") OR su("Consolidated framework") OR su("CFIR") OR su("COM-B")) AND (su("Implementation strategy) OR su("Implementation strategies") OR su("Implementation intervention") OR su("Implementation interventions") OR su("Facilitation") OR su("Change agent") OR su("Change agents") OR su("Coach") OR su("Coaches") OR su("Coaching") OR su("Knowledge broker") OR su("Knowledge brokers") OR su("Behaviour change technique") OR su("Behaviour change techniques") OR su("BCT") OR su("BCTs") OR su("Behaviour Change Wheel") OR su("Behaviour change intervention") OR su("Behaviour change interventions") OR su("ERIC") OR su("Targeted strategy") OR su("Targeted strategies") OR su("Targeted intervention") OR su("Targeted interventions") OR su("Tailored intervention") OR su("Tailored interventions") OR su("Tailored strategy") OR su("Tailored strategies") OR su("Tailoring intervention") OR su("Tailoring interventions") OR su("Tailoring strategy") OR su("Tailoring strategies") OR su("Tailored implementation") OR su("Intervention map") OR su("Intervention mapping") OR su("Facilitating implementation") OR su("Facilitated implementation") OR su("QUERI") OR su("Overcome barrier") OR su("Overcome barriers") OR su("Overcoming barrier") OR su("Overcoming barriers") OR su("Effective strategy") OR su("Effective strategies")) AND (su("Health care") OR su("Healthcare") OR su("Health service") OR su("Health services") OR su("Primary care) OR su("Health system") OR su("Health personnel") OR su("Health plan

implementation") OR su("Clinical Protocols") OR su("Practice Guidelines") OR su("Evidence-Based Practice"))

Appendix 2: Samples of qualitative assessment

Effective

'Co-location also promoted real-time staff communication; encouraged collaboration between psychologists and primary care; and allowed specialists to attend huddles and team meetings ensuring comprehensive care' (Agha, 2018).

'By the time of site visits to clinics conducted during the second step of the trial, the manager had clarified proper suicide risk protocols with all clinics' (Woodward, 2021).

'Helped to motivate project participants to overcome their challenges with data entry. Hospitals viewed sharing data as essential to maintain buy-in for the safety bundle implementation' (Walker, 2021).

'MMAP facilitators found this strategy facilitated a more collaborative approach between leadership and clinical staff, which resulted in earlier and more effective communication, implementation planning and, ultimately, execution' (Pastva, 2020).

Ineffective

'Not cost-effective, efficient option for most sites' (Agha, 2018).

'Barrier adequately addressed? No. We did not have the means to actively support the practices discussing and changing their routines' (Flottorp, 2003).

'Practice of having rough record-keeping persisted' (Mukhopadhyay, 2021).

'3 of the 4 sites still experienced a learning curve during the pilot implementation period. Sufficient Training Did Not Eliminate a Learning Curve' (Zulkiewicz, 2021).

Partial

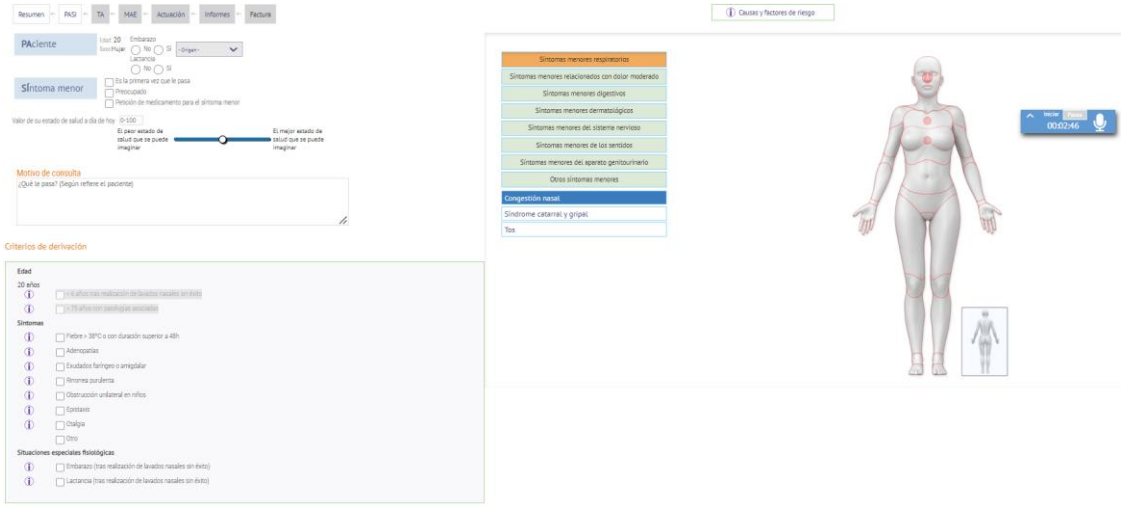
'These strategies led to improved organizational capacity and health worker motivation which improved polio program execution; however, the sustainability of those gains was dependent on the degree of integration of polio structures within the broader health system and in some cases drew health workers away from routine service delivery' (Alonge, 2020).

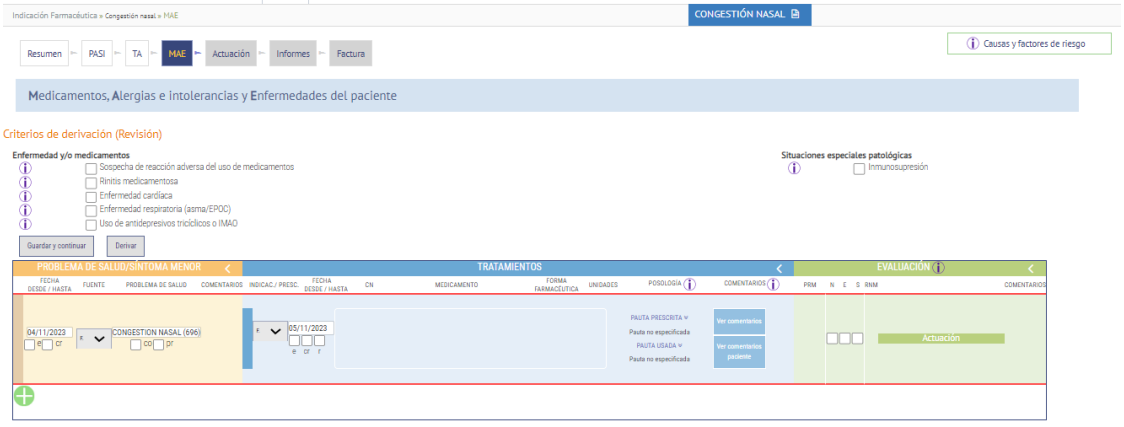
'This feedback reassured some staff that the priority of clinical care would not be compromised, but others were not convinced and declined to participate' (DeVon, 2013).

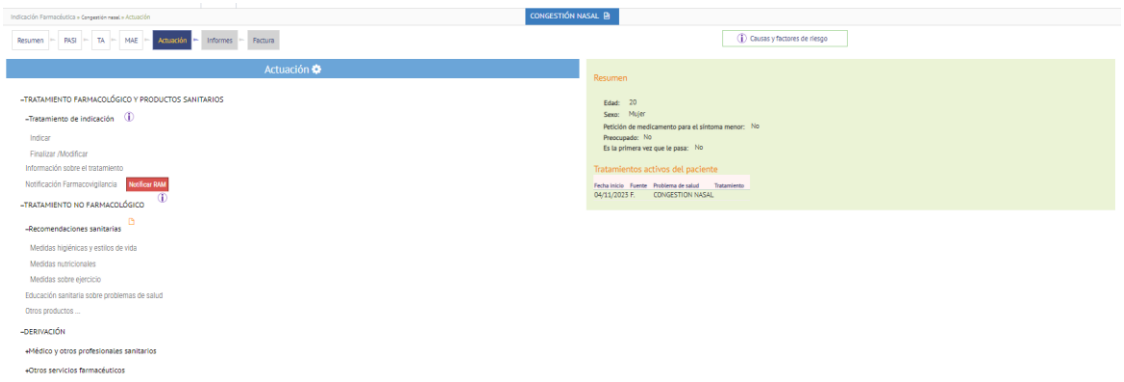
'The advice was supportive, albeit not always in patients with a complex personality' (Sinnema, 2013).

'Supportive. One GP though, was convinced that patients give socially desirable answers on rating scales and, therefore, he did not trust the 4DSQ and only relied on his own clinical assessment' (Sinnema, 2013).

Appendix 3: Minor ailment service recording in SEFAC eXPERT®







Appendix 4: Variables included in the minor ailment service record (adapted from Graham et al

Variable	Type
Patient and minor ailment data	
Age	Quantitative (discrete)
Sex (male, female, intersexual)	Qualitative (nominal)
Minor ailment (see Table 1)	Qualitative (nominal)
Description of ailment	Qualitative
Type of consultation (minor ailment consultation or medication request) [11]	Qualitative (binary)
First time for the ailment (Yes/No)	Qualitative (binary)
Worried about the ailment (Yes/No)	Qualitative (binary)
Patient's state of health on the day of the consultation (Likert scale from 0 to 100)	Quantitative (discrete)
Patient related referral criteria (age/pregnancy/breastfeeding)	Qualitative (nominal)

[11] Patients could seek advice about a minor ailment or request medication for treating a condition

Ailment related referral criteria (red flags) [12]	Qualitative (nominal)
Duration of ailment	
Date of onset of minor symptom (last episode)	Quantitative continuous
Duration related referral criteria	Qualitative (nominal)
Actions already taken by the patient	
Selection of medicines, medical devices, dietetic and cosmetic products (BotPlus catalogue)	Qualitative (nominal)
Description of lifestyle measures, diet and other products	Qualitative
Medications, allergies and intolerances and conditions	
Selection of conditions (BotPlus catalogue)	Qualitative (nominal)
Selection of allergies (BotPlus catalogue)	Qualitative (nominal)
Selection of medicines (BotPlus catalogue)	Qualitative (nominal)
Condition and medicine related referral criteria	Qualitative (nominal)
Pathology related referral criteria (e.g. immunodepression)	Qualitative (nominal)

[12] A red flag is a clinical sign that can indicate an underlying health condition

Intervention	
Selection of pharmacological treatment(s) (BotPlus catalogue)	Qualitative (nominal)
Description of the pharmacological treatment	Qualitative
Notification of adverse drug reaction (Yes/No)	Qualitative (binary)
Modification of the requested medication (Yes/No)	Qualitative (binary)
Termination of a patient's medication (Yes/No)	Qualitative (binary)
Description of non-pharmacological treatment(s)	Qualitative
Referral to GP and/or other health professionals (Yes/No)	Qualitative (binary)
Treatment proposals (add, modify or terminate)	Qualitative (nominal)
Communication of a drug related problem, negative medication outcomes or other	Qualitative (nominal)
Referral to another community pharmacy service (Yes/No)	Qualitative (binary)

Appendix 5: TIDieR checklist for the intervention between the research group and the change agents

No.	Item	Description
1	**Brief name**	Intervention between the research group and the change agents when implementing a minor ailment service in Spanish community pharmacies
2	**Why**	The process of identifying determinants and designing targeted implementation strategies is typically managed by a specialised individual known as a 'change agent'. This role requires expertise in implementation science and proficiency with the data collection platform used in the implementation study (106). The i-PARIHS determinant framework describes a facilitation pathway for change agents, categorised into three levels: novice, experienced, and expert. While novice change agents can effectively support local implementation projects, their knowledge and skills are expected to evolve over time (134,136). A practical way to increase their effectiveness is by providing them with tools designed to support organisational change facilitation. Examples of such tools include handbooks (137,138), determinant assessment tools (102), time tracking log sheets (139), implementation strategy taxonomies (140–143), and resources for selecting strategies (144).
3	**What materials**	Resources such as the FISpH theoretical framework (96), the Global Implementation Society's Competencies for Implementation

		Facilitators guide (138), the CFIR website (172) and several implementation science publications (97,140,141,148) were used. PowerPoint presentations were used to guide the change agent training.
4	**What procedures**	The change agents received training at the start of the study. This training covered key concepts and best practices for the minor ailment service in community pharmacies, along with strategies for effective interprofessional and patient communication. It also included information on the impact of the INDICA+PRO implementation study, clinical guidelines, GP referral criteria, and how to record minor ailment consultations using the SEFAC eXPERT® platform. The training featured case studies and the study implementation protocol. Change agents also received specialised training, focussing on their specific responsibilities and roles. This included identifying determinants, designing implementation strategies, and using the electronic data collection notebook (eCRD) available on the SEFAC eXPERT® platform. The goal was to train change agents to effectively evaluate pharmacist adherence to the study protocol, and record identified determinants and implementation strategies. To support their ongoing development, monthly meetings with the INDICA+PRO Implementation research group were carried out. These meetings were used to analyse project progress and provide further training as needed. In addition to this, a member of the

		research group was continuously on hand to offer guidance, clarification and to address any questions or concerns.
5	**Who provided**	The research group conducting the intervention was composed entirely of pharmacists, with varying levels of research expertise, ranging from MSc to PhD.
6	**How**	The intervention was delivered both individually and in groups, using various methods, including face-to-face meetings, telephone calls, videocalls, and instant messaging.
7	**Where**	The intervention took place in appropriate venues, such as official buildings or facilities rented for the training day, as well as over the phone or online.
8	**When and how much**	The intervention was delivered throughout the entire study period. Initial training included 18 hours for the ECAs and 12 hours for the CCAs, with ongoing training provided at least once a month.
9	**Tailoring**	The intervention was not planned to be personalised, titrated or adapted.
10	**Modifications**	The initial training was adjusted during the study to accommodate changes in the change agents involved. The duration and content were tailored to meet the specific needs of each new change agent joining the study.
11	**How well: planned**	The intervention adherence or fidelity was not assessed.

12	**How well: actual**	The intervention adherence or fidelity was not assessed.

Appendix 6: Change agent guide

CHANGE AGENT DETERMINANT CLASSIFICATION GUIDE

Determinant domain			Determinant	Definition	Example quote for a barrier	Example quote for a facilitator
I	Intervention characteristics	Characteristics of the Minor Ailment Service and the INDICA+PRO Study	**Intervention Source**	Pharmacists' opinion on the fact that the design, coordination, and decision making is carried out by the University of Granada and SEFAC.	'This study has been designed by people who have never worked with the general public'	'This study has been designed by organisations that are very focussed on community pharmacy'
			Evidence Strength & Quality	Pharmacists' perception of the quality and validity of the evidence of the service and expected outcomes.	'There is no evidence for the need for protocols within a minor ailment service'	'I have read very good studies that claim that minor ailment services are vital for the pharmacy profession'
			Relative advantage	Benefits of INDICA+PRO minor ailment service over an alternative service or project.	'We've looked at different minor ailment service protocols, and I don't know if this study's will really benefit my pharmacy'	'We have evaluated some other minor ailment service projects, and INDICA+PRO is the most suitable project for us'
			Adaptability	Extent to which elements of INDICA+PRO can be adapted or reinvented to meet the local needs of the pharmacy.	'This minor ailment service protocol is too inflexible for us to use in our pharmacy'	'I have been able to adapt the INDICA+PRO protocols to the needs of my pharmacy without any problems'

			Trialability	Ability to test INDICA+PRO in the pharmacy and undo its implementation, if necessary. In other words, the potential for a trial period before deciding whether to go ahead with full implementation.	'I find it very difficult to test-run INDICA+PRO. I know it's just a matter of trying out two or three patient consultations and seeing if I want to continue, but it's a lot of paperwork to just sign up'	'As long as my colleagues help me, it should be OK to test-run INDICA+PRO with a few patient consultations… just to see how it goes'
			Complexity	Complexity of: - The use of the online platform (SEFAC eXPERT®) - Professional behaviour change (produces fundamental changes in pharmacy activities and a clear departure from existing practices) - Study duration - Patient consultation process OR - Number of steps required for implementation	'I don't understand how to use the platform, it's very complicated, I get confused every time I access it' 'I don't like having to change what I've always done in the pharmacy' 'INDICA+PRO is quite a long study, I don't want to have to document patient consultations every day for such a long time' 'I find it tedious having to fill in so much patient data on the platform for each consultation' 'My change agent is always calling me to	'I enjoy using the platform, I find it very intuitive and easy to use'. 'Continual professional growth is very important to me' 'The length of the study will give me the opportunity to gain experience in documenting a wide range of minor ailments' 'I like the fact that the platform requests comprehensive data. This means that for future consultations I

					check up on my progress. Participating in this study is more complicated than I originally thought'	already have this data all saved in one place' 'My change agent helps me implement the service step by step. This helps me a lot, it seems much less complex now'
			Design Quality & Packaging	Quality of the design of resources for INDICA+PRO (SEFAC eXPERT®, training, minor ailments guide…)	'I don't think SEFAC eXPERT® is well designed, it always generates errors and is not very intuitive'	'I thought the training was very well designed'
II	**Outer setting**	**Patients, Organisations and Community Pharmacy Outsiders**	**Patient needs & resources**	Pharmacists' knowledge of their patients' needs and whether the service will meet them (patient benefits and beliefs about them) OR Patient-Pharmacist Feedback OR	'I've just opened this pharmacy, I don't know anyone and I don't know if they're going to be happy with the service or not…' 'I don't think patients will like it if I ask them to sign the consent form' 'The patient came in and refused to let me deliver the service. He says I ask too many questions'	'I know my patients need me to help them because they can no longer go to the health centre due to the COVID-19 pandemic' 'I think our patients are going to love this service. They have always liked that we take our time with them' 'The patient came back very happy with the way we assessed them when

				Patient Characteristics/Personal Situations	'My pharmacy is in the city centre and all my patients are in a hurry'	they came in with a minor ailment' 'My patients are very old, they seek the pharmacist's opinion a lot.
			Cosmopolitanism	Relationship with professional societies (SEFAC, FIP, etc.), other pharmacies and other healthcare professionals.	'I find myself very isolated professionally, the fees for these associations are very expensive' 'I have no need to follow other pharmacies on social media' 'The nurse at our health centre is very unfriendly, I avoid calling them'	'We love to participate in [professional society]'s activities and training courses' 'I follow all the pharmacies in the area on Instagram. I like to see what they are doing' 'The doctor at our health centre is very good, we have already sent him referrals without any problem'
			Peer Pressure	Most other pharmacies have implemented the INDICA+PRO service OR	'We wanted to be an innovative pharmacy, but now all pharmacies have INDICA+PRO' 'Now that the pharmacy across the street has	We have seen so many pharmacies implementing the service that we didn't want to be left behind'

