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What Must Change When Pharmaceutical Care Crosses Borders? Adapting Clinical Services to Workforce Capacity, Regulation, Supply Reliability, and Patient Trust

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ABSTRACT

Pharmaceutical-care services are increasingly transferred across jurisdictions through policy borrowing, professional expansion, implementation programmes, and adaptation of established community-pharmacy models. Yet a service that is effective in one setting cannot be assumed to remain operationally equivalent when introduced into a health system with different professional authority, workforce capacity, medicine availability, financing arrangements, information infrastructure, and patient expectations of pharmacists. This article develops a theory-building account of cross-border pharmaceutical-care transfer centered on the distinction between a service function and its local delivery form. A service function refers to the clinically or organizationally necessary work through which an intended medication-use purpose is achieved. Delivery form describes the personnel, workflow, regulatory permissions, payment arrangements, information channels, supply conditions, and encounter characteristics through which that work is carried out locally. Evidence from community-pharmacy implementation, workforce development, medicines shortages, prescribing policy, digital communication, care transitions, financing, and patient trust indicates that these conditions are analytically separable but operationally interdependent. Cross-border transfer should consequently be judged by whether locally adapted arrangements preserve the intended function under target-system conditions, rather than by visual or procedural similarity to the source service. The article advances functional equivalence as an evaluative principle for distinguishing acceptable adaptation from redesign that alters or compromises the intended service function. This approach shifts cross-country comparison away from intervention labels and broad cultural explanations toward explicit institutional, material, informational, and relational mechanisms that can be observed, tested, and modified.

Keywords: Pharmaceutical care, Community pharmacy services, Cross-country implementation, Scope of practice, Pharmacy workforce, Medicines supply

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Introduction

Pharmaceutical care encompasses a wide range of pharmacist-led activities intended to improve medication use, identify or resolve medicine-related problems, support adherence, monitor treatment, and contribute to patient-centered outcomes. The accumulated evidence indicates that such services can improve several clinical and behavioral outcomes, although economic and humanistic findings remain less consistent across service types and evidence syntheses [1]. This heterogeneity matters when services travel between health systems. Evidence that a pharmaceutical-care intervention performs well in one jurisdiction establishes neither that its operational assumptions exist elsewhere nor that the same configuration of personnel, authority, workflow, resources, and

patient interaction can be reproduced without modification. Cross-border transfer thus poses a different question from whether pharmaceutical care can be effective in principle.

Comparative experience already shows that apparently similar community-pharmacy sectors can support substantially different service portfolios. Austria, England, Estonia, and Portugal, for example, differed in which community-pharmacy services were available or permitted and in the institutional drivers associated with their development [2]. Such differences caution against using national culture as a residual explanation for service performance. Legal authority, commissioning arrangements, workforce organization, information exchange, medicine-supply systems, and historical service roles can vary independently even among countries with broadly comparable levels of health-system development. When these conditions change, a service bearing the same name may represent a materially different clinical opportunity for patients.

Implementation research also shows that the conditions governing service delivery rarely operate as isolated barriers. In a large community-pharmacy implementation programme, determinants and implementation strategies formed numerous interdependent relationships, indicating that changes in workflow, organizational support, professional motivation, patient recruitment, and external facilitation can reinforce or constrain one another [3]. A cross-border transfer decision based on a checklist of isolated contextual variables may consequently miss the way one condition changes the practical meaning of another. Adequate workforce numbers, for example, offer limited protection if legal scope is narrow; expanded scope can remain unused where reimbursement is absent; digital referral systems cannot guarantee continuity if receiving pharmacies lack time, information access, or an agreed responsibility for acting on the referral.

The pharmacy literature has begun to address this challenge explicitly by distinguishing adoption of a professional pharmacy service from adaptation of that service to a new implementation environment [4]. The unresolved issue is what exactly should be preserved during such adaptation. Treating the source intervention label as the transferable object risks making procedural fidelity the objective even when the target setting cannot support the original workflow. At the opposite extreme, unrestricted adaptation can alter the clinical work so substantially that the transferred service no longer performs the function that justified it. The central question of this article is consequently: which features of pharmaceutical-care services must be adapted when models cross countries with different workforce capacity, professional regulation, medicine supply, financing, information infrastructure, and patient trust?

The proposed answer begins with a distinction between service function and delivery form. Service function denotes the clinically or organizationally necessary work through which the service is expected to achieve its medication-use purpose. Delivery form denotes the local arrangement through which that work occurs, including who performs it, under what authority, with what information and medicines, through which workflow, under what payment conditions, and within what kind of patient-professional relationship. Transfer can preserve the former while modifying the latter. Whether that preservation has actually occurred is an empirical question that must ultimately be judged through target-context performance rather than assumed from similarity to the source model.