				Competitor/reference pharmacies have implemented INDICA+PRO OR Seeking competitive advantage over other community pharmacies OR Desire to implement at the same pace or in the same way as other pharmacies	implemented INDICA+PRO, we have lost our advantage'	'We signed up because we saw on social media that [reference pharmacy] has already implemented the service' 'Another pharmacy has opened in the village and we wanted to have a competitive advantage over it' 'Our change agent has shown us our progress compared to other pharmacies in the area and we have picked up the pace'
			External Policies & Incentives	External governmental or non-governmental policies (public reports, recommendations and official guidelines) OR External incentives (courses from external organisations, attendance to conferences, diplomas	'The government wants us to deliver all these services in the pharmacy, but they should be focussing on other issues' 'I don't like being offered incentives'	'A newspaper wrote an article about the problem of overloading health centres with minor ailments. Our boss read it and encouraged us to increase consultation numbers' 'I am so motivated! If I reach 120 consultations

				from external organisations…)		I will get a researcher certificate and I will be invited to a SEFAC training'
III	**Inner setting**	**Community pharmacies**	**Structural Characteristics**	Age of the pharmacy (as an entity, not as a space) OR Internal division of labour (owners, pharmacists, technicians) in the pharmacy and how they coordinate with one another OR Decision-making in the pharmacy (only the owner, all employees…) OR Number of hierarchical levels in the Pharmacy	'My pharmacy has just opened, we are too busy organising' 'Well, we all do a bit of everything here… that's why we don't have many consultations' 'In my pharmacy only the owner makes decisions, I have no say in anything' 'I am the last to know about anything in this pharmacy, I am quite low down on the chain'	'We have owned this pharmacy for many years, but we need to start innovating' 'My pharmacy is very well coordinated, we all know what our role is' 'The owner is very good, he asks for everyone's opinion before deciding anything about the pharmacy' 'All the staff are on the same level'
			Networks & Communications	Teamwork (good coordination, clear definitions of roles, collaboration, clearly	'Although we all have our roles, we don't coordinate well with each other'	'We all work as a team, for example, we have [Name] in charge of dispensing, and I am in

				communicated mission and objectives, cohesion…) OR Good Working Environment and Interpersonal Relations OR Formal and informal interpersonal communication OR Internal Support	'Honestly, I don't get along with my colleagues' 'I don't know why, but it's as if my colleague doesn't understand me when I explain something to them. There always seems to be a miscommunication'. 'I really want to implement the service, but my staff don't help me'.	charge of minor ailment consultations. We are always referring patients to each other' 'We all get along very well here' 'We are always talking on the WhatsApp™ group, sharing ideas' 'My colleagues understand that I have to spend time on other tasks, so they always come out to help me at the counter when they see that I am delivering a minor ailment service consultation'.
			Culture	Norms, values and basic assumptions of community pharmacy and how pharmacy functions due to this culture (hierarchical control-focussed pharmacy, sales-focussed business pharmacy…)	'This is a sales-focussed pharmacy, the owner does not care about the services'	'From the very beginning, this pharmacy has been a service-focussed pharmacy'

			Implementation Climate (Tension for change)	Extent to which pharmacists perceive the current professional situation as intolerable or in need of change.	'This profession is doing fine as it is, online shopping will never replace us'	'I think something needs to change in pharmacies to take the burden off the health system, look at what the pandemic has done to it!'
			Implementation Climate (Compatibility)	Value placed on service by pharmacists in the pharmacy and how it aligns with their own values. OR Compatibility of the project with existing pharmacy workflows and systems.	'We feel that the service takes away autonomy from our work' 'INDICA+PRO is a nuisance in my pharmacy, it doesn't fit very well with how we work'	'We believe that using the online platform for our consultations will add value to our work' 'We already had some pharmacists working on other services so they were happy to finally get more staff on board'
			Implementation Climate (Relative priority)	Perception of the importance of INDICA+PRO implementation within the pharmacy (whether pharmacist providers feel encouraged, supported and rewarded for their efforts).	This service is a distraction from my real job' 'I can't register many patient consultations because we are already involved in another study and the pharmacy is at its limits'	'It is very important to the owner that we complete these patient consultations'

			Implementation Climate (Organisational Incentives and Rewards)	Incentives, rewards and tangible/non-tangible internal benefits (awards, promotions, salary increases…)	'I earn the same whether I deliver the service or not'	'I notice that all my colleagues trust my judgement more and ask me for more help since I started providing the service'
			Implementation climate (Goals and feedback)	The degree to which routine pharmacy goals (not INDICA+PRO specific) are clearly communicated to the team, are attempted and for which employees receive feedback.	'The boss has never brought us together to communicate any pharmacy issues, let alone goals or strategic direction'	'Typically the team meets every Friday to discuss the pharmacy's strategic progress'
			Implementation climate (Learning Climate)	The degree to which the pharmacy demonstrates attributes of a 'learning environment' in which: (a) pharmacy owners admit that they themselves can make mistakes and need help and support from their team members (b) Team members feel that they are essential, valued and knowledgeable about the minor ailment service. c) Team members feel confident in experimenting with new methods. d) There is sufficient time and space in the pharmacy	'The owner thinks he can never make a mistake and that he is above all of us. It is very discouraging'	'I stress to my team to let me know about any problems they encounter so that we can discuss and solve them'

				for reflective thinking and evaluation of the implementation process.		
			Readiness for Implementation (Leadership Engagement)	Leaders' commitment, involvement and accountability of the implementation Leader: person who leads the strategic direction of the pharmacy, e.g., pharmacy owners.	'The pharmacy owner was supposed to help implement the service, and they haven't'.	'The senior pharmacist always reminds us to access the platform to record the service delivery'
			Readiness for Implementation (Available Resources)	The level of resources dedicated to INDICA+PRO in the pharmacy. E.g.: physical space, privacy (e.g. COVID screens), training sessions…), advertising, staff…	'I don't feel like I have time to complete patient consultations because one of my pharmacists has just gone on maternity leave and I have been left without any staff'	'The owner has just bought us a new computer for the service' 'The pharmacy is big, so we can accommodate for any queues that the service may generate' 'We have a private consultation room for patient privacy when providing the service'
			Readiness for Implementation (Access to information & knowledge)	Ease of access to easy to understand and quality information and knowledge.	'I completed the training a year ago and now I can't remember anything because they don't record it'	'We always have a minor ailment guide at hand because the owner bought one for each of us'

				Quality: adequate bibliographic sources (from experts, other experienced pharmacist providers, courses...).	'I couldn't get in touch with anyone to help me with a problem on the platform, so I stopped logging in' 'I find it difficult to access information on minor ailments, so I just look it all up on Wikipedia'	'We have a WhatsApp™ group with the other minor ailment service providers in the area. They quickly solve any questions'
IV	**Characteristics of the individuals involved**	**Characteristics of the pharmacists**	**Knowledge & Beliefs**	Pharmacist enthusiasm and motivation, individual interest in INDICA+PRO, knowledge of INDICA+PRO, and patient communication and SEFAC eXPERT® skills	'I'm thinking of dropping out of the study because I'm not seeing any results' 'INDICA+PRO is a medication management service study, right?' 'I don't know what I'm doing wrong, but my patients don't seem to want to tell me anything' 'I have no idea how to use the platform. I know it's not difficult, but I missed the training'.	'I love to see the number of patient consultations increase each month' 'Do you know if there are any complementary training courses we can do?' 'INDICA+PRO is a minor ailment service study 'I have always been very good at talking to my patients' 'I am able to use the platform without any

						problems. The training helped me a lot'
			Self-efficacy	Individual pharmacists' belief in their own abilities to achieve INDICA+PRO goals	'I don't think I'm good at this… there's no way I'm going to meet the 10 consultations/month goal' 'I don't see myself being capable in getting patients to sign the consent form'	'If I've already been able to achieve 5 consultations in a month, I don't think it will be difficult for me to get to 10'
			Individual Identification with Organization	How pharmacists perceive their pharmacy, as well as their relationship and commitment to it.	'I don't want to complete patient consultations because I think I will be leaving the pharmacy next month'	'This pharmacy is very important to me. Besides being my main source of income, we are doing something good for the village'
			Other Personal Attributes	Intelligence, previous experience in provision of community pharmacy services, prior experience in collaboration with other health professionals, etc.	'I'm not very good at this' 'A family member passed away the other day, I haven't been able to complete any patient consultations' 'This is the first time providing a community pharmacy service. I have no idea what I'm doing'.	'I have no more night shifts so I feel much less tired and able to complete patient consultations now' 'I have previous experience with working with doctors at the health centre for a follow-up service we provide'

V	**Process of implementation**	**INDICA+PRO implementation process**	**Planning**	The extent to which the INDICA+PRO implementation plan has been developed prior to implementation and the quality of that planning	'The project seemed to just appear in the pharmacy one day, I didn't even know where to start'	'We held a work meeting with everyone in which we tried to figure out what steps we should take to get the project underway'
			Engaging	Engaging patients, other pharmacist providers, opinion leaders, champions and change agents	'Every time I offer a patient the service, they refuse because they don't want me to 'steal their personal data'' 'I can't get my colleague to join the study, I feel very isolated' [Opinion leader] didn't speak very well the other day, they didn't manage to get anyone motivated' '[Champion] has left the pharmacy, now there is nobody here to support us' 'They changed my change agent, and while they were making the change I	'When I offer the patient a follow-up consultation, they sign up to the service straight away' 'My colleagues saw me providing the service and they all signed up straight away… now we are a team' 'We had a very interesting chat with [opinion leader] the other day. It motivated us a lot' '[Champion] is very good at completing patient consultations for INDICA+PRO' '[Change agent] motivated me to keep

					didn't have anyone to contact'	completing patient consultations, it has helped me a lot'
			Executing	Carrying out the implementation according to the initial plan (code only if initial planning has been carried out).	'We have not been able to meet any of the goals we set before we started'	'All the pharmacists have achieved the set patient consultation goals'
			Reflecting & Evaluating	Information received on the progress of INDICA+PRO (regular reports, team meetings to discuss INDICA+PRO, targets, etc.)	'We haven't met to see how many patient consultations we've completed'	'Every month we receive and evaluate a progress report which compares us to other pharmacies. It allows us to see how we are doing'
VI	**Other**		**No. potential participants**	No. of potential patients to receive the service at the pharmacy (may be due to the location of the pharmacy)	'Patients only come to my pharmacy collect their prescriptions, there are hardly any minor ailment patients'	'My pharmacy is in a rural area, so many people come in for minor ailment consultations'
			Participant perception	Patients' perception of their own need for the Service	'My patients have not enjoyed the service, they don't see the need for it'	'My patients are very grateful to me for assessing and treating their minor ailments'
			Quality	Record Quality and Protocol Compliance	'For all patient consultations I always click on this [wrong] option'	'I take great care to always correctly complete all the points on the platform'
			Other			

CHANGE AGENT STRATEGY CLASSIFICATION GUIDE

Groups of strategies		Strategies	Examples of strategies
Planning for change	**Increasing awareness**	Highlighting a need for practice change	Point out to pharmacists that if we fail to adapt our practices and embrace change, our profession will inevitably become static Tell pharmacists what might happen if we stop delivering community pharmacy services (online shopping, robots, etc.)
		Selecting an area for change relevant to staff/recognized as a priority for the pharmacists	Select 'collaboration with the other healthcare professionals' as a relevant area of change (referral reports can be generated through the platform)
		Stimulating critical inquiry and assisting the pharmacists to develop/refine specific clinical practice questions	
		Assisting with/performing a formal/informal practice audit (Collect information on an indicator when the pharmacist performs the indication without using SEFAC eXPERT® (baseline) and compare it to the referral results obtained from the study)	The pharmacist referred X% of patients before using SEFAC eXPERT®. Compare this with the study data (Y% of patients are referred)

		Interpreting baseline data and providing feedback/insight to the pharmacists into performance gaps Baseline data: indicator values that are collected before starting to record, e.g. % referral, mean change in quality of life…) Gap in Professional Practice: difference between expected performance and actual performance. May be due to a lack of knowledge or skills.	Using the information on referral collected in the audit, interpret this data and provide feedback to the pharmacist
		Emphasizing enhanced patient outcomes as opposed to poor practice as reason for change	Show pharmacists the average 'satisfaction' and 'improvement' scores of patients and indicate to them that by delivering the service they achieve good patient outcomes
	Developing a plan	Goal-setting and assisting with development of an action plan	Set pharmacists a goal of 1 patient consultation per week Help pharmacists develop a plan to facilitate the patient signing of the consent form Aim to record only one set of symptoms during that week As a plan, have the pharmacist start patient consultations during quiet hours

		Helping identify and determine solutions to address potential barriers to EBP	Ask pharmacists if they have had any problems in starting patient consultations (help them identify barriers) and determine a solution to those barriers Identify any barriers that may arise when starting patient consultations and provide a solution
		Displaying and generating enthusiasm at the start of the INDICA+PRO project	Talk about the awards the project is winning Show enthusiasm about what other pharmacies are achieving
		Thinking ahead in the process (Think about how that pharmacy can evolve when developing the plan)	

Leading and managing change	**Knowledge and data management**	Knowledge translation/dissemination (assisting the pharmacists with conducting literature searches, obtaining articles, appraising and summarising the evidence)	
		Helping to interpret the research read by the pharmacists and apply it in practice	
		Providing resources/tools for change	Provide pharmacists with posters advertising INDICA+PRO Provide pharmacists with patient leaflets on the different minor ailments Send recorded training videos

			Offer knowledge workshops (organised and/or delivered by a change agent) Distribute information on other minor ailment cases identified in other pharmacies/provinces as a tool for change
	Project management	Identifying a leader (champion) (Identify the pharmacist in the pharmacy who is dedicated to supporting and promoting INDICA+PRO)	
		Establishing and allocating roles/delegating responsibilities	Recommend pharmacists delegate the signing of informed consents to the pharmacy technicians (delegate responsibilities). Assign each pharmacist within the pharmacy a group of symptoms (assign roles)
		Advocating for resources and change	Talk to the pharmacy owner to allow more time for the pharmacists to complete patient registrations Ask for more staff in the pharmacy Advocate the need for internal incentives (awards, promotions, salary increases...)
	Recognizing the importance of context	Creating an open, supportive, and trusting environment conducive to the implementation of a new community pharmacy service	

		Help create a 'learning environment' in the pharmacy	
		Helping to build in the structures/processes to support pharmacists and help them overcome obstacles	Design a process for patient consultations (from the time the patient walks into the pharmacy until the outcome is delivered) Design a procedure to help patients sign the consent form
		Creating local (pharmacy/pharmacist) ownership of change Help pharmacists participate in the identification of problems concerning INDICA+PRO so that they can develop a sense of responsibility and ownership of the solutions	
		Assisting with adapting evidence to the local context	There are X% referrals in the study as a whole. Take that percentage and put it in context for that pharmacy
		Boundary-spanning (addressing organizational systems/culture), managing the different requirements of each discipline/role in the pharmacy	Address the existing [sales, hierarchical...] culture in the pharmacy Coordinate and help staff understand what each pharmacist's role in the pharmacy implies for the implementation of the service
		Tailoring/adapting facilitation services to the pharmacy's local setting	Call the pharmacist when there are fewer people in the pharmacy (adapt the service provided)

			Adapt implementation strategies to the environment in which the pharmacy is located (village, town centre...)
	Fostering team-building/group dynamics	Relationship-building between pharmacists	
		Encouraging effective teamwork	Suggest weekly meetings to foster communication within the team Encourage a sense of belonging to the team
		Enabling individual and group development	Help pharmacists overcome their fears about patient consultations Facilitate and/or encourage discussions Encourage knowledge and experience sharing Stimulate critical inquiry/reflection, brainstorming, analysis of strengths, weaknesses, opportunities and threats, etc.
		Encouraging/ensuring adequate participation of each pharmacist within the project	
		Increasing awareness of and helping pharmacists overcome resistance to change	Help pharmacists realise what their barriers are and help them to overcome them

		Consensus-building (shared decision-making)	Motivate the pharmacy owner to have meetings with their pharmacists for decision-making in the pharmacy
	Administrative and project-specific support	Organizing/scheduling meetings	Organise a monthly videoconference meeting with all pharmacies Schedule a face-to-face visit to a pharmacy Organise a meeting for pharmacists with the pharmacy owner
		Leading/participating in meetings	
		Gathering information and assembling/distributing reports and materials	Prepare a monthly report for the pharmacy, compiling information on clinical variables (quality of life, number of direct product requests, etc.) and number of patient consultations Send the pharmacy a graph with the evolution of the number of patient consultations Detect SEFAC eXPERT® platform usage errors and correct them Compare the evolution of other pharmacies with that of this pharmacy.
		General planning	

		Providing skills training	Offer skills workshops (organised and/or delivered by the change agent).
		Taking on specific tasks	Take on the task of writing the pharmacist an email after 10 days to remind them to call the patient for service follow-up.