Service functions and locally variable delivery forms

Real-world pharmacy services provide a useful basis for separating these two levels. A realist evaluation of extended pharmacist roles in Aotearoa New Zealand found that service development depended on combinations of contextual conditions and mechanisms, including funding, time, training, workforce arrangements, professional relationships, and organizational support [5]. The importance of these combinations suggests that a service cannot be adequately described only through its visible clinical activity. Two pharmacies may both offer a medication-focused consultation, yet one may perform it through scheduled appointments with access to shared records and funded pharmacist time, while another attempts to deliver the same nominal service opportunistically during dispensing without comparable information or protected capacity. The activity label is identical; the operating system is not.

Implementation studies of more narrowly specified services reinforce this distinction. A scoping review of point-of-care testing in community pharmacies identified determinants spanning the intervention itself, organizational conditions, professional characteristics, and the wider implementation environment [6]. These factors do not redefine the diagnostic purpose of testing, but they influence whether that purpose can be achieved safely and consistently. A service description that specifies the test while leaving training, workflow integration, referral

responsibilities, equipment, documentation, and follow-up implicit contains insufficient information for transfer. What appears to be a standardized service can depend on multiple hidden delivery assumptions.

The same issue becomes visible when a service is designed prospectively. Work examining a community-pharmacy bladder and bowel service identified requirements related to capability, opportunity, motivation, training, workforce, funding, information technology, policy support, and interprofessional participation [7]. These conditions belong to different analytical domains. Training concerns whether the workforce can undertake the task; staffing concerns whether sufficient capacity exists; commissioning determines whether time and infrastructure can be sustained; information technology determines whether relevant information can be accessed or transmitted; and professional relationships influence whether referrals and subsequent actions occur. Collapsing these conditions under a single category such as "context" obscures which component must actually change when a service moves.

The transferable object is better understood as the set of functions required to produce the intended medication-use contribution. A clinical assessment function, for example, may require adequate patient information, appropriately trained personnel, authority to make or communicate a decision, and a mechanism for acting on that decision. The exact professional title, consultation format, documentation platform, referral route, or payment mechanism may differ between systems without necessarily changing that function. Conversely, a service may preserve its original forms while losing its function if the target context deprives those forms of their practical effect.

This distinction also changes how fidelity should be interpreted. Procedural similarity is valuable when the procedure itself is essential to safety or effectiveness, but it should not become a proxy for successful transfer. Some components of a service are intrinsically function-bearing and should remain stable; others are implementation arrangements that can legitimately vary. The task is to identify which is which before attempting replication. That judgment should remain tied to observable performance. International work on pharmaceutical-care quality indicators defines quality measurement across structural, process, and outcome dimensions [8]. These dimensions provide a useful basis for testing whether an adapted service still possesses the structures necessary for operation, executes the processes that constitute the intended pharmaceutical-care work, and produces outcomes compatible with its purpose.

The practical implication is that transfer planning should begin by decomposing the source service into required functions and the conditions through which those functions are currently delivered. The comparison with the target setting can then ask which conditions are already present, which can be substituted, and which require redesign. This preserves clinical purpose without treating the source system's organizational history as part of the intervention itself.

The distinction becomes clearest when individual service functions are examined against the delivery arrangements on which their execution depends.

Table 1. Preserving pharmaceutical-care functions while changing their local delivery form

Pharmaceutical-care function	What must remain functionally intact	Delivery form that may legitimately vary	Target-context condition that may force adaptation	Signal that literal replication is failing	Evaluation emphasis
Medication-related assessment	Sufficient information must be obtained to identify clinically relevant medicine-use problems	Consultation setting, interview sequence, record platform, appointment model, participating professional	Information access, pharmacist training, workload, legal role	Assessment is nominally completed but clinically relevant information is unavailable or cannot be acted upon	Information completeness, process quality, actionable problem identification

Treatment optimization	A clinically justified medicine-related decision must reach a professional or system able to implement it	Pharmacist prescribing, collaborative agreement, recommendation to prescriber, protocol-based action	Scope of practice, interprofessional rules, authorization pathways	Problems are recognized but decisions repeatedly stall because no actor has usable authority	Decision completion, handoff reliability, timeliness
Monitoring and follow-up	Relevant response, adherence, safety, or implementation information must be reassessed over an appropriate interval	In-person review, telephone contact, digital follow-up, shared-record review	Staffing, digital infrastructure, reimbursement, continuity mechanisms	The initial intervention occurs but subsequent response or risk cannot be observed	Follow-up completion, continuity, escalation where required
Patient communication and support	Patients must receive and be able to engage with information needed for medicine use and decision-making	Counseling format, digital tools, written material, language support, appointment length	Communication resources, access, patient expectations, trust, digital capability	Information is delivered but does not generate disclosure, understanding, or usable engagement	Participation, comprehension, communication quality
Coordination across care settings	Relevant medicine information and responsibility must move with the patient	Electronic referral, shared record, formal handover, pharmacist-to-pharmacist or pharmacist-to-prescriber communication	Interoperability, institutional responsibility, professional access rights	Responsibility or information is lost at organizational boundaries	Referral completion, information continuity, role clarity
Access to intended therapy	The medication-related decision must be capable of being realized through obtainable treatment	Local product selection, substitution route, procurement channel, formulary or dispensing pathway	Supply reliability, reimbursement, regulation, affordability	Clinically appropriate recommendations cannot be implemented because treatment is unavailable or inaccessible	Treatment obtained, substitution reliability, continuity of supply

Note: The table represents the article's proposed synthesis of service functions and adaptable delivery forms. The examples do not imply that every pharmaceutical-care service requires every listed function or that the same evaluation indicators are appropriate in all settings.

Authority and capability define the feasible clinical task

Once the service function has been identified, the next question is who can perform it and under what conditions. Workforce capacity is often represented through numbers of pharmacists or pharmacy staff, yet numerical availability provides only one component of functional capacity. Advanced-practice development requires competencies that can be defined, taught, assessed, and translated into local professional roles. International work on a global advanced pharmacy workforce framework has accordingly emphasized staged development and validation across professional and cultural settings [9]. This supports treating capability as an attribute that must be established for the work being transferred, rather than inferred from a professional title.

Operational capacity also depends on whether skilled personnel have sufficient time and organizational support to use those skills. Implementation of a community-pharmacy fall-prevention service demonstrated the practical importance of staffing, time, collaboration, training, and professional motivation [10]. These determinants show

why an intervention can be within pharmacists' theoretical competence while remaining infeasible within routine workload. A country-to-country comparison based only on pharmacist density would miss whether pharmacists are expected simultaneously to dispense, supervise staff, conduct consultations, document care, communicate with other professionals, and absorb unfunded service activity.

Professional roles can create a further distinction between capability and enactment. Community-pharmacy service providers and developers have described clinical service implementation as a complex change process involving expectations about professional practice and the conditions supporting new roles [11]. A pharmacist may possess the technical competence to perform a clinical activity without that activity being established as routine work, accepted by colleagues, integrated into workflow, or recognized by patients. Transfer planning must consequently consider the transition from individual competence to collectively enacted service responsibility.

These determinants also interact at organizational level. Network analysis of a medication-review implementation programme found relationships among workflow, pharmacist motivation, patient recruitment, leadership, implementation support, and other facilitating or hindering factors [12]. This means that workforce capability should not be treated as a fixed input that can be inserted into any service model. Protected time can change whether training is usable; leadership can change whether workflow is reorganized; external support can alter the effect of local motivation; and recruitment processes can determine whether trained pharmacists actually encounter eligible patients. The effective unit of transfer is the service-in-system, not the trained professional in isolation.

Training infrastructure nevertheless remains a crucial mechanism for creating capability. A nationwide Turkish implementation programme demonstrated how continuing professional development could be used to disseminate pharmaceutical-care practice through the community-pharmacy workforce [13]. Such evidence supports investment in structured workforce development when a target service requires competencies that are not yet routinely exercised. Training should, however, be interpreted as one condition in a larger operating configuration. Competence cannot substitute for insufficient staffing, incompatible workflows, missing information, weak interprofessional pathways, or absent authority.

Professional regulation adds another layer. Comparative evidence already shows that countries differ in the services community pharmacists are permitted to provide [2]. In transfer terms, the key distinction is between what a workforce can do competently and what it may do within its legal and professional scope. These conditions may align, but they need not. A service can require adaptation when pharmacists in the target system possess the underlying clinical competence yet lack authority to initiate the same action undertaken by pharmacists in the source system. In such cases, the function may still be preserved through a different decision pathway—for example, structured recommendation, collaborative practice, protocol-based action, or referral—provided that the alternative arrangement remains timely and capable of producing the intended medication-use consequence.

This creates an important boundary for cross-border comparison. Differences in professional scope should not automatically be interpreted as evidence that one system cannot deliver the underlying service function. The more informative question is whether another authorized route can perform the same clinically necessary work with acceptable reliability. Where no such route exists, the transferred service is no longer merely undergoing implementation adaptation; its feasible clinical task has changed.

Material and information infrastructure shape service operation

Even a capable and appropriately authorized workforce cannot deliver pharmaceutical care independently of the material system through which medicines and information move. Medicine supply is especially important because many pharmaceutical-care decisions culminate in treatment initiation, continuation, substitution, modification, or monitoring. Comparative work on medicines-shortage reporting systems across eight countries shows that the institutional arrangements used to identify, report, and communicate shortages vary between jurisdictions [14]. Reporting systems are only one component of supply reliability, but they illustrate that medicine availability is governed by infrastructure beyond the clinical encounter. A service that identifies the correct treatment but cannot connect the patient to an obtainable product has preserved its assessment process while losing part of its practical function.