Monitoring progress and ongoing implementation	**Problem-solving**	Problem-solving and addressing specific issues	
		Making changes to the developed plan as necessary	
		Networking	Create a WhatsApp™ group for pharmacists in the area
	Providing support	Mentoring and role-modelling the minor ailment service	Tell pharmacists about what you have achieved in your own pharmacy Mentor your pharmacists based on your own experience with INDICA+PRO
		Maintaining momentum and enthusiasm	Maintain enthusiasm as pharmacists progress through the study.
		Acknowledging ideas and efforts	Acknowledge when a pharmacist proposes an idea to speed up the patient consultation process Acknowledge the effort to achieve X patient consultations that month
		Providing ongoing support/reassurance and constructive feedback	Reassure the pharmacist provider when they feel unable to provide the service

			Offer constructive feedback on how they are progressing in the study
		Empowering group members	Give the pharmacists authority to contact you directly Empower pharmacists to complete patient consultations even when they lack confidence.
		Providing advice/guidance/assistance	
		Being available as needed	Tell pharmacists that they can contact you at any time
		Ensuring the pharmacists remain on task and things are not missed (process/methodology is followed)	Ensure that the new pharmacist providers do not complete an excessive number of patient consultations on the first day and follow the implementation process Ensure that pharmacists follow the established steps for patient consultations
	Effective communication	Providing regular communication (emails, phone calls)	Write weekly to pharmacists to see how they are progressing Call the pharmacist monthly
		Keeping pharmacy group members informed	Call pharmacists to inform them of their progress

			Write to pharmacists with any new developments in the study
		Acting as a liaison between the different groups that may exist in the pharmacy	Write to the pharmacy owner if required by the pharmacists

Evaluating change	**Assessment**	Performing/assisting with evaluation	Evaluate the progress of pharmacists in pharmacy
		Linking evidence implementation to patient outcomes	Show pharmacists the 'improvement' of their own patients
		Acknowledging success, recognizing and celebrating achievements	Celebrate when pharmacists reach their target number of patient consultations

Other	**Other**	Showcase other project benefits not identified previously in the guide	
		Troubleshooting technical issues encountered within the online platform	Help the pharmacists use the SEFAC eXPERT® platform Assist the pharmacists with accessing the SEFAC eXPERT® platform Help the pharmacists when they have technical issues when registering on the SEFAC eXPERT® platform

			Explain to the pharmacists how to use the SEFAC eXPERT® platform
		Walkthrough of the minor ailment consultation process	Register a patient consultation with the pharmacists so that they learn how to carry them out
		Read studies (change agents) and present results to pharmacists	
		Offer external incentives (external to the pharmacy)	Offer research certificates
		Other	

Appendix 7: TIDieR checklist for the intervention between the change agent and the pharmacist

No.	Item	Description
1	**Brief name**	Intervention between the change agent and the pharmacist when implementing a minor ailment service in Spanish community pharmacies
2	**Why**	Translating research findings into practice is a complex, non-linear process that involves multiple stages, activities, and steps. To manage this complexity effectively, active, systematic, and intentional approaches to implementation are essential (2). Disregarding determinants that negatively affect implementation often makes it more challenging to successfully integrate community pharmacy services (109,110). Typically, identifying these determinants and designing strategies to address them are tasks assigned to a formally designated individual with specialised training, known as a 'change agent' (106). Beyond systematically analysing these determinants to develop targeted strategies, change agents also play a key role in guiding and supporting individuals and teams tasked with adopting the innovation.
3	**What**	The CFIR website (172) and various implementation science publications (97,140,141,148) were used as intervention resources. PowerPoint presentations were employed to support the pharmacist

		training process. Additionally, the change agent guide (see Appendix 6) was used to record and categorise information on the determinants identified within the pharmacy. It was also used to design and categorise implementation strategies. The guide incorporated an adapted version of the CFIR (106) and Dogherty (141) taxonomies, tailored to community pharmacy and translated into Spanish.
4	**Who provided**	The intervention was delivered by both ECAs and CCAs, both groups consisting of pharmacists. The ECAs were based in provinces with a participating pharmacy board and were contracted by these boards to provide regular follow-up to pharmacists. The CCAs operated in provinces without a participating pharmacy board. These agents were volunteers recruited through the SEFAC organisation
5	**How**	The pharmacists participating in the study received initial training by the change agents that addressed the minor ailment service procedure, the clinical protocols, and the process of recording consultations in the SEFAC eXPERT® platform (82). It focussed on improving their knowledge in assessing, counselling for, and treating minor ailments, including the proper dispensing of over-the-counter medications, and improving their communication skills with patients, GPs, and healthcare centres. Additionally, the training introduced pharmacists to the implementation of the service in accordance with good practices in Spanish community pharmacies (240). During follow-up, pharmacists received ongoing training

		provided by ECAs and CCAs. This continuous training addressed topics such as service delivery, adherence to protocols, communication with patients and other health professionals, utilisation of the study's web-based software, and effective data collection. During the implementation of the minor ailment service in these community pharmacies, change agents used a change agent guide (Appendix 6) and a specialised electronic platform to systematically record the determinants they encountered. They also documented the implementation strategies developed and operationalised to address these determinants, along with their subsequent impact.
6	**Where**	The intervention occurred on-site in the community pharmacies (only ECAs), via telephone calls, emails, instant messaging platforms, and videoconferencing. Change agents used an eCRD hosted on the SEFAC eXPERT® platform (available at www.sefacexpert.org) (82) to record determinants and implementation strategies.
7	**When and how much**	Both ECAs and CCAs delivered initial training to the participating pharmacists. The ECAs offered ongoing support at least once per month, while the CCAs maintained continuous but less frequent follow-up, sometimes engaging with pharmacists less than once a month.
8	**Tailoring**	The intervention was not planned to be personalised, titrated or

		adapted.
9	**Modifications**	The intervention was revised in 2021 to integrate the adapted CFIR 2009 (106) and Dogherty (141) taxonomies into the eCRD. Additionally, the outcome of the determinant, whether it was successfully addressed or not, was included. The data for this PhD study were obtained from the updated eCRD, while data from the previous version were excluded.
10	**How well: planned**	The intervention adherence or fidelity was not assessed.
11	**How well: actual**	The intervention adherence or fidelity was not assessed.

Appendix 8: Adapted CFIR framework and mapping

Dominio		Barrera o Facilitador[13]				
1	Características del Servicio de indicación farmacéutica y del Estudio INDICA+PRO	1.1/1	Origen de INDICA+PRO	Opinión de los farmacéuticos sobre el hecho de que el diseño, coordinación y toma de decisiones la lleve a cabo la UGR y SEFAC.		
		1.2/2	Solidez y Calidad de la Evidencia	Percepción por parte de los farmacéuticos sobre la calidad y validez de la evidencia del servicio de indicación y resultados previstos de INDICA+PRO.		
		1.3/3	Ventaja Relativa de INDICA+PRO	Beneficios de INDICA+PRO frente a otro servicio/proyecto alternativo.		
		1.4/4	Adaptabilidad	Grado en que elementos de INDICA+PRO se puede adaptar o reinventar para satisfacer las necesidades locales de la farmacia.		
		1.5/5	Período de Prueba	Capacidad de probar INDICA+PRO en la farmacia y deshacer la implantación si es necesario. Es decir, un período de prueba antes de decidir si seguir adelante con la implantación completa.		
		1.6/6-10	Complejidad Percibida	Percepción por los farmacéuticos de la dificultad o complejidad para la implantación de INDICA+PRO.	1.6.1/6	Uso de SEFAC eXPERT
					1.6.2/7	Cambio de comportamiento profesional (Produce cambios fundamentales en las actividades de la farmacia y una clara desviación de las prácticas existentes).
					1.6.3/8	Duración del estudio INDICA+PRO
					1.6.4/9	Complejidad del Proceso de Registro

[13] Black numbers represent the original research framework, while green numbers indicate the INDICA+PRO study's corresponding numbering. If only a green number is present, the category was introduced exclusively for the INDICA+PRO study.

					1.6.5/10	**Número de pasos necesarios para la Implantación**
		1.7/11	**Calidad de Diseño**	Calidad del diseño de los recursos para INDICA+PRO (SEFAC eXPERT, formaciones, libro de síntomas menores…)		
2	**Entorno externo (Pacientes, Organizaciones y Farmacias Comunitarias Ajenas)**	2.1/12-16	**Pacientes**		2.1.1/12	**Conocimiento por parte de los farmacéuticos de las necesidades de sus pacientes y si el servicio de indicación INDICA+PRO va a satisfacerlas (beneficios para el paciente y creencias sobre ellos)**
					2.1.2/13	**Retroalimentación ('feedback') Paciente-Farmacéutico**
					X	**Grado en el que la farmacia es 'Centrada en el Paciente'**
					2.1.5/16	**Características/Situaciones Personales de Pacientes**
		2.2/17-19	**Cosmopolitismo (organizaciones y farmacias comunitarias ajenas)**	Grado en el que la farmacia está conectada externamente	2.2.1/17	**Grupos Profesionales (SEFAC, FIP, SEFAR...)**
					2.2.2/18	**Otras Farmacias (participantes o no en INDICA+PRO)**

					2.2.3/19	**Otros Profesionales Sanitarios**
		2.3/20-23	**Presión Social**	Presión mimética o competitiva para la implantación de INDICA+PRO en la farmacia.	**2.3.1/20**	**Mayoría de otras Farmacias han implantado INDICA+PRO**
					2.3.2/21	**Farmacias Competidoras o de Referencia han implantado INDICA+PRO**
					2.3.3/22	**Búsqueda de Ventaja Competitiva frente a otras Farmacias Comunitarias**
					2.3.4/23	**Implantar al mismo ritmo o de la misma manera que otras Farmacias**
		2.4/24-25	**Políticas e Incentivos Externos**	Estrategias externas para difundir INDICA+PRO	**2.4.1/24**	**Políticas Externas Gubernamentales o No (Informes públicos, recomendaciones y pautas oficiales)**
					2.4.2/25	**Incentivos Externos (Cursos de organizaciones externas, asistencia a congresos, diplomas de organizaciones externas, créditos, puntos…)**
3	**Entorno Interno**	**3.1/26-29**	**Características Personales-Estructurales de la Farmacia**	Características Estructurales de la Farmacia y Agrupaciones del personal en la misma.	**X**	**Tamaño de la Farmacia**
					3.1.1/26	**Antigüedad de la Farmacia (como entidad, no como espacio)**

	(Farmacias Comunitarias)				**X**	**Condiciones de la Farmacia como lugar físico para la Prestación del Servicio (privacidad, ZAP, pantalla COVID…)**
					X	**Ubicación de la Farmacia**
					3.1.2/27	**División interna del trabajo (titulares, adjuntos, técnicos) y cómo se coordinan entre ellos**
					3.1.3/28	**Toma de decisiones en la Farmacia (únicamente el titular, todos los empleados…)**
					3.1.4/29	**Número de niveles jerárquicos en la Farmacia**
		3.2/30-33	**Comunicación dentro del Equipo de la Farmacia**	La naturaleza y calidad de la comunicación (formal e informal) dentro de la misma farmacia comunitaria.	**3.2.1/30**	**Trabajo en equipo (buena coordinación, definiciones claras de roles, colaboración, misión y objetivos claramente comunicados, cohesión…)**
					3.2.2/31	**Buen Ambiente de Trabajo y Relaciones Interpersonales**
					3.2.3/32	**Comunicación interpersonal formal e informal**
					3.2.4/33	**Apoyo Interno**

<table>
<tr><td rowspan="8"></td><td rowspan="8"></td><td>3.3/34</td><td colspan="2">Cultura de la Farmacia</td><td colspan="5">Normas, valores y supuestos básicos de la farmacia comunitaria y cómo funciona la farmacia debido a esta cultura
(farmacia enfocada al control jerárquico, farmacia empresarial enfocada en las ventas...).</td></tr>
<tr><td rowspan="7">3.4/35-42</td><td rowspan="7">Ambiente de Implantación en la Farmacia</td><td rowspan="7">La aceptación de INDICA+PRO en la farmacia y la medida en la que registrar indicaciones será recompensado, apoyado y esperado dentro de la misma farmacia.</td><td>3.4.1/35</td><td>Tensión para Cambio en la Farmacia</td><td colspan="3">Grado en que los farmacéuticos perciben la situación profesional actual como intolerable o que necesita de un cambio.</td></tr>
<tr><td rowspan="2">3.4.2/36-37</td><td rowspan="2">Compatibilidad</td><td rowspan="2">El grado de compatibilidad de INDICA+PRO</td><td>3.4.2.1/36</td><td>Significado <u>asignado</u> al servicio por los farmacéuticos de la farmacia y cómo se alinea con sus propios valores</td></tr>
<tr><td>3.4.2.2/37</td><td>Compatibilidad de INDICA+PRO con los flujos de trabajo y sistemas existentes en la Farmacia</td></tr>
<tr><td>3.4.3/38</td><td>Prioridad</td><td colspan="3">Percepción sobre la importancia de la implantación de INDICA+PRO en la farmacia
(si los farmacéuticos prestadores se sienten fomentados, apoyados y recompensados por su esfuerzo).</td></tr>
<tr><td rowspan="2">3.4.4/39-40</td><td rowspan="2">Incentivos, Recompensas y Beneficios <u>Internos</u></td><td rowspan="2">Incentivos procedentes de la misma farmacia comunitaria.</td><td>3.4.4.1/39</td><td>Tangibles
(premios, ascensos, incrementos salariales…)</td></tr>
<tr><td>3.4.4.2/40</td><td>No Tangibles
(ej.: mayor respeto dentro de la farmacia)</td></tr>
<tr><td>3.4.5/41</td><td>Objetivos y Retroalimentación Rutinaria (‘feedback’)</td><td colspan="3">El grado en que las metas <u>rutinarias</u> de la farmacia (<u>no</u> las específicas de INDICA+PRO) se comunican claramente al equipo, se intentan llevar a cabo y para las cuales los empleados reciben ‘feedback’ o retroalimentación</td></tr>
</table>

					3.4.6/42	**Ambiente de Aprendizaje en la Farmacia**	El grado en el que la farmacia demuestra atributos de un 'ambiente de aprendizaje' en el que: a) Los farmacéuticos titulares admiten que ellos mismos pueden cometer errores y necesitan ayuda y apoyo de los miembros de su equipo b) Los miembros del equipo sienten que son esenciales, valorados y conocedores de INDICA+PRO c) Los miembros del equipo se sienten seguros a la hora de probar nuevos métodos d) Hay suficiente tiempo y espacio en la farmacia para el pensamiento reflexivo y la evaluación del proceso de implantación.	
		3.5/43-45	**Compromiso de la Farmacia**	Indicadores <u>tangibles e inmediatos</u> en la farmacia del compromiso con INDICA+PRO	**3.5.1/43**	**Compromiso de Liderazgo en la Farmacia**	Compromiso, participación y responsabilidad de los 'líderes' (personas que lideran la dirección estratégica de la farmacia (ej.: titulares)) de INDICA+PRO en la farmacia	
					3.5.2/44	**Recursos Disponibles en la Farmacia**	El nivel de <u>recursos dedicados</u> a INDICA+PRO en la <u>farmacia</u> Ej.: espacio físico, privacidad (ej.: pantallas COVID), ZAP tiempo, dinero, sesiones de formación…), publicidad, personal…	
					3.5.3/45	**Acceso a Información y Conocimientos**	Facilidad de acceso a información y conocimientos de INDICA+PRO fáciles de entender y de calidad. Calidad: Grado de Utilización de Fuentes Bibliográficas adecuadas (procedentes de expertos, otros farmacéuticos proveedores con experiencia, cursos…)	
4	**Características de los Farmacéuticos**	**4.1/46-51**	**Creencias, Habilidades y Conocimientos del Farmacéutico**	Actitud <u>individual</u> del farmacéutico prestador hacia INDICA+PRO, sus conocimientos sobre el mismo y sus habilidades.				**4.1.1/46** **Entusiasmo y Motivación del Farmacéutico** **4.1.2/47** **Interés Individual del Farmacéutico por INDICA+PRO** **X** **Tiempo dedicado por parte del <u>farmacéutico</u>**

						X	**Experiencia previa en SPFA y colaboración con otros profesionales sanitarios**
						X	**Creencias sobre Pacientes**
						4.1.3/48	**Conocimientos del Farmacéutico sobre INDICA+PRO**
						4.1.4/49	**Habilidades de Comunicación con los Pacientes**
						X	**Habilidades de Reclutamiento**
						4.1.5/50	**Habilidades de Uso de SEFAC eXPERT (ej.: formación)**
		4.2/52	**Autoeficacia del Farmacéutico**	Creencia individual de los farmacéuticos en sus propias capacidades para lograr los objetivos de INDICA+PRO			
		X	**Etapa Individual del Cambio**	Fase en la que se encuentra el farmacéutico (a medida que avanza hacia el uso hábil, entusiasta y sostenido de INDICA+PRO)			
		4.3/53	**Identificación Individual con la Farmacia**	Cómo perciben los farmacéuticos su farmacia, además de su relación y grado de compromiso con ella.			
		4.4/54	**Otras Características y Situaciones Personales del Farmacéutico (ej.: inteligencia, experiencia previa del farmacéutico en SPFA, experiencia de colaboración con otros profesionales sanitarios, etc.)**				
5	**Proceso de implantación INDICA+PRO**	**5.1/55**	**Planificación del Proceso de Implantación**	El grado en que el proceso de implantación de INDICA+PRO se ha desarrollado de antemano y la calidad de esa planificación.			
		5.2/56-61	**Involucración**	Atraer e involucrar a personas en el	**5.2.1/58**	**Líderes de Opinión**	Presencia, resultados y calidad de los individuos que tienen influencia formal o informal en las actitudes y creencias de sus compañeros

			(Reclutamiento de Pacientes: 56) **(Reclutamiento de otros Farmacéuticos Prestadores: 57)**	proceso de implantación			(ej.: personas influyentes de los COF, SEFAC…).
					X	**Líderes Internos de Implantación (formalmente nombrados)**	Presencia, resultados y calidad de los farmacéuticos en la misma farmacia nombrados formalmente responsables de INDICA+PRO
					5.2.3/59	**Campeones ('Champions')**	Presencia, resultados y calidad de los farmacéuticos en la misma farmacia que se dedican a apoyar e impulsar INDICA+PRO superando cualquier resistencia en la farmacia al cambio.
					5.2.4/60	**FaFas/SEFaFas**	Presencia, resultados y calidad de los FaFas/SEFaFas
		5.3/61	**Ejecución**		El llevar a cabo la implantación según el plan inicial (codificar solamente en el caso de que se halla llevado a cabo una planificación inicial (5.1)		
		5.4/62	**Reflexión y Evaluación**		Información recibida sobre el progreso de INDICA+PRO (informes periódicos, reuniones de equipo para hablar sobre INDICA+PRO, metas, etc.)		
6	**Otros**	**14**	**Nº de Pacientes Potenciales de Recibir el Servicio en la Farmacia** **(puede deberse a la ubicación de la farmacia)**				
		15	**Percepción por parte de los Pacientes de su propia necesidad de recibir el Servicio**				
		51	**Calidad de los Registros y Adecuación al Protocolo**				
		63	**Otros**				

Appendix 9: Adapted Dogherty taxonomy and mapping

Fase de Facilitación		Grupos de Estrategias		Estrategias [14]		
Stages of facilitation		Groupings of activity		Activities		
Español	Inglés	Español	Inglés	Español	Inglés	Inglés Abreviado
Preparar para la Implantación del Servicio	**Planning for change**	**Aumentar Percepción**	**Increasing awareness**	**1/1** Destacar la necesidad de cambio	Highlighting a need for practice change	Need for change
				2/2 Seleccionar área de cambio	Selecting an area for change relevant to staff/recognized as a priority	Area for change
				3/3 Estimular la reflexión crítica	Stimulating critical inquiry and assisting groups to develop/refine specific clinical practice questions	Critical inquiry
				4/4 Realizar auditoría formal/informal	Assisting with/performing a formal/informal practice audit	Practice audit

[14] Black numbers represent the original research taxonomy, while green numbers indicate the INDICA+PRO study's corresponding numbering. If only a green number is present, the category was introduced exclusively for the INDICA+PRO study.