Supply-related adaptation may consequently involve more than choosing a locally marketed medicine. Formularies, procurement systems, substitution authority, shortage communication, dispensing rules, and continuity arrangements can determine whether a therapeutic decision can be realized. This is particularly relevant

when source models assume stable access to particular products or rapid substitution during shortages. Transfer without examination of these assumptions may produce a service that appears clinically faithful while repeatedly generating recommendations patients cannot obtain.

Information infrastructure presents a parallel problem. Digital tools can alter the content and structure of pharmacy encounters by making patient-reported information more visible before or during consultation. In a pilot randomized study, use of a digital tool collecting medication beliefs and adherence information changed elements of patient-pharmacist communication, including active patient participation and pharmacist questioning [15]. The significance for cross-border transfer is not that one digital application should be replicated. It is that information acquisition is itself part of the delivery form. If a source service depends on structured pre-consultation data, shared records, electronic decision support, or reliable digital communication, introducing the visible consultation without an equivalent information mechanism changes what the pharmacist can know and act upon.

Regulation also intersects with this information and material infrastructure. An international scoping review of community-pharmacist independent prescribing found substantial jurisdictional variation in the legal activities pharmacists could undertake, the education or training expected, and the reimbursement arrangements attached to prescribing services [16]. These dimensions should remain analytically separate. Legal authorization defines permissible action; training contributes to capability; reimbursement affects whether the action can be delivered sustainably. A system may expand one while leaving the others unchanged, creating nominal service availability without reliable routine execution.

Care transitions show how information failure can interrupt a pharmaceutical-care function even where the responsible professionals exist on both sides of the boundary. In Wales, implementation of Discharge Medicines Review referrals was constrained when hospital-to-community processes and information flows were absent or poorly established [17]. The problem was not simply insufficient pharmacist willingness. The service required information and responsibility to cross an organizational boundary. Without a dependable referral mechanism, community pharmacists could not consistently know that the service should begin or obtain the information needed to perform it.

Financing determines whether these functions can be supported over time. A nationwide New Zealand study documented substantial provision of unfunded patient-focused services in community pharmacies, demonstrating that clinically valuable work can consume labor even when formal reimbursement does not fully recognize it [18]. Such work may be sustained temporarily through professional commitment, cross-subsidy, or workflow compression, but those mechanisms should not be mistaken for an economically neutral delivery model. A service transferred from a system with dedicated payment into one where comparable work is unfunded may retain its written protocol while becoming less available, shorter, more selective, or dependent on local business capacity.

The financing problem becomes more visible when workload is documented. Longitudinal recording of drug-related problems and their management in a Swiss community pharmacy showed that pharmacist interventions can be traced in ways that expose the time and professional resources consumed by medicine-related problem solving [19]. The precise estimates from one pharmacy should not be generalized to national financing requirements, yet the methodological implication is broader: invisible workload is difficult to commission. Cross-border transfer should identify which activities consume professional time and whether the target payment system recognizes those activities sufficiently for routine delivery.

Existing health-system role allocation can further alter what a transferred service means in practice. Malaysian community pharmacists discussing medication-review implementation described barriers, facilitators, and strategies within a system whose dispensing and professional arrangements differ from settings in which community pharmacists may already occupy a more established clinical-review role [20]. The relevant lesson is not that one national configuration is preferable. It is that local role allocation changes the pathway by which patients encounter the pharmacist, the information available during the encounter, the incentives for providing the service, and the actions available afterward.

Taken together, these findings show why supply, financing, digital infrastructure, and information continuity should not be collapsed into a generic category of “resources.” Each affects a different part of the service's operating chain. Supply determines whether treatment can be obtained; information systems determine what can be known and communicated; financing shapes whether time and infrastructure can be sustained; regulatory arrangements define permissible actions; and existing institutional roles shape how responsibilities move between

actors. Their interactions matter, but their distinct mechanisms must remain visible if adaptation decisions are to be specific enough to test.

A transferable pharmaceutical-care service must consequently be described at two levels. The first is its intended medication-use function. The second is the configuration of authority, capability, material access, information exchange, and financing required to realize that function in a particular health system. When the target context changes one of those conditions, the relevant response is not automatically to abandon the service or reproduce the source configuration more forcefully. The adaptation question is which local arrangement can restore the missing operating function without changing the clinical purpose that justified the service in the first place.