				5/5 Interpretar valores basales y dar feedback	Interpreting baseline data and providing feedback/insight into performance gaps	Performance gaps
				6/6 Resaltar la mejora de los resultados en el paciente	Emphasizing enhanced patient outcomes as opposed to poor practice as reason for change	Enhanced patient outcomes
		Desarrollar un Plan	**Developing a plan**	**7/8** Fijar metas y plan de acción	Goal-setting and assisting with development of an action plan	Goal-setting & planning
				8/9 Identificar soluciones para abordar barreras	Helping identify and determine solutions to address potential barriers to EBP	Solutions
				9/10 Generar entusiasmo	Displaying and generating enthusiasm at the start of the project	Initial enthusiasm
				10/11 Pensar en futuro al desarrollar el plan	Thinking ahead in the process	Thinking ahead
Liderar y <u>Gestionar</u> la Implantación del Servicio	**Leading and managing change**	**Gestionar Conocimientos y Datos**	**Knowledge and data management**	**11/14** Ayudar en búsquedas bibliográficas	Knowledge translation/dissemination (assisting with conducting literature searches,	Knowledge dissemination

					obtaining articles, appraising and summarizing the evidence)	
				12/15 Ayudar a interpretar estudios	Helping to interpret the research and apply it in practice	Research interpretation
				13/17 Proporcionar recursos y herramientas	Providing resources/tools for change	Resource provision
		Gestionar el Proyecto INDICA+PRO	**Project management**	**14/18** Identificar 'líderes del cambio'	Identifying a leader	Leader identification
				15/19 Establecer y asignar roles	Establishing and allocating roles/delegating responsibilities	Role allocation
				16/20 Defender la necesidad de recursos	Advocating for resources and change	Resource advocation
		Reconocer la Importancia del Contexto	**Recognizing the importance of context**	**17/21** Crear entorno favorable para implantación	Creating an open, supportive, and trusting environment conducive to change	Change environment
				18/22 Construir estructuras y procesos de apoyo	Helping to build in the structures/processes to support staff and help them overcome obstacles	Support structures

				19/23 Crear responsabilidad propia del cambio	Creating local ownership of change	Ownership of change
				20/24 Adaptar la evidencia al contexto	Assisting with adapting evidence to the local context	Evidence adaptation
				21/25 Superar sistemas organizativos y cultura de la farmacia	Boundary-spanning (addressing organizational systems/culture), managing the different requirements of each discipline/role	Boundary-spanning
				22/26 Adaptar estrategias y servicios prestados	Tailoring/adapting facilitation services to the local setting	Tailoring
		Fomentar la formación de equipos y aumentar la dinámica de grupo	**Fostering team-building/group dynamics**	**23/27** Construir relaciones interpersonales	Relationship-building	Relationship-building
				24/28 Fomentar el trabajo en equipo	Encouraging effective teamwork	Teamwork
				25/29 Habilitar el desarrollo individual	Enabling individual development	Individual development
				25/30 Habilitar el desarrollo grupal	Enabling group development	Group development

				26/31 Fomentar la participación de cada farmacéutico	Encouraging/ensuring adequate participation	Participation
				27/32 Evitar la resistencia a la implantación	Increasing awareness of and helping overcome resistance to change	Overcome resistance
				28/33 Fomentar la toma de decisiones compartida	Consensus-building (shared decision-making)	Consensus-building
		Proporcionar Ayuda Administrativa	**Administrative and project-specific support**	**29/34** Organizar reuniones	Organizing/scheduling meetings	Meeting organization
				30/35 Liderar/participar en reuniones	Leading/participating in meetings	Meeting leading
				31/36 Recopilar/distribuir información	Gathering information and assembling/distributing reports and materials	Information distribution
				32/37 Realizar una planificación general	General planning	Planning
				33/38 Formar en habilidades	Providing skills training	Skills training
				34/39 Asumir tareas específicas	Taking on specific tasks	Taking on tasks

<u>Monitorizar</u> el Progreso de la Implantación del Servicio	**Monitoring progress and ongoing implementation**	**Resolver Problemas**	**Problem-solving**	**35/41** Resolver problemas específicos	Problem-solving and addressing specific issues	Problem-solving
				36/42 Hacer cambios en el plan de acción	Making changes to the developed plan as necessary	Plan changing
				37/43 Establecer redes	Networking	Networking
		Proporcionar Ayuda General	**Providing support**	**38/44** Ser un modelo para la implantación	Mentoring and role-modelling EBP	Role-modelling
				39/45 Mantener el entusiasmo	Maintaining momentum and enthusiasm	Enthusiasm maintenance
				40/46 Reconocer ideas/esfuerzos	Acknowledging ideas and efforts	Idea acknowledgement
				41/47 Ofrecer apoyo y tranquilidad	Providing ongoing support/reassurance and constructive feedback	Support and reassurance
				42/48 Empoderar a los farmacéuticos	Empowering group members	Empowering
				43/49 Orientar, aconsejar, asistir	Providing advice/guidance/assistance	Advice provision
				44/50 Dar disponibilidad	Being available as needed	Availability

				45/51 Asegurar el seguimiento de la metodología de implantación	Ensuring group remains on task and things are not missed (process/methodology is followed)	Methodology
		Conceder Comunicación Efectiva	**Effective communication**	**46/52** Ofrecer comunicación frecuente	Providing regular communication (emails, phone calls)	Regular communication
				47/53 Mantener informado a todo el equipo	Keeping group members informed	Informing members
				48/54 Actuar como enlace entre grupos	Acting as a liaison	Liason

<u>Evaluar</u> la Implantación del Servicio	**Evaluating change**	**Evaluar**	**Assessment**	**49/55** Realizar evaluaciones	Performing/assisting with evaluation	Evaluation conducting
				50/56 Vincular implantación con resultados en pacientes	Linking evidence implementation to patient outcomes	Patient outcomes linking
				51/57 Reconocer éxitos	Acknowledging success, recognizing and celebrating achievements	Success acknowledgement

Otros	**Other**	**Otros**	**Other**	7 Presentar otros beneficios	Other benefits	Other benefits
				12 Ayuda técnica	Technical assistance	Technical assistance
				13 Realizar un SIF con el farmacéutico	Walkthrough	Walkthrough
				16 Presentar resultados de estudios a los farmacéuticos	Research results	Research results
				40 Ofrecer incentivos externos	External incentives	External incentives
				58 Otros	Other	Other

Appendix 10: CFIR 2.0 (108) framework coding distribution identified in the systematic review

Barrier	n (%)
Innovation deliverers: capability	122 (22.0)
Innovation deliverers: opportunity	73 (13.2)
Available resources	58 (10.5)
Work infrastructure	37 (6.7)
Innovation deliverers: motivation	33 (5.9)
Innovation complexity	25 (4.5)
Innovation evidence-base	17 (3.1)
Innovation design	16 (2.9)
Other implementation support	14 (2.5)
Access to knowledge & information	13 (2.3)
Compatibility	12 (2.2)
Communications	10 (1.8)
Information technology infrastructure	10 (1.8)
Innovation deliverers: need	9 (1.8)
Innovation recipients: motivation	9 (1.8)
Critical incidents	8 (1.4)
Available resources: materials & equipment	7 (1.3)
Reflecting & evaluating	7 (1.3)
Innovation cost	6 (1.1)
Implementation leads: opportunity	6 (1.1)
Culture	6 (1.1)
Relative priority	6 (1.1)
Doing	5 (0.9)
Local attitudes	5 (0.9)
Structural characteristics	4 (0.7)
Available resources: space	4 (0.7)
Implementation leads: capability	4 (0.7)
Relational connections	3 (0.5)
Innovation recipients: Opportunity	3 (0.5)
Mid-level leaders	3 (0.5)
Engaging	3 (0.5)
Available resources: materials and equipment	3 (0.5)
Physical infrastructure	2 (0.4)
Innovation recipients: capability	2 (0.4)
Mid-level leaders: motivation	2 (0.4)
Teaming	1 (0.2)
Planning	1 (0.2)
Local conditions	1 (0.2)

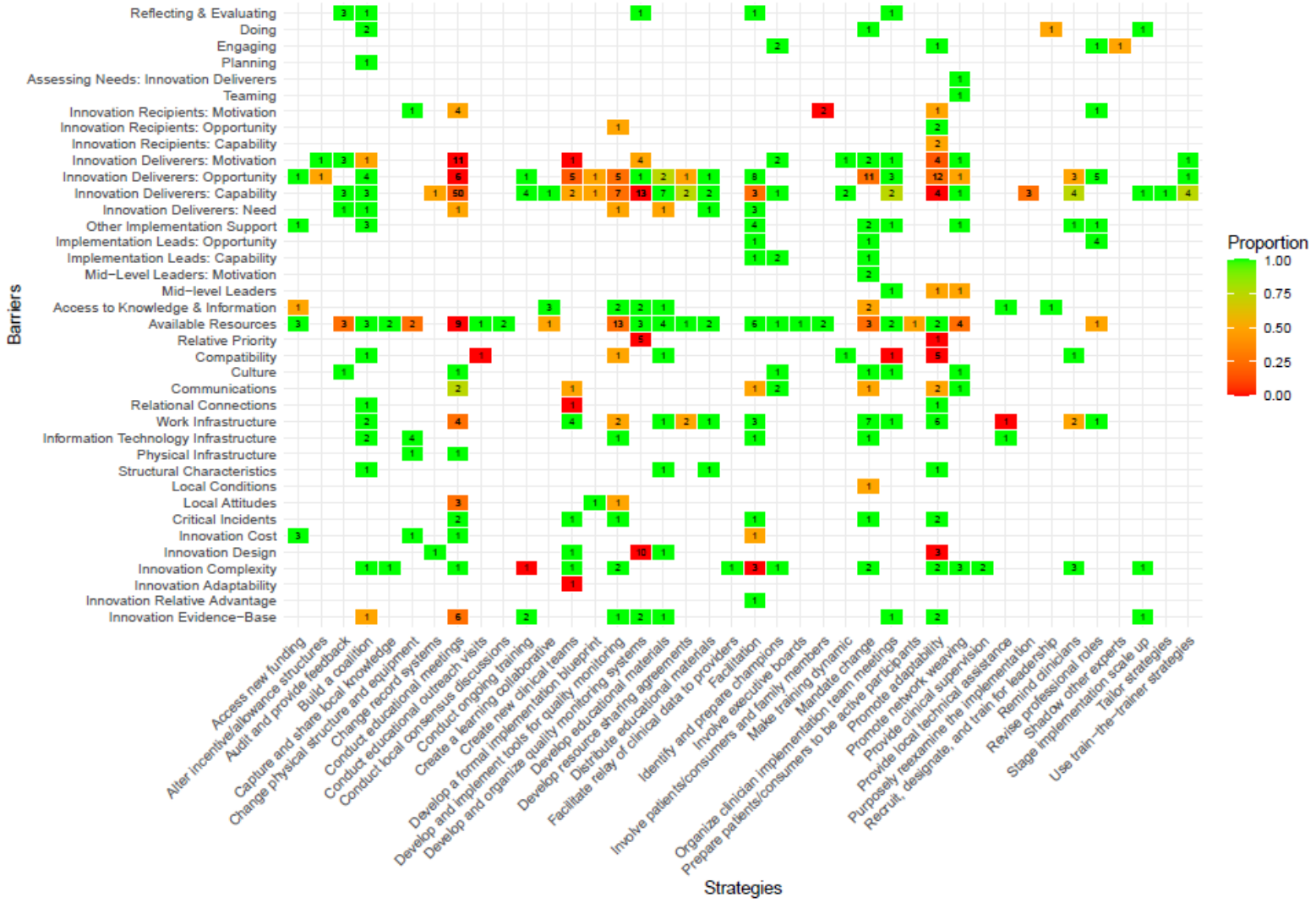
Innovation adaptability	1 (0.2)
Engaging: innovation Recipients	1 (0.2)
Innovation relative advantage	1 (0.2)
Assessing Needs: innovation deliverers	1 (0.2)
Engaging: innovation deliverers	1 (0.2)

Appendix 11: ERIC framework coding distribution identified in the systematic review

Implementation strategy	n (%)
Conduct educational meetings	102 (18.4)
Promote adaptability	54 (9.7)
Develop and organise quality monitoring systems	41 (7.4)
Mandate change	39 (7.0)
Develop and implement tools for quality monitoring	38 (6.8)
Facilitation	38 (6.8)
Build a coalition	28 (5.0)
Develop educational materials	20 (3.6)
Create new clinical teams	18 (3.2)
Promote network weaving	16 (2.9)
Organize clinician implementation team meetings	15 (2.7)
Revise professional roles	14 (2.5)
Audit and provide feedback	14 (2.5)
Remind clinicians	14 (2.5)
Identify and prepare champions	12 (2.2)
Change physical structure and equipment	9 (1.6)
Access new funding	9 (1.6)
Distribute educational materials	8 (1.4)
Conduct ongoing training	8 (1.4)
Use train-the-trainer strategies	6 (1.1)
Develop resource sharing agreements	6 (1.1)
Create a learning collaborative	5 (0.9)
Involve patients/consumers and family members	4 (0.7)
Stage implementation scale up	4 (0.7)
Make training dynamic	4 (0.7)
Purposely reexamine the implementation	3 (0.5)
Capture and share local knowledge	3 (0.5)
Provide local technical assistance	3 (0.5)
Develop a formal implementation blueprint	3 (0.5)
Recruit, designate, and train for leadership	2 (0.4)
Conduct educational outreach visits	2 (0.4)
Alter incentive/allowance structures	2 (0.4)
Change record systems	2 (0.4)
Provide clinical supervision	2 (0.4)
Conduct local consensus discussions	2 (0.4)
Involve executive boards	1 (0.2)
Prepare patients/consumers to be active participants	1 (0.2)
Shadow other experts	1 (0.2)
Tailor strategies	1 (0.2)

Facilitate relay of clinical data to providers	1 (0.2)

Appendix 12: Heatmap of barriers and implementation strategies by outcome proportions



Appendix 13: Distribution of determinant and domain identification during the implementation of a minor ailment service

Determinant	Barrier		Facilitator		Total	
	n	%	n	%	n	%
Engaging (innovation recipients) - *Process*	133	34.1	7	4.6	140	25.9
Knowledge and beliefs (enthusiasm) - *Individuals*	25	6.4	53	35.1	78	14.4
Complexity (behavioural change) - *Intervention*	42	10.8	16	10.6	58	10.7
Knowledge & beliefs (SEFAC eXPERT® skills) - *Individuals*	39	10.0	1	0.7	40	7.4
Knowledge and beliefs (rationale for adopting the service) - *Individuals*	14	3.6	18	11.9	32	5.9
Readiness for implementation (available resources) – *Inner*	28	7.2	1	0.7	29	5.4
Quality - *Other*	18	4.6	1	0.7	19	3.5
Knowledge & beliefs (interest in the service) - *Individuals*	12	3.1	6	4.0	18	3.3
Engaging (opinion leaders) - *Process*	0	0.0	16	10.6	16	3.0
Readiness for implementation (leadership engagement) - *Inner*	11	2.8	3	2.0	14	2.6
Other - *Other*	9	2.3	3	2.0	12	2.2
Other Personal Attributes - *Individuals*	10	2.6	1	0.7	11	2.0
Culture - *Inner*	4	1.0	5	3.3	9	1.7
Knowledge & beliefs (patient communication skills) - *Individuals*	8	2.1	0	0.0	8	1.5
Networks & communications (work environment and interpersonal relationships) - *Inner*	5	1.3	1	0.7	6	1.1
Self-efficacy - *Individuals*	5	1.3	1	0.7	6	1.1
Engaging (change agents) - *Process*	0	0.0	6	4.0	6	1.1
Implementation climate (learning climate) - *Inner*	4	1.0	0	0.0	4	0.7
Implementation climate (compatibility) - *Inner*	4	1.0	0	0.0	4	0.7

Patient needs & resources (deliverer knowledge) - *Outer*	3	0.8	0	0.0	3	0.6
Implementation Climate (relative priority) - *Inner*	2	0.5	1	0.7	3	0.6
Cosmopolitanism (other delivering organisations) - *Outer*	0	0.0	3	2.0	3	0.6
Patient needs & resources (recipient) - *Outer*	2	0.5	0	0.0	2	0.4
Complexity (recording skills) - *Intervention*	2	0.5	0	0.0	2	0.4
Complexity (SEFAC eXPERT®) - *Intervention*	2	0.5	0	0.0	2	0.4
Implementation climate (tension for change) - *Inner*	0	0.0	2	1.3	2	0.4
Cosmopolitanism (other professional organisations) - *Outer*	0	0.0	2	1.3	2	0.4
Networks & communications (internal support) - *Inner*	1	0.3	0	0.0	1	0.2
Design Quality & Packaging - *Intervention*	1	0.3	0	0.0	1	0.2
Engaging (champions) - *Process*	1	0.3	0	0.0	1	0.2
Executing - *Process*	1	0.3	0	0.0	1	0.2
Planning - *Process*	1	0.3	0	0.0	1	0.2
Networks & Communications (teamwork) - *Inner*	1	0.3	0	0.0	1	0.2
Structural Characteristics (internal organisation and coordination) - *Inner*	1	0.3	0	0.0	1	0.2
No. potential participants/recipients - *Other*	1	0.3	0	0.0	1	0.2
Adaptability - *Intervention*	0	0.0	1	0.7	1	0.2
Implementation Climate (organisation incentives and rewards. non-tangible) - *Inner*	0	0.0	1	0.7	1	0.2
Implementation climate (goals and feedback) - *Inner*	0	0.0	1	0.7	1	0.2
Patient needs & resources (feedback) - *Outer*	0	0.0	1	0.7	1	0.2
Total	**390**	**100**	**151**	**100**	**541**	**100**

Appendix 14: Distribution of implementation strategy groups and subgroups and discrete strategies during the implementation of a minor ailment service

Implementation strategy group	Implementation strategy subgroup	n (%)	Discrete implementation strategies	n (%)
Leading and managing change	Administrative and project-specific support	209 (15.0%)	Providing skills training	144 (10.4%)
			Organising/scheduling meetings	40 (2.9%)
			General planning	9 (0.6%)
			Gathering information and assembling/distributing reports and materials	9 (0.6%)
			Taking on specific tasks	6 (0.4%)
			Leading/participating in meetings	1 (0.1%)
	Knowledge and data management Knowledge and data management	135 (9.7%)	Providing resources/tools for change	131 (9.4%)
			Knowledge translation/dissemination (assisting with conducting literature searches, obtaining articles, appraising and summarising the evidence)	3 (0.2%)
			Helping to interpret the research and apply it in practice	1 (0.1%)
		81 (5.8%)	Enabling group development	44 (3.2%)

	Fostering team-building/group dynamics		Enabling individual development	14 (1.0%)
			Encouraging effective teamwork	9 (0.6%)
			Relationship-building	9 (0.6%)
			Encouraging/ensuring adequate participation	5 (0.4%)
	Recognising the importance of context	56 (4.0%)	Helping to build in the structures/processes to support staff and help them overcome obstacles	29 (2.1%)
			Boundary-spanning (addressing organizational systems/culture), managing the different requirements of each discipline/role	10 (0.7%)
			Creating an open, supportive, and trusting environment conducive to change	9 (0.6%)
			Creating local ownership of change	8 (0.6%)
	Project management	4 (0.3%)	Advocating for resources and change	2 (0.1%)
			Establishing and allocating roles/delegating responsibilities	2 (0.1%)
Monitoring progress and ongoing implementation	Providing support	209 (15.0%)	Providing ongoing support/reassurance and constructive feedback	52 (3.7%)
			Maintaining momentum and enthusiasm	49 (3.5%)
			Being available as needed	45 (3.2%)

			Providing advice/guidance/assistance	26 (1.9%)
			Acknowledging ideas and efforts	16 (1.2%)
			Empowering group members	15 (1.1%)
			Mentoring and role-modelling EBP	4 (0.3%)
			Ensuring group remains on task and things are not missed (process/methodology is followed)	2 (0.1%)
	Problem-solving	82 (5.9%)	Networking	44 (3.2%)
			Problem-solving and addressing specific issues	37 (2.7%)
			Making changes to the developed plan as necessary	1 (0.1%)
	Effective communication	33 (2.4%)	Keeping group members informed	16 (1.2%)
			Providing regular communication (emails, phone calls)	16 (1.2%)
			Acting as a liaison	1 (1.2%)
Planning for change	Increasing awareness	180 (13.0%)	Emphasising enhanced patient outcomes as opposed to poor practice as reason for change	60 (4.3%)
			Highlighting a need for practice change	43 (3.1%)
			Stimulating critical inquiry and assisting groups to develop/refine specific clinical practice questions	39 (2.8%)
			Selecting an area for change relevant to staff/recognised as a priority	38 (2.7%)
	Developing a plan	100 (7.2%)	Goal-setting and assisting with development of an action plan	83 (6.0%)

			Displaying and generating enthusiasm at the start of the project	14 (1.0%)
			Helping identify and determine solutions to address potential barriers to EBP	3 (0.2%)
Other	Other	277 (19.9%)	Walkthrough	104 (7.5%)
			Other	60 (4.3%)
			Technical assistance	45 (3.2%)
			Other benefits	26 (1.9%)
			External incentives	21 (1.5%)
			Research results	21 (1.5%)
Evaluating change	Assessment	23 (1.7%)	Performing/assisting with evaluation	12 (0.9%)
			Acknowledging success, recognising and celebrating achievements	8 (0.6%)
			Linking evidence implementation to patient outcomes	3 (0.2%)

Appendix 15: Distribution of implementation strategies targeted at barriers

Barrier	Cause	Strategy	Frequency	
			n	%
Intervention characteristics	Characteristics of the individuals involved	Other	915	21.60
Process of implementation	Characteristics of the individuals involved	Planning for change	436	10.29
Intervention characteristics	Intervention characteristics	Other	348	8.22
Characteristics of the individuals involved	Characteristics of the individuals involved	Other	294	6.94
Process of implementation	Characteristics of the individuals involved	Leading and managing change	269	6.35
Characteristics of the individuals involved	Characteristics of the individuals involved	Planning for change	213	5.03
Intervention characteristics	Characteristics of the individuals involved	Planning for change	203	4.79
Characteristics of the individuals involved	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	156	3.68
Intervention characteristics	Intervention characteristics	Planning for change	122	2.88
Process of implementation	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	116	2.74
Process of implementation	Characteristics of the individuals involved	Other	106	2.50
Intervention characteristics	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	102	2.41
Intervention characteristics	Characteristics of the individuals involved	Leading and managing change	101	2.38

Characteristics of the individuals involved	Characteristics of the individuals involved	Leading and managing change	85	2.01
Process of implementation	Outer setting	Leading and managing change	79	1.86
Process of implementation	Outer setting	Planning for change	76	1.79
Process of implementation	Inner setting	Other	69	1.63
Inner setting	Inner setting	Leading and managing change	43	1.02
Process of implementation	Intervention characteristics	Monitoring progress and ongoing implementation	40	0.94
Characteristics of the individuals involved	Other	Other	30	0.71
Process of implementation	Inner setting	Leading and managing change	29	0.68
Inner setting	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	27	0.64
Characteristics of the individuals involved	Other	Planning for change	21	0.50
Characteristics of the individuals involved	Other	Monitoring progress and ongoing implementation	20	0.47
Process of implementation	Intervention characteristics	Leading and managing change	20	0.47
Process of implementation	Other	Planning for change	19	0.45
Process of implementation	Other	Other	17	0.40
Inner setting	Inner setting	Planning for change	15	0.35

Process of implementation	Intervention characteristics	Planning for change	14	0.33
Process of implementation	Inner setting	Planning for change	12	0.28
Intervention characteristics	Intervention characteristics	Leading and managing change	11	0.26
Characteristics of the individuals involved	Inner setting	Monitoring progress and ongoing implementation	10	0.24
Characteristics of the individuals involved	Inner setting	Planning for change	10	0.24
Intervention characteristics	Inner setting	Leading and managing change	10	0.24
Intervention characteristics	Intervention characteristics	Monitoring progress and ongoing implementation	10	0.24
Characteristics of the individuals involved	Inner setting	Leading and managing change	9	0.21
Inner setting	Inner setting	Monitoring progress and ongoing implementation	9	0.21
Other	Characteristics of the individuals involved	Leading and managing change	9	0.21
Process of implementation	Intervention characteristics	Other	9	0.21
Inner setting	Characteristics of the individuals involved	Leading and managing change	8	0.19
Intervention characteristics	Inner setting	Planning for change	8	0.19
Other	Inner setting	Leading and managing change	8	0.19

Process of implementation	Process of implementation	Monitoring progress and ongoing implementation	8	0.19
Process of implementation	Process of implementation	Planning for change	8	0.19
Characteristics of the individuals involved	Outer setting	Planning for change	7	0.17
Intervention characteristics	Inner setting	Monitoring progress and ongoing implementation	7	0.17
Characteristics of the individuals involved	Inner setting	Other	5	0.12
Other	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	5	0.12
Characteristics of the individuals involved	Intervention characteristics	Planning for change	4	0.09
Inner setting	Other	Leading and managing change	4	0.09
Intervention characteristics	Other	Leading and managing change	4	0.09
Other	Characteristics of the individuals involved	Planning for change	4	0.09
Outer setting	Characteristics of the individuals involved	Other	4	0.09
Outer setting	Outer setting	Leading and managing change	4	0.09
Characteristics of the individuals involved	Intervention characteristics	Monitoring progress and ongoing implementation	3	0.07
Inner setting	Inner setting	Evaluating change	3	0.07
Inner setting	Inner setting	Other	3	0.07

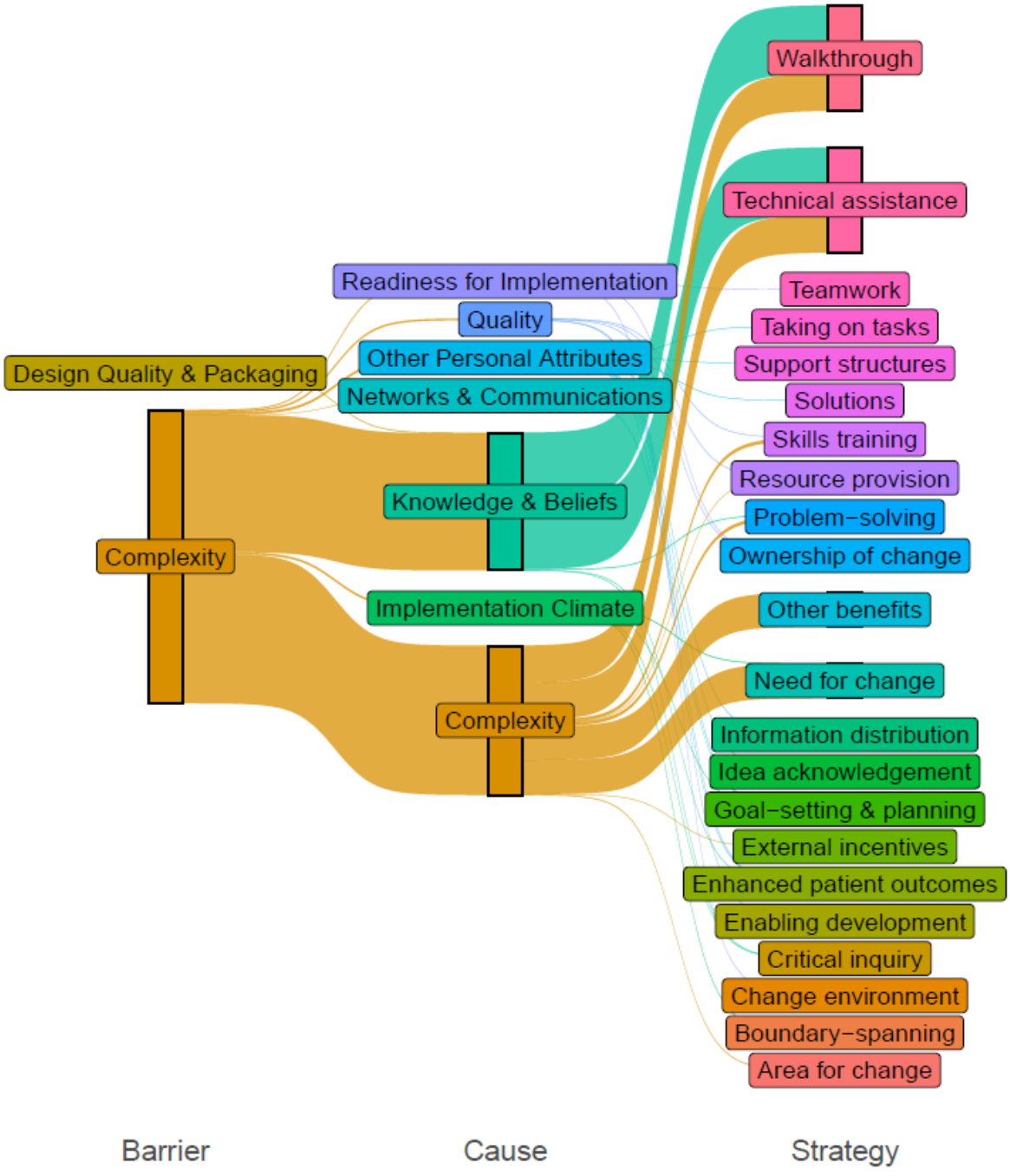
Other	Characteristics of the individuals involved	Other	3	0.07
Outer setting	Characteristics of the individuals involved	Leading and managing change	3	0.07
Outer setting	Characteristics of the individuals involved	Planning for change	3	0.07
Process of implementation	Characteristics of the individuals involved	Evaluating change	3	0.07
Process of implementation	Inner setting	Monitoring progress and ongoing implementation	3	0.07
Process of implementation	Other	Leading and managing change	3	0.07
Characteristics of the individuals involved	Characteristics of the individuals involved	Evaluating change	2	0.05
Characteristics of the individuals involved	Other	Leading and managing change	2	0.05
Characteristics of the individuals involved	Process of implementation	Planning for change	2	0.05
Other	Inner setting	Planning for change	2	0.05
Other	Other	Monitoring progress and ongoing implementation	2	0.05
Other	Other	Planning for change	2	0.05
Other	Outer setting	Planning for change	2	0.05
Outer setting	Inner setting	Leading and managing change	2	0.05
Outer setting	Inner setting	Planning for change	2	0.05
Outer setting	Other	Other	2	0.05
Characteristics of the individuals involved	Intervention characteristics	Other	1	0.02
Characteristics of the individuals involved	Outer setting	Leading and managing change	1	0.02

Inner setting	Characteristics of the individuals involved	Other	1	0.02
Inner setting	Other	Planning for change	1	0.02
Inner setting	Outer setting	Planning for change	1	0.02
Intervention characteristics	Inner setting	Evaluating change	1	0.02
Intervention characteristics	Other	Planning for change	1	0.02
Other	Characteristics of the individuals involved	Evaluating change	1	0.02
Other	Inner setting	Monitoring progress and ongoing implementation	1	0.02
Other	Inner setting	Other	1	0.02
Other	Intervention characteristics	Leading and managing change	1	0.02
Other	Intervention characteristics	Monitoring progress and ongoing implementation	1	0.02
Other	Intervention characteristics	Planning for change	1	0.02
Other	Other	Leading and managing change	1	0.02
Other	Outer setting	Leading and managing change	1	0.02
Outer setting	Other	Leading and managing change	1	0.02
Process of implementation	Inner setting	Evaluating change	1	0.02

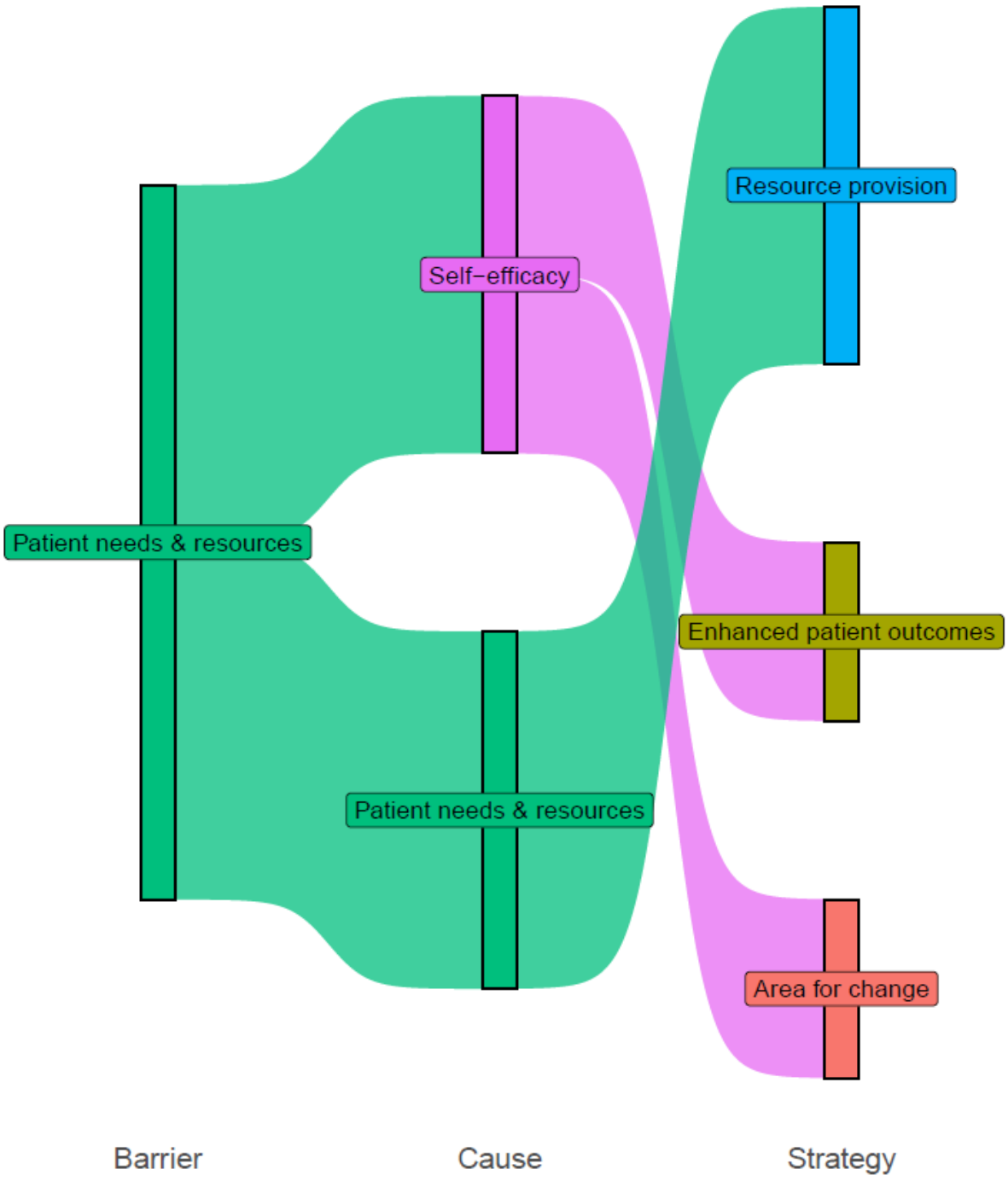
Appendix 16: Detailed Sankey diagrams for barriers