Trust formation within service encounters and institutions

Institutional arrangements determine whether a pharmaceutical-care service is available, but availability alone does not ensure that patients will disclose information, accept pharmacists' clinical recommendations, or return for follow-up. Stakeholder research on community-pharmacy service quality in Norway identified communication, access to information, interpersonal relationships, satisfaction, and the pharmacy work environment as important dimensions of service quality [21]. These findings place patient experience partly within the operating conditions of the service itself. A rushed encounter, fragmented information flow, inadequate privacy, or poorly defined professional role can influence how the service is perceived even when the technical content of the consultation is unchanged.

Trust is therefore more usefully treated as a relational condition than as a fixed characteristic of a country's culture. Interviews with community-pharmacy patients in Ontario identified availability, affability, acknowledgement, respect, and interpersonal chemistry as recurring contributors to trust in pharmacists [22]. These factors arise through encounters. They can be strengthened or weakened by continuity, accessibility, communication style, recognition of patient concerns, and the perceived legitimacy of the pharmacist's role. A service transferred into a setting where pharmacists have historically been viewed mainly as dispensers may consequently require different communication, introduction, referral, or continuity arrangements from a similar service introduced where clinical pharmacist roles are already familiar.

The distinction matters most when expanded services require patients to disclose sensitive information, accept clinical assessment, or rely on pharmacists for decisions previously associated with another profession. Digital infrastructure can support those interactions by structuring the exchange of patient-reported information, but it can also alter the encounter itself [15]. Likewise, failed information transfer between organizations can undermine confidence in continuity even when individual professionals communicate well [17]. Cross-country differences in service portfolios further shape what patients expect pharmacists to do [2]. Trust should therefore be examined alongside professional role visibility, information continuity, access, and encounter quality while remaining analytically distinct from each of them.

This approach avoids using generalized national attitudes as explanations for service success or failure. Where uptake is poor, the more testable questions are whether patients understand the pharmacist's role, whether the service is accessible, whether interactions provide sufficient privacy and continuity, whether information reaches the pharmacist, whether recommendations can be acted upon, and whether previous encounters have demonstrated reliability. Trust may influence whether an available service becomes a used service, but it should not be invoked to explain failures that originate in missing authority, staffing, supply, financing, or information.

The cross-border adaptation problem can therefore be decomposed into observable conditions that affect what patients experience and what pharmacists can deliver.

Table 2. Cross-border conditions that alter how pharmaceutical-care functions are delivered

Context variable	What differs between health systems	Service consequence when the condition is favorable	Service consequence when the condition is weak or absent	Adaptation question
Workforce capability	Clinical competencies, training pathways, role preparation, continuing professional development	Required assessment, counseling, monitoring, or decision tasks can be performed competently	Service is narrowed, referred elsewhere, delayed, or delivered without the intended depth	Which competencies must exist locally, and who can realistically develop or maintain them?

Workforce capacity	Staffing, protected clinical time, workflow flexibility, supporting personnel	Clinical work can be integrated into routine operations	Trained pharmacists may remain unable to perform the service consistently	Does the target setting provide enough usable professional time for the intended function?
Regulation and scope of practice	Prescribing authority, protocol permissions, referral rights, access to clinical information, accountability rules	Pharmacists can complete required actions directly or through defined collaborative pathways	Problems are identified but action depends on slow, uncertain, or unavailable authorization pathways	Can another legally permitted route preserve the function without unacceptable delay or loss?
Financing	Public reimbursement, insurer payment, patient payment, cross-subsidy, unfunded professional labor	Necessary time, infrastructure, documentation, and follow-up can be maintained	Delivery becomes selective, compressed, intermittent, or dependent on pharmacy business capacity	Who pays for the professional work and infrastructure required by the service?
Medicine supply reliability	Procurement stability, shortage reporting, substitution mechanisms, formulary availability, dispensing access	Therapeutic recommendations can be translated into treatment obtained	Clinically appropriate decisions cannot be realized or continuity repeatedly breaks	Does the service assume access to products or substitutions that the target system cannot reliably provide?
Information infrastructure	Shared records, referral channels, interoperability, digital tools, documentation systems	Relevant clinical information reaches the professional responsible for assessment and follow-up	Decisions are made with incomplete information or responsibility is lost at transitions	What minimum information must move, between whom, and through which dependable channel?
Patient trust and role legitimacy	Familiarity with pharmacist clinical roles, prior experience, continuity, privacy, respectful communication	Patients are more likely to disclose information, participate, consider recommendations, and return for follow-up	Nominal access fails to become meaningful engagement	How must the encounter be introduced or organized so that patients understand and can rely on the pharmacist's role?

Note: The variables are deliberately separated because similar service failures can arise through different mechanisms. Their interaction is important, but one variable should not be used as a proxy for another.

Testing functional equivalence after adaptation

Once a service has been adapted, similarity to the source model is no longer an adequate evaluation criterion. Complex-intervention guidance emphasizes that intervention effects depend on interactions among context, implementation, mechanisms, stakeholders, and outcomes [23]. For pharmaceutical-care transfer, this means that evaluation should ask whether the target configuration still performs the clinically necessary work, not whether it reproduces every source-setting procedure.