ADDITIONAL SANKEY DIAGRAMS FOR SUCCESFUL STRATEGIES

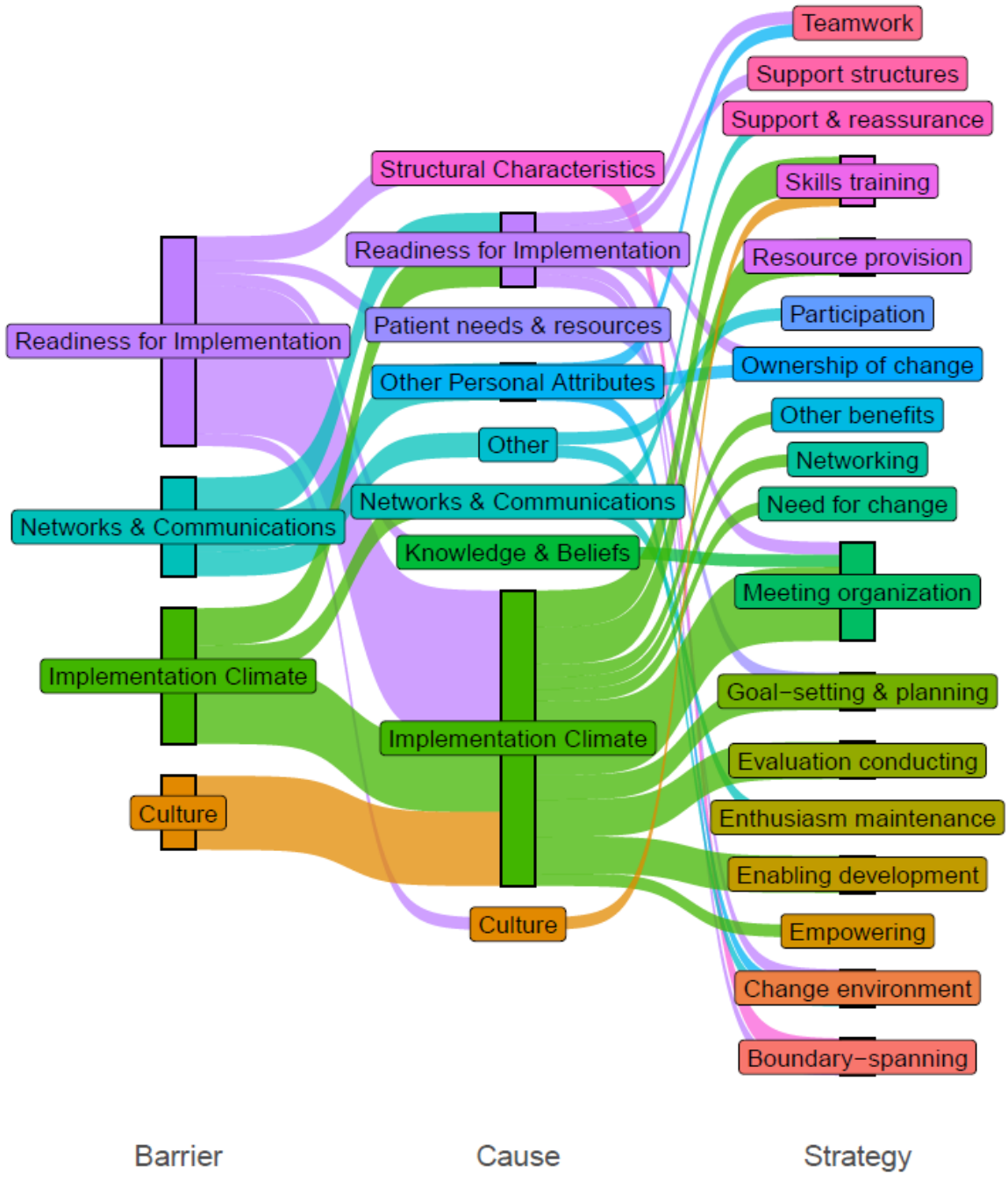
Barriers effectively overcome in 'Intervention characteristics' domain



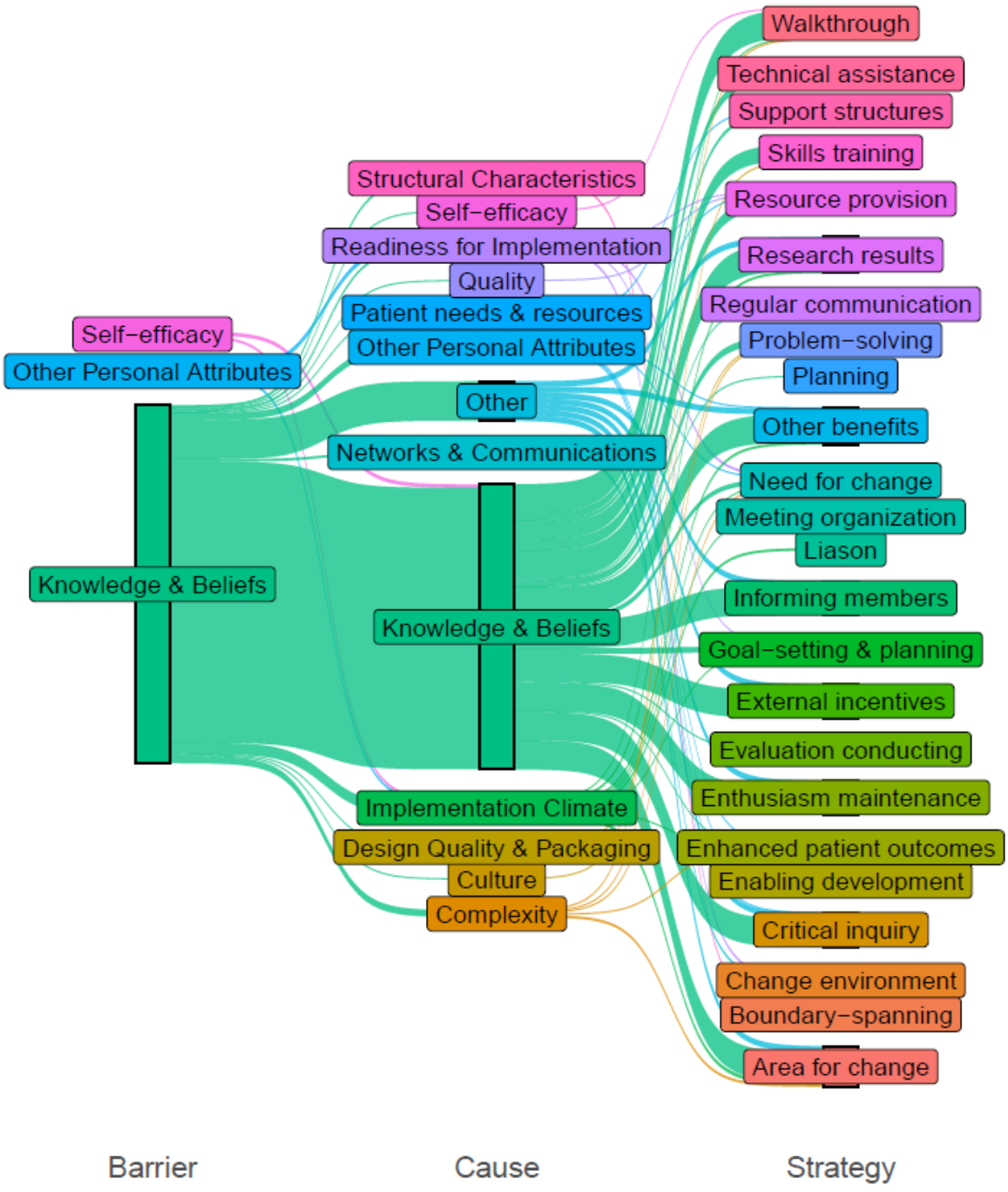
Barriers effectively overcome in 'Outer setting' domain



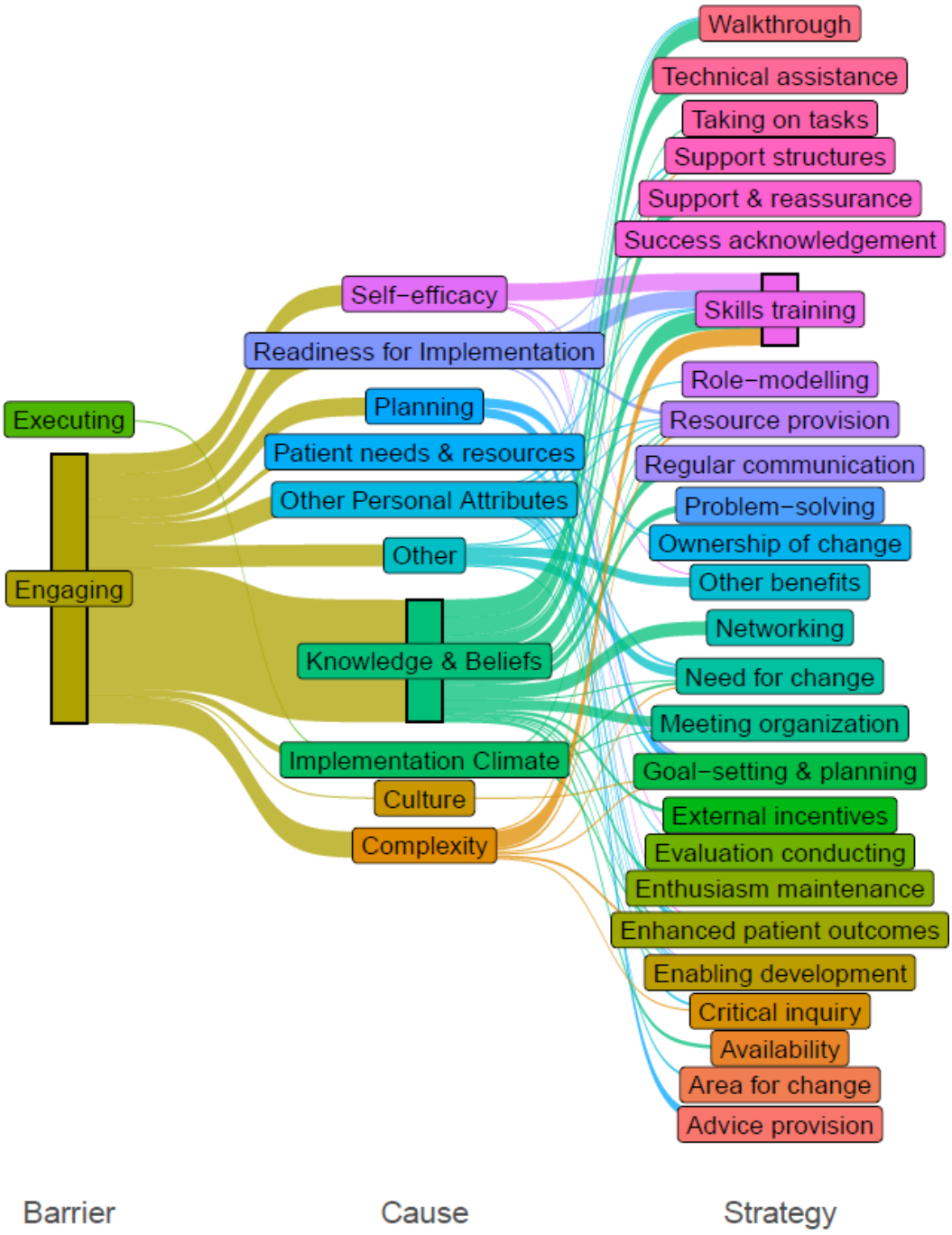
Barriers effectively overcome in 'Inner setting' domain



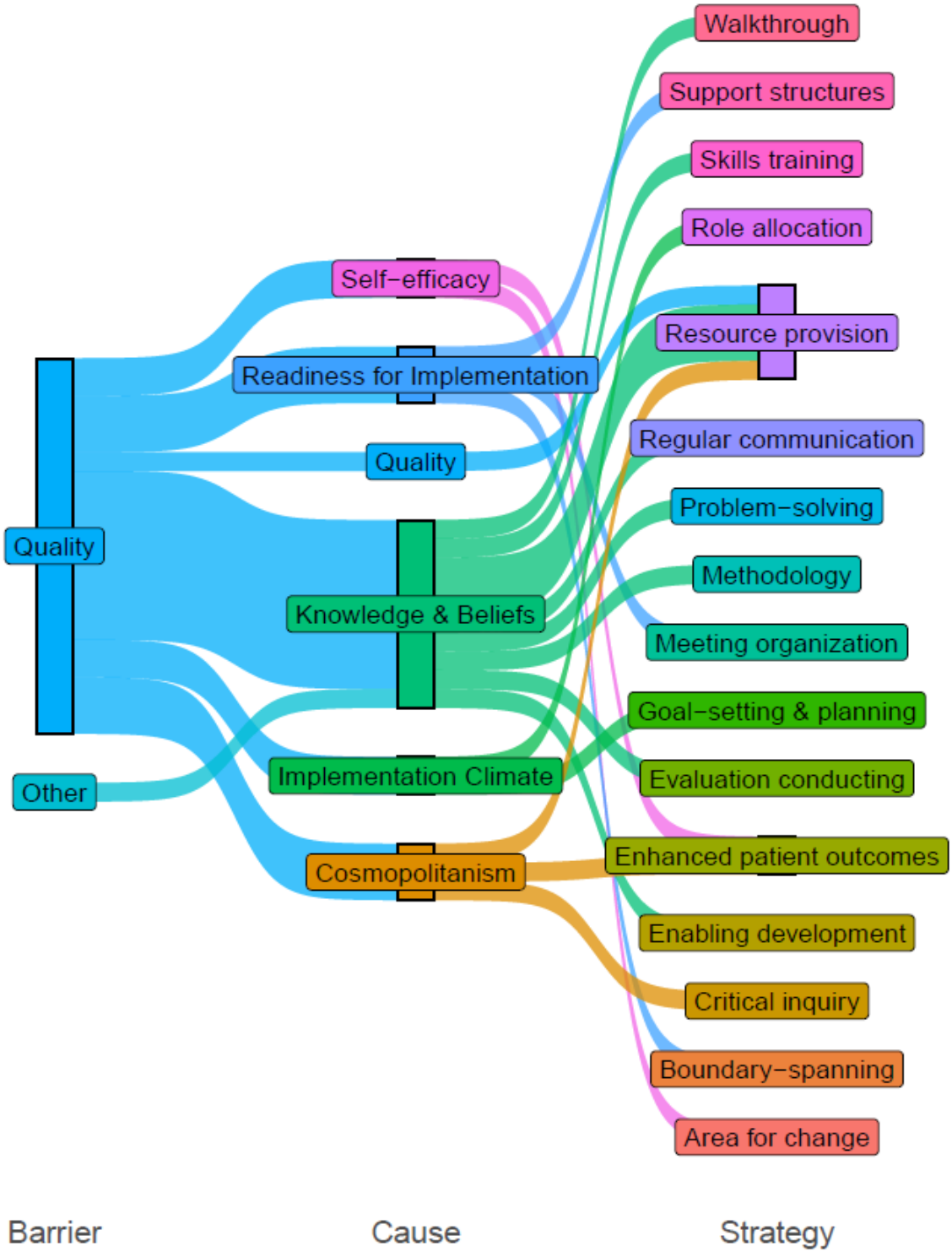
Barriers effectively overcome in 'Characteristics of the individuals involved' domain