A prospective source-to-target comparison can make these assumptions explicit. The TRANSFER Approach was developed to support judgments about whether review findings are applicable to a specified target context by systematically examining factors that may influence transferability with relevant decision makers [24]. Applied to pharmaceutical care, this logic encourages identification of the contextual requirements on which a source service depends before implementation begins. If the source model assumes independent prescribing, shared records, stable medicine supply, protected consultation time, or established patient acceptance of pharmacist clinical roles, those assumptions should be compared directly with the target environment.

Adaptation must also be documented in enough detail to distinguish a deliberate response to local conditions from uncontrolled service drift. The FRAME organizes modifications according to what was changed, when changes occurred, who made them, the level at which they operated, their reasons, and their relationship to fidelity [25].

These distinctions are especially relevant when the same service label is retained after substantial local redesign. A change in consultation modality may preserve the intended function; removal of a required assessment step may not. A different authorized professional pathway may be functionally equivalent; elimination of the ability to act on identified problems may fundamentally change the intervention.

Adaptation itself should not be assumed to improve transfer. A systematic review of guidance for adapting complex interventions found substantial agreement on the importance of context and stakeholder involvement while also documenting cases in which extensively adapted interventions did not succeed [26]. The implication is that the amount of modification is not a measure of quality. Some source components may be indispensable, some may be locally replaceable, and others may be artifacts of the original service environment. The scientific task is to identify which changes preserve the mechanism required to perform the service function.

Transferability research similarly emphasizes the interaction among characteristics of the population, the intervention, the environment, and the transfer process [27]. Such appraisal can improve the plausibility of a transfer decision, but successful transfer cannot be certified prospectively. Functional equivalence must ultimately be demonstrated in the target setting through evidence that the adapted service can be delivered, reaches the intended patients, performs its necessary processes, and produces outcomes compatible with its purpose without creating unacceptable new burdens or safety problems.

The practical evaluation question is therefore not whether the adapted service is identical to the source service, but whether differences in delivery form have preserved, impaired, or changed the intended function.

Table 3. Evidence needed to distinguish functional equivalence from context-specific redesign

Evaluation question	Evidence that supports functional equivalence	Evidence suggesting further adaptation is needed	Evidence suggesting the service function itself has changed	Appropriate interpretation
Can the intended patients reach the service?	Target population can access the service through a reliable pathway	Eligible patients encounter delays, geographic gaps, referral losses, affordability barriers, or role confusion	Access has narrowed to a materially different patient group	Delivery pathway requires adaptation before outcome comparison is meaningful
Can the required clinical work be performed?	Trained personnel have sufficient information, time, authority, and operational support	Work is repeatedly truncated, deferred, or transferred because required conditions are missing	Key assessment, decision, monitoring, or coordination work is no longer performed	Distinguish remediable implementation constraint from loss of the original function
Can identified medicine-related decisions be acted upon?	Recommendations lead reliably to an authorized clinical action or usable referral pathway	Decisions depend on slow, inconsistent, or discretionary handoffs	The service has become advisory when the source function required action	The delivery form is not functionally equivalent unless the alternative pathway restores actionability
Can the intended treatment be obtained and continued?	Medicines or appropriate substitutions are reliably available and affordable	Shortages, procurement failures, reimbursement barriers, or substitution restrictions interrupt treatment	The service routinely recommends options that cannot exist in the target system	Treatment-access assumptions must be redesigned
Can relevant information move across settings?	Required clinical information reaches responsible professionals at the appropriate time	Missing referrals, incompatible records, incomplete documentation, or unclear responsibility disrupt continuity	Follow-up and coordination components effectively disappear	Information infrastructure is part of the intervention's operating conditions
Do patients engage with the pharmacist's role?	Patients understand the service, disclose relevant information, participate, and return when follow-up is required	Low participation is associated with poor role clarity, discontinuity, privacy problems, or weak trust	The transferred service has become a different type of encounter with reduced clinical participation	Relational and access adaptations may be necessary before interpreting low uptake as service ineffectiveness
Are structure, process, and outcomes acceptable in the target context?	Structures enable delivery, core processes occur, and outcomes remain compatible with the intended purpose	One or more dimensions deteriorate because modifiable local conditions are unresolved	Target outcomes depend on removal or substitution of function-bearing components	Functional equivalence requires convergent evidence rather than procedural resemblance alone

Is the adapted service sustainable?	Workload, financing, staffing, information systems, and supply conditions support routine delivery	Continued delivery depends on hidden labor, exceptional individuals, temporary funding, or unstable workarounds	Routine service becomes infeasible without changing its intended scope	Short-term implementation success should not be mistaken for sustainable transfer

Note: No numerical equivalence threshold is proposed. The table specifies qualitative evidentiary conditions to be operationalized for the service and target system under study.

Figure 1 represents source-to-target transfer as the preservation of clinically necessary functions through locally specific operating conditions.

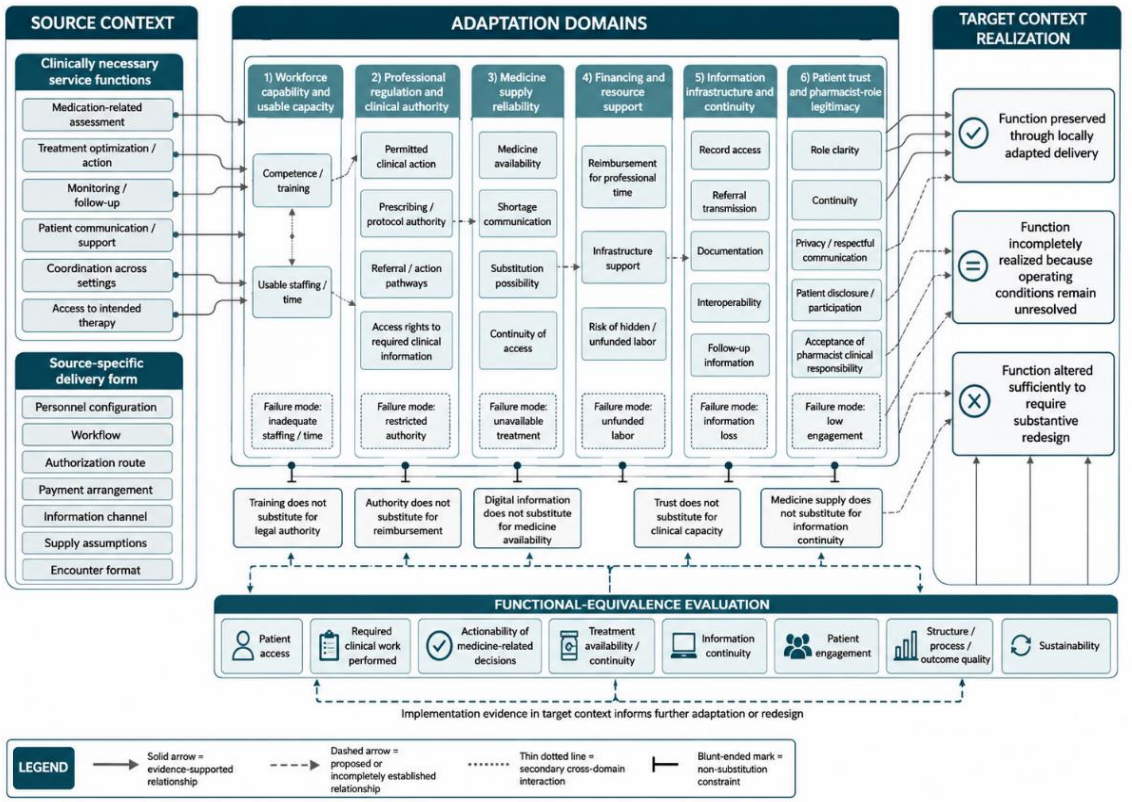

Figure 1. Cross-border pharmaceutical-care transfer as function-preserving adaptation under local constraints

Results and Discussion

The evidence considered here supports a more precise interpretation of cross-border pharmaceutical-care transfer. The central problem is not whether a service developed elsewhere should be copied or whether every component should be modified. The problem is identifying which components perform indispensable clinical or organizational functions and which reflect the operating conditions of the source health system. Pharmacy-specific adaptation research already recognizes that professional services may require modification when introduced into new environments [4], while realist implementation evidence shows that service mechanisms depend on combinations of funding, workforce, training, workflow, and institutional conditions [5]. The incremental contribution of the present synthesis is to make the transferable object explicit: what should travel is the required service function, while the delivery form should remain open to evidence-based local redesign.

This distinction has direct implications for policy borrowing. A health system considering adoption of an international pharmacy service should first ask what medication-use problem the source service addresses and what work must occur for that problem to be resolved. Only then should planners compare the source and target arrangements. Literal similarity may be unnecessary where another locally legitimate pathway performs the same function. Conversely, an intervention can retain its source name, forms, training package, and consultation sequence while becoming functionally weaker if pharmacists lack authority, patients cannot access the

recommended medicine, referral information does not arrive, or the service depends on unfunded professional labor.

The contextual variables examined in this article should therefore remain disaggregated. Medicine-supply arrangements influence whether treatment decisions can be realized [14]. Digital and referral infrastructure influence what pharmacists know and whether responsibility moves across organizational boundaries [15, 17]. Financing affects whether professional time can be sustained [18]. Regulatory rules determine which actions pharmacists may perform [16]. Patient trust influences whether available clinical opportunities are accepted and used [22]. These variables can interact, but interaction does not make them interchangeable. A failure caused by restricted prescribing authority requires a different response from a failure caused by medicine shortages, inadequate staffing, absent reimbursement, or poor patient engagement.