Barriers effectively overcome in 'Process of implementation' domain

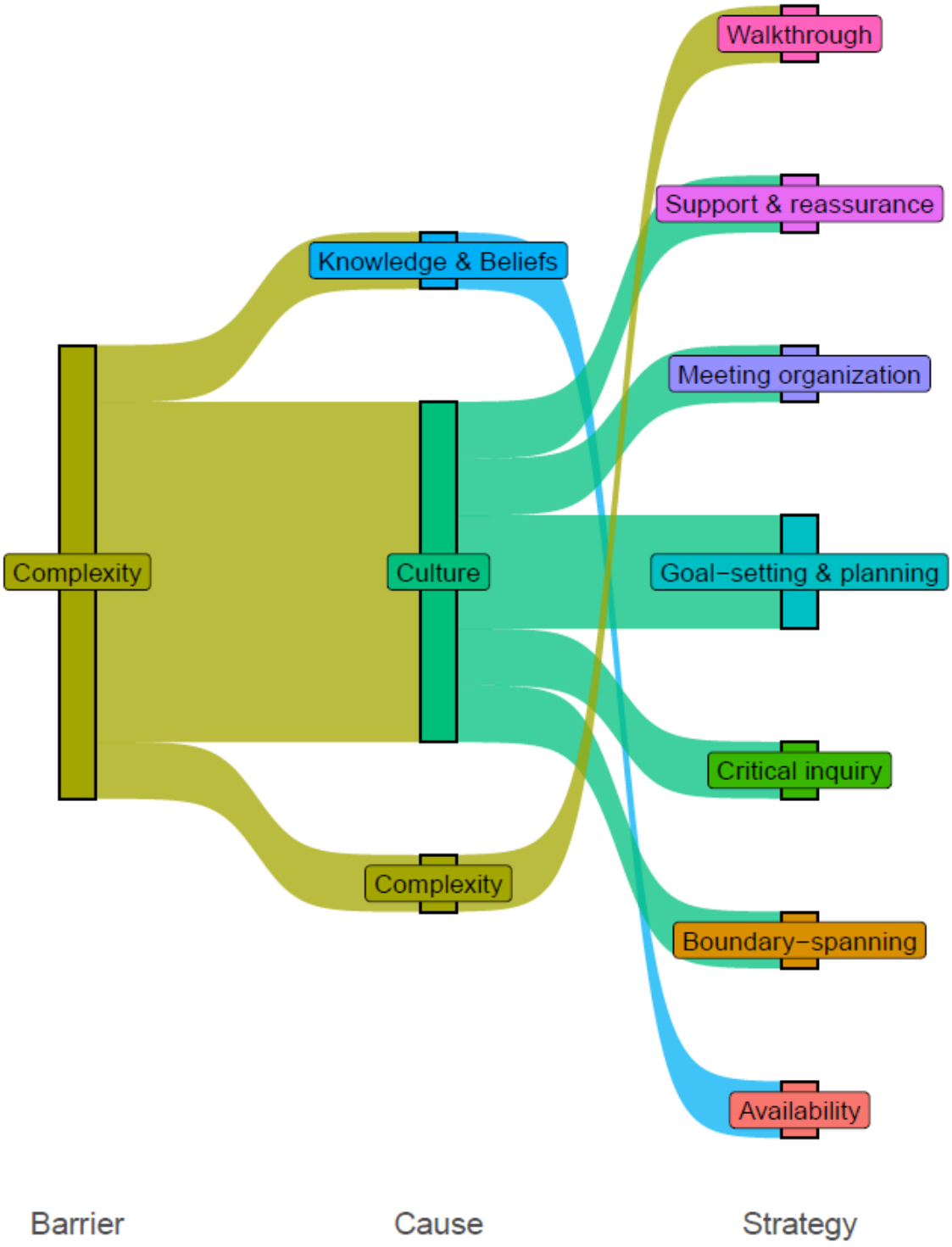


Barriers effectively overcome in 'Other' domain

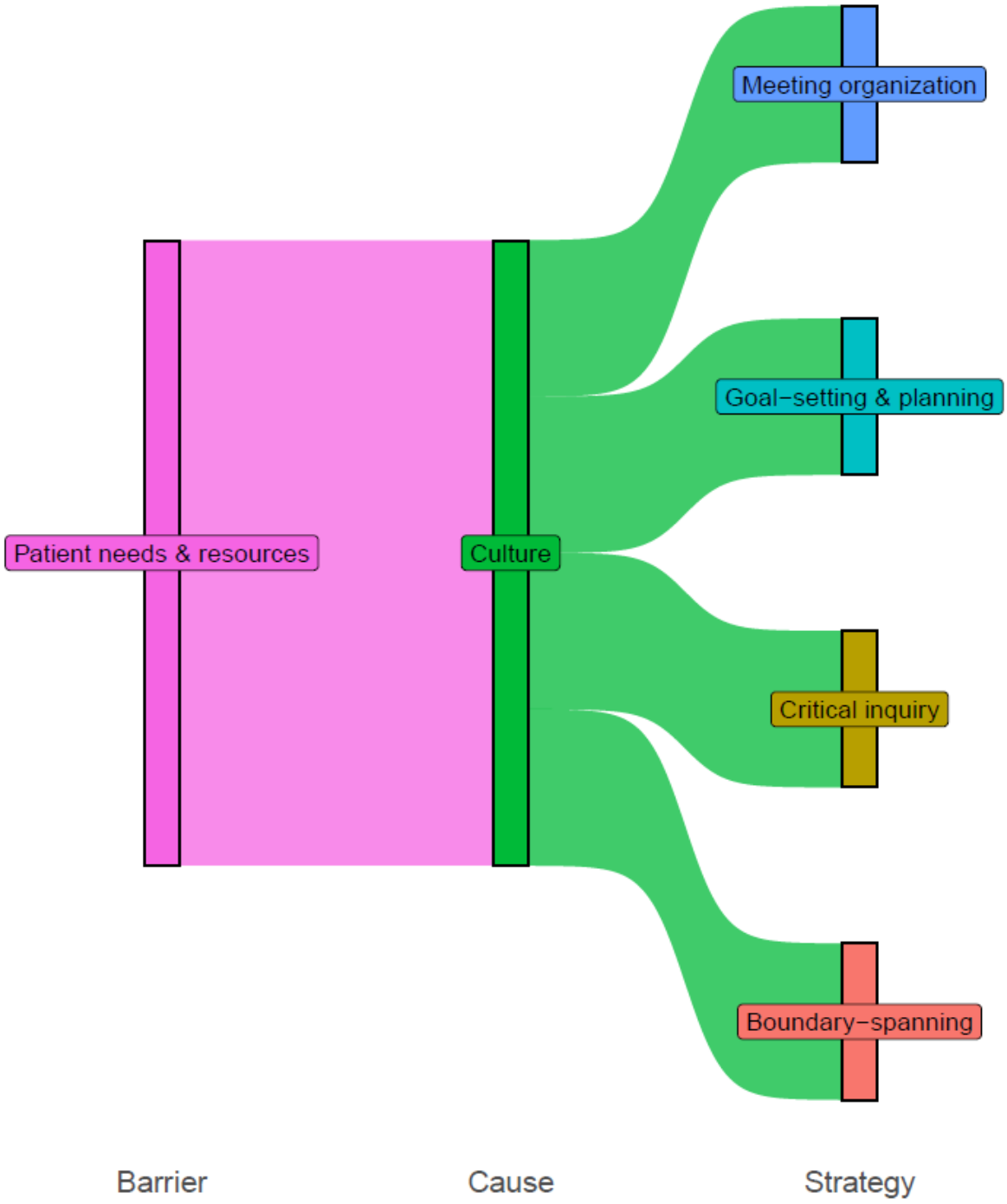


ADDITIONAL SANKEY DIAGRAMS FOR UNSUCCESFUL STRATEGIES

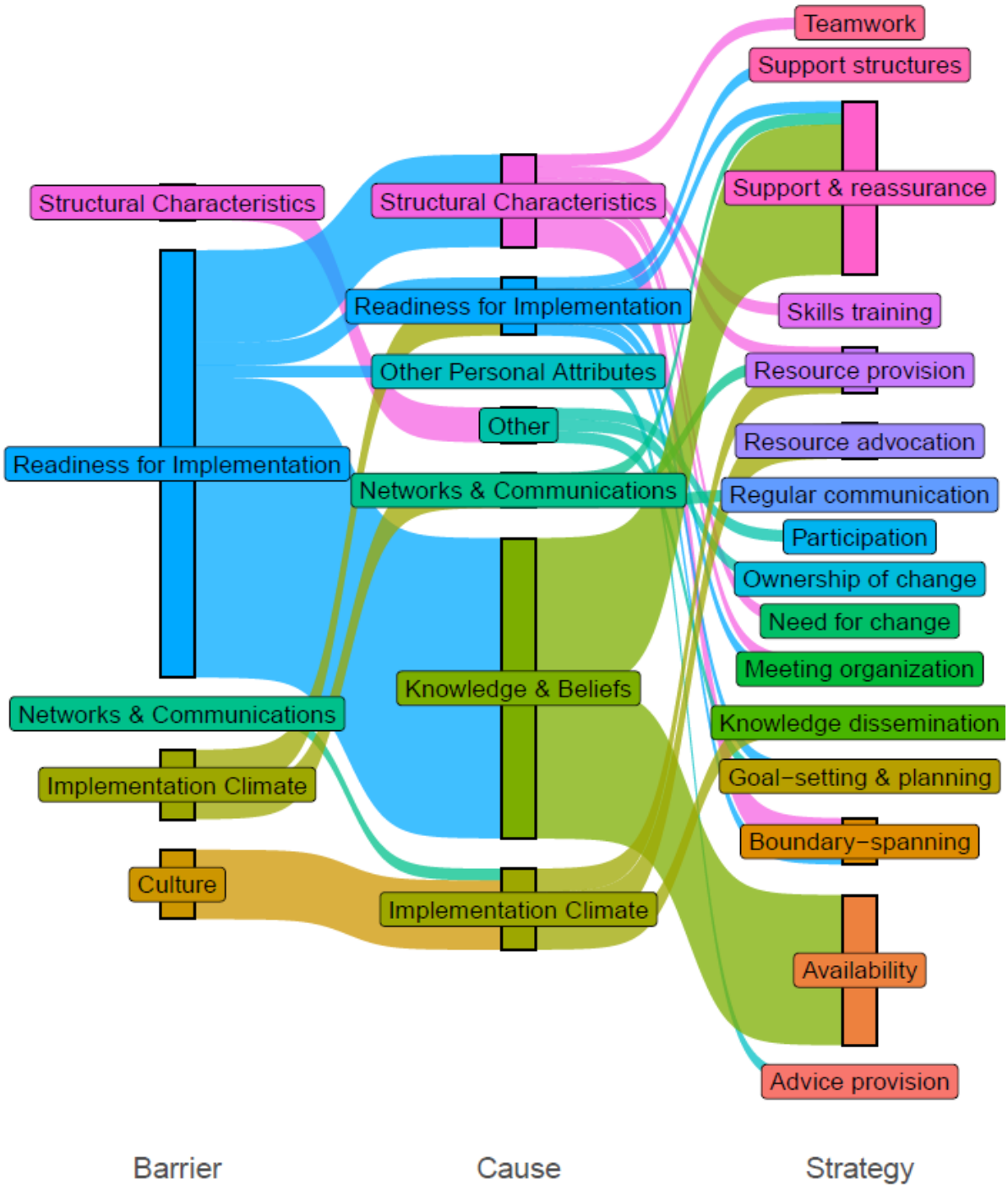
Barriers not overcome in 'Intervention characteristics' domain



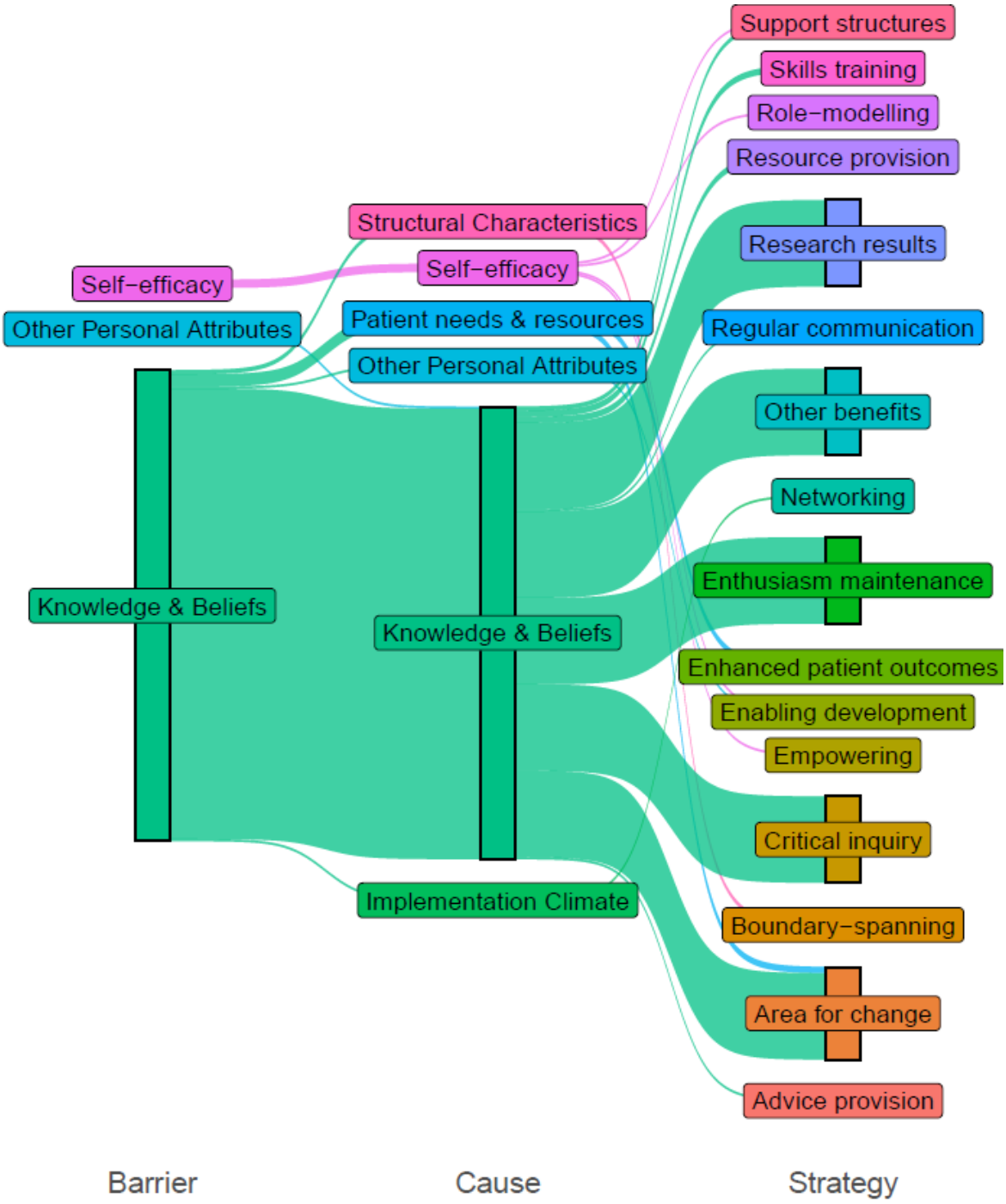
Barriers not overcome in 'Outer setting' domain



Barriers not overcome in 'Inner setting' domain

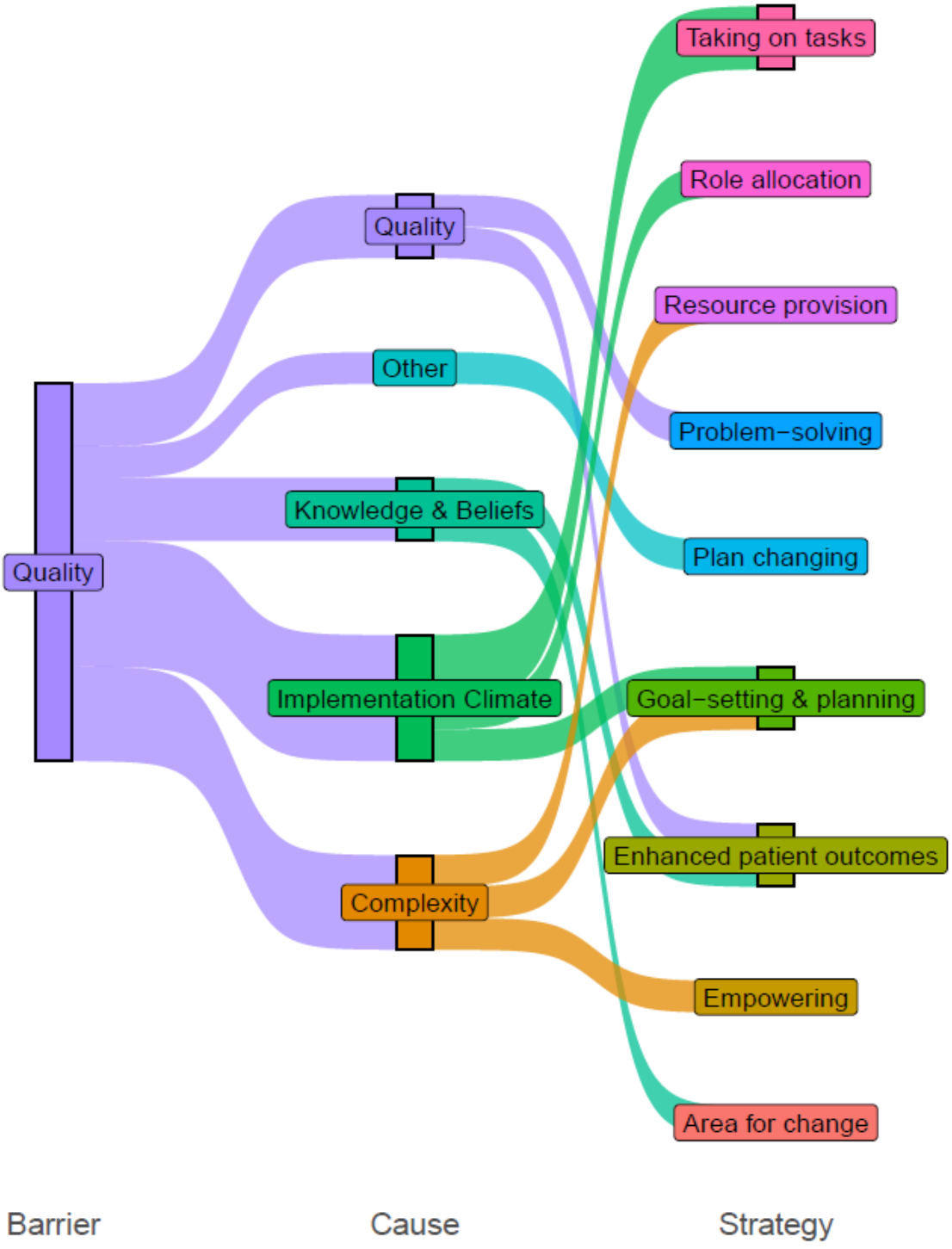


Barriers not overcome in 'Characteristics of the individuals involved' domain



Barriers not overcome in 'Process of implementation' domain

Barriers not overcome in 'Other' domain



Appendix 17: Distribution of effective implementation strategies targeted at facilitators

Facilitator	Cause	Strategy	Frequency	
			n	%
Characteristics of the individuals involved	Process of implementation	Monitoring progress and ongoing implementation	10	9.3
Process of implementation	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	10	9.3
Characteristics of the individuals involved	Process of implementation	Leading and managing change	9	8.4
Characteristics of the individuals involved	Characteristics of the individuals involved	Leading and managing change	5	4.7
Characteristics of the individuals involved	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	5	4.7
Characteristics of the individuals involved	Characteristics of the individuals involved	Planning for change	5	4.7
Inner setting	Characteristics of the individuals involved	Leading and managing change	5	4.7
Characteristics of the individuals involved	Outer setting	Leading and managing change	4	3.7
Inner setting	Inner setting	Monitoring progress and ongoing implementation	4	3.7
Characteristics of the individuals involved	Outer setting	Monitoring progress and ongoing implementation	3	2.8
Characteristics of the individuals involved	Process of implementation	Evaluating change	3	2.8
Intervention characteristics	Inner setting	Leading and managing change	3	2.8
Outer setting	Process of implementation	Monitoring progress and ongoing implementation	3	2.8
Process of implementation	Inner setting	Planning for change	3	2.8

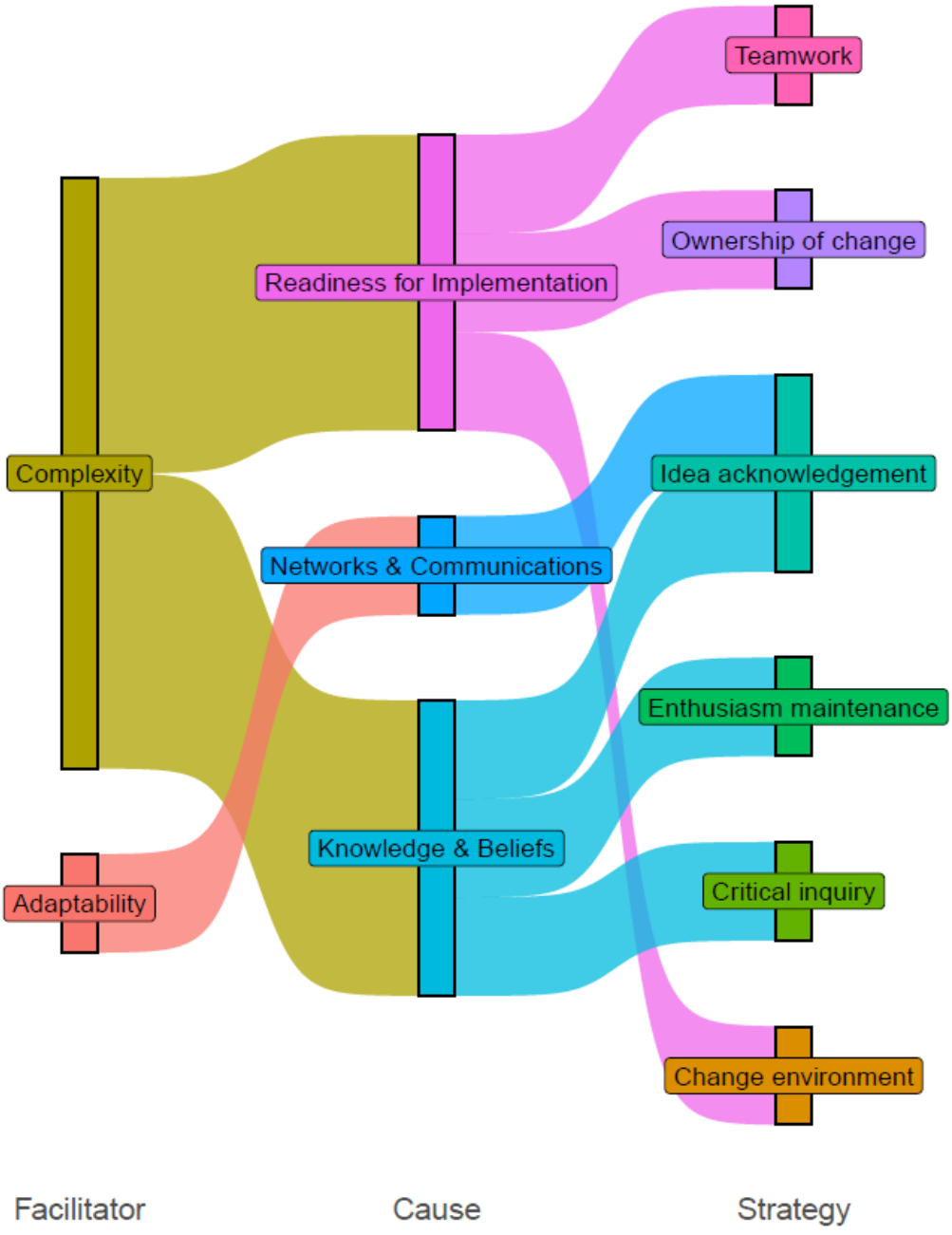
Characteristics of the individuals involved	Characteristics of the individuals involved	Evaluating change	2	1.9
Characteristics of the individuals involved	Inner setting	Planning for change	2	1.9
Characteristics of the individuals involved	Other	Leading and managing change	2	1.9
Characteristics of the individuals involved	Outer setting	Other	2	1.9
Characteristics of the individuals involved	Outer setting	Planning for change	2	1.9
Inner setting	Characteristics of the individuals involved	Evaluating change	2	1.9
Intervention characteristics	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	2	1.9
Process of implementation	Intervention characteristics	Leading and managing change	2	1.9
Process of implementation	Outer setting	Leading and managing change	2	1.9
Process of implementation	Outer setting	Monitoring progress and ongoing implementation	2	1.9
Process of implementation	Process of implementation	Leading and managing change	2	1.9
Characteristics of the individuals involved	Inner setting	Other	1	0.9
Characteristics of the individuals involved	Other	Other	1	0.9
Characteristics of the individuals involved	Process of implementation	Planning for change	1	0.9
Inner setting	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	1	0.9
Intervention characteristics	Characteristics of the individuals involved	Planning for change	1	0.9
Intervention characteristics	Inner setting	Monitoring progress and ongoing implementation	1	0.9