This decomposition also helps explain why broad country-level cultural explanations can be misleading. Cultural and social expectations may influence interactions, but many observed differences in service performance have more proximate institutional mechanisms. Patients may appear reluctant to use a pharmacist-led service because the role is unfamiliar, because referral pathways do not confer legitimacy, because privacy is inadequate, or because previous encounters have been brief and transaction-focused. Pharmacists may appear resistant to expanded practice because they lack protected time, payment, information, or authority. Replacing these mechanisms with a generalized cultural account weakens both explanation and intervention design.

Functional equivalence offers an evaluative response to this problem. International pharmaceutical-care quality work supports distinguishing structural, process, and outcome dimensions [8], while complex-intervention and transferability methods emphasize the importance of context and target-setting evaluation [23]. An adapted service should therefore be considered functionally equivalent only when evidence converges across the dimensions relevant to that service. Required structures must be present, essential processes must occur, medicine-related decisions must remain actionable, patients must be able to access and engage with the service, and outcomes must remain compatible with the intended purpose. No universal numerical threshold follows from the present evidence, and equivalence should not be reduced to statistical similarity on a single endpoint.

Three propositions follow from this synthesis. First, when source and target systems differ materially in professional authority, workforce capability, financing, supply reliability, or information infrastructure, literal replication of the source delivery form should be less likely to preserve service performance than adaptation explicitly directed toward preserving required functions. Second, adaptations chosen to maintain the function of assessment, decision, monitoring, coordination, or treatment realization should outperform adaptations selected primarily to resemble the visible source procedure when those procedures depend on unavailable local conditions. Third, patient trust should exert its strongest influence on realized uptake when the service requires disclosure, repeated interaction, acceptance of expanded pharmacist responsibility, or reliance on pharmacist clinical judgment.

These propositions are falsifiable. Repeated successful literal replication across substantially different institutional and material settings would weaken the claim that function-oriented adaptation is generally advantageous. Likewise, if interventions deliberately modified to preserve service functions consistently perform worse than unchanged delivery arrangements under comparable implementation support, the distinction would have limited explanatory value. The trust proposition would be weakened if measured trust did not predict uptake in the specified encounters after accounting for availability, affordability, regulation, and staffing. Low continuity or role familiarity alone would not establish low trust.

Several limitations constrain the argument. The evidence base combines studies of different pharmacy services, countries, implementation stages, and methodological designs. Much of the direct empirical literature concerns community pharmacy, and some mechanisms may operate differently in hospital, ambulatory, or integrated-care settings. Cross-country comparative evidence remains less abundant than single-system implementation research. The proposed function-versus-delivery distinction is consequently a theory-building synthesis, not a validated classification system. Its value depends on whether future comparative implementation studies can specify functions prospectively, document adaptations transparently, and test whether target-context performance changes in predicted ways.

Research should therefore move beyond reporting that a service was “adapted” or “implemented.” Studies should document which source functions were considered indispensable, which delivery components changed, which contextual condition motivated each change, and whether the adapted pathway continued to perform the intended

work. Adaptation reporting approaches [25], structured transferability assessment [24], and criteria addressing source–target population, intervention, environment, and transfer processes [27] provide methodological foundations for this work. Comparative studies that observe several jurisdictions implementing the same service function through different delivery forms would be especially informative.

For health-system decision makers, the practical sequence is straightforward. Define the service function. Identify the source assumptions that currently enable it. Examine workforce capability and capacity, professional authority, financing, supply reliability, information infrastructure, and trust separately in the target setting. Modify the delivery form where assumptions fail. Then test whether the intended function has actually been preserved. This sequence avoids both mechanical replication and unrestricted local modification while creating a clearer basis for deciding when adaptation is sufficient and when substantive redesign is required.

Conclusion

Pharmaceutical care does not cross borders as an intervention label alone. It crosses as a set of clinical and organizational functions that depend on local people, authority, medicines, financing, information, and relationships. When those operating conditions differ, the delivery form should change to the extent necessary to keep the intended function executable, accessible, actionable, and sustainable.

The central standard is therefore functional preservation under target-system conditions. Workforce limitations, regulatory scope, supply instability, financing arrangements, information discontinuity, and patient trust should be examined as distinct causes of service variation rather than compressed into broad national explanations. An adapted service can reasonably differ from its source model and still remain equivalent in purpose; a superficially identical service can fail if its essential operating conditions are absent. Cross-border transfer should ultimately be judged by what the service can demonstrably accomplish in the setting where patients actually receive it.

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