Outer setting	Characteristics of the individuals involved	Leading and managing change	1	0.9
Outer setting	Characteristics of the individuals involved	Monitoring progress and ongoing implementation	1	0.9
Outer setting	Process of implementation	Leading and managing change	1	0.9
Process of implementation	Characteristics of the individuals involved	Evaluating change	1	0.9
Process of implementation	Inner setting	Leading and managing change	1	0.9
Process of implementation	Inner setting	Monitoring progress and ongoing implementation	1	0.9
Process of implementation	Intervention characteristics	Monitoring progress and ongoing implementation	1	0.9

Appendix 18: Detailed Sankey diagrams for facilitators

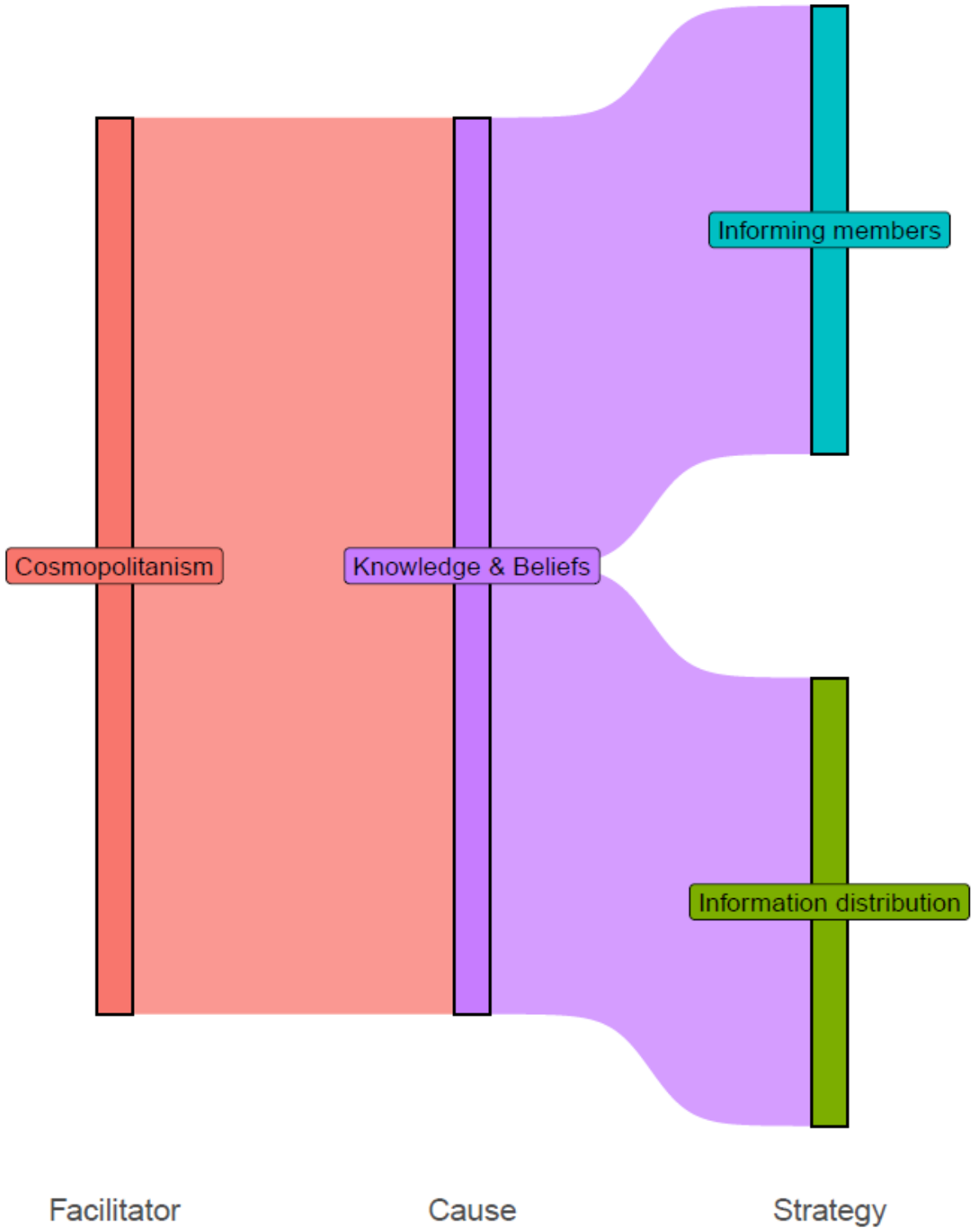
ADDITIONAL SANKEY DIAGRAMS FOR SUCCESFUL STRATEGIES[15]

Facilitators effectively reinforced in 'Intervention characteristics' domain

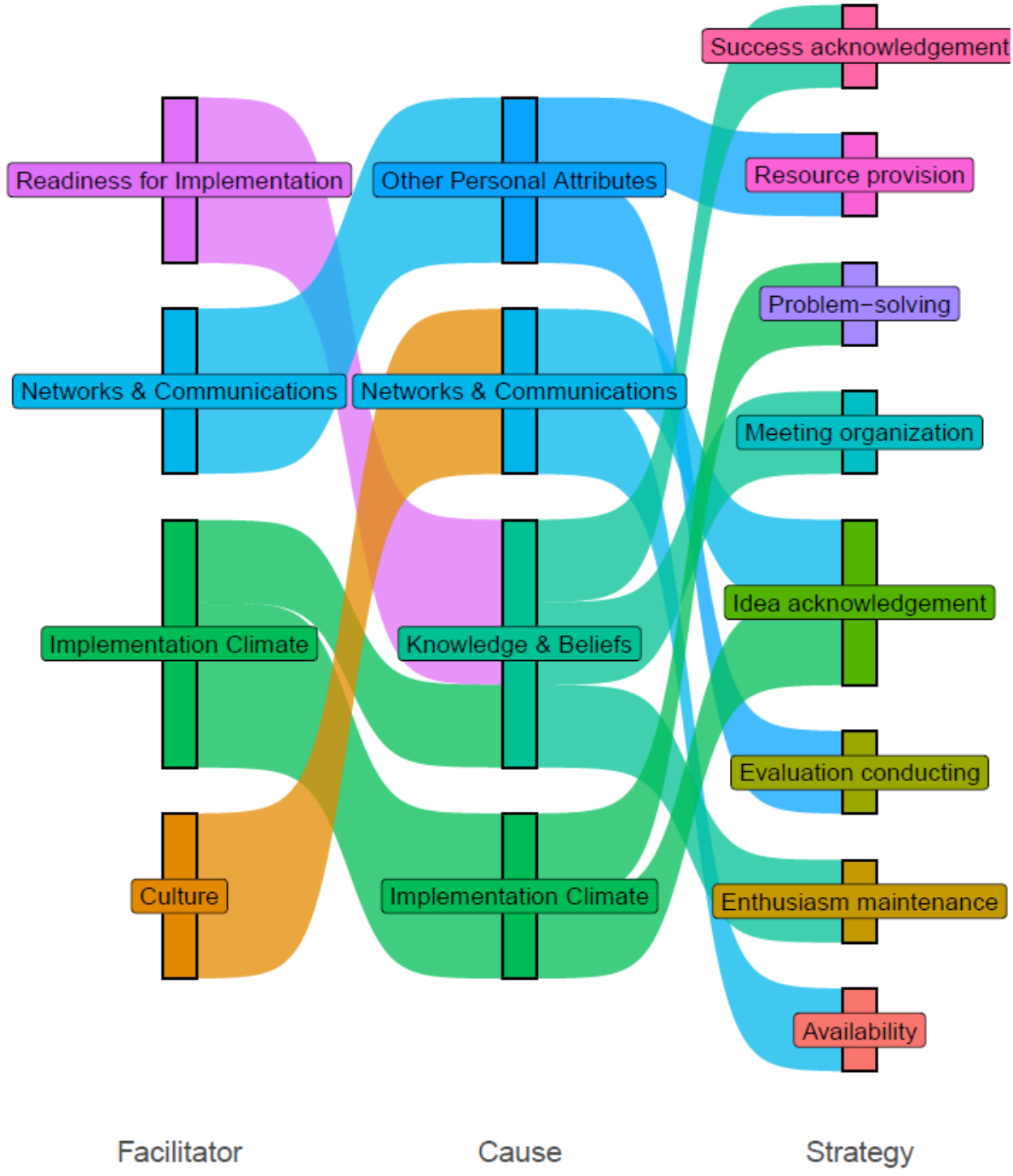


[15] Sankey diagrams were only created for effective strategies, as the sample size for ineffective strategies was too small.

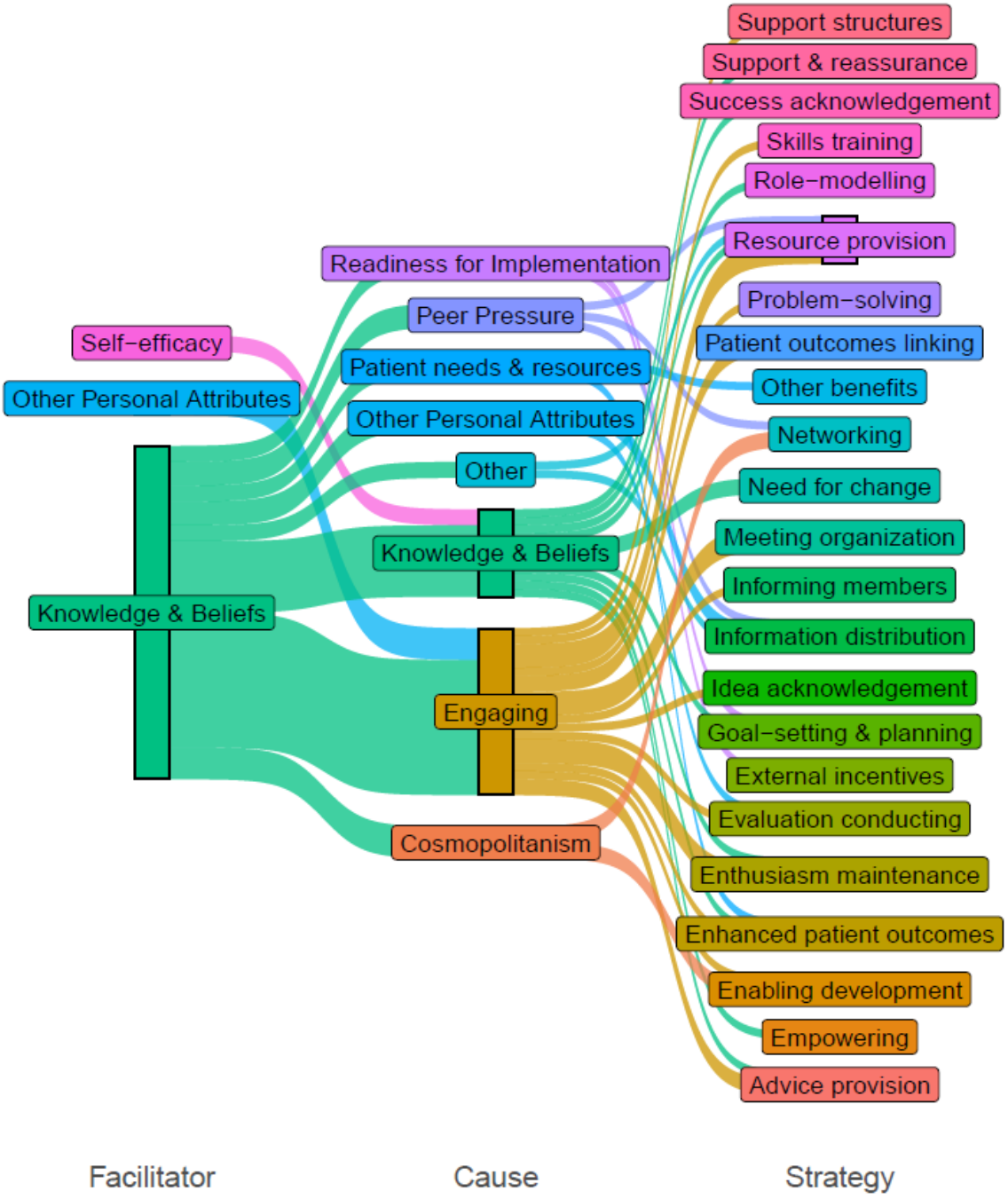
Facilitators effectively reinforced in 'Outer setting' domain



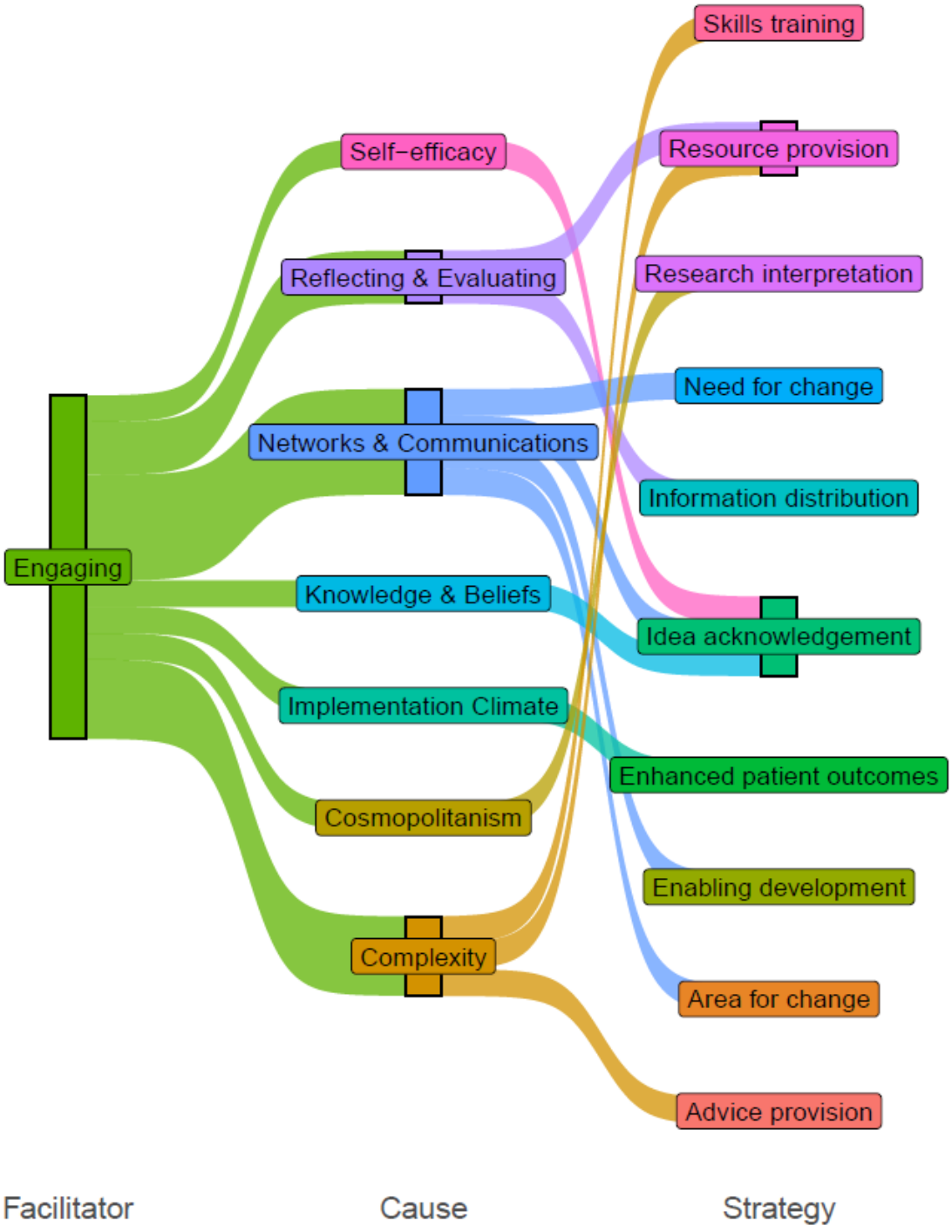
Facilitators effectively reinforced in 'Inner setting' domain



Facilitators effectively reinforced in 'Characteristics of the individuals involved' domain



Facilitators effectively reinforced in 'Process of implementation' domain



Facilitators effectively reinforced in 'Other' domain