

A Positive Pharmacy Screening Result Can Leave Preventive Care Unfinished: Explaining the Gap Between Risk Detection, Referral Acceptance, and Entry into Follow-Up Care

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Abstract

Community-pharmacy screening can identify people at elevated risk and create opportunities for earlier preventive care, yet a positive screening result does not itself establish that care has been completed. This conceptual article examines the sequence between risk detection and verified follow-up as a boundary-spanning process involving patient interpretation, referral initiation, information transfer, scheduling, care entry, and return of disposition information. Drawing on pharmacy screening, referral-closure, interprofessional-integration, and access-equity evidence, the article develops a Boundary-Spanning Detection-to-Care Model in which progression depends on successful transitions between analytically distinct states rather than on referral issuance alone. The model distinguishes acceptance of a referral from the receiving system's capacity to act on it and treats closed-loop referral as verified progression or resolution. It also anticipates that attrition may arise from workflow ambiguity, capacity constraints, communication failures, or patient choice and that these losses may be socially patterned. The model therefore shifts evaluation from counting positive screens and recommendations toward stage-specific measures of handoff, scheduling, care entry, feedback, and unresolved status. The central claim is conditional: pharmacy screening contributes most reliably to preventive care when detection is coupled to visible, executable, and accountable cross-organizational pathways.

Keywords: Community pharmacy screening, Closed-loop referral, Preventive care, Boundary spanning, Care entry, Health equity

Introduction

Community pharmacies offer a convenient setting in which preventive risk can be identified outside conventional clinic visits. Pharmacist-led biometric screening has demonstrated that community pharmacies can detect previously unrecognized abnormalities and generate primary-care referrals [1]. That capability is important, but its public-health meaning depends on what

happens after detection. Reviews of pharmacy-delivered public-health interventions show that pharmacy access can support prevention while evidence on effects across social groups remains less complete [2]. A positive screen is therefore best understood as the beginning of a care process whose downstream states require separate observation.

The distinction is especially visible when screening requires diagnostic confirmation elsewhere. In the Pharmacy Diabetes Screening Trial, community-pharmacy screening identified participants requiring subsequent assessment, while confirmed diagnoses depended on downstream clinical testing [3]. A collaborative diabetes screening programme similarly showed that eligibility for general-practice referral and completion of the scheduled appointment were not the same event [4]. These findings do not imply that every

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uncompleted referral represents preventable failure. They do establish that detection, referral, attendance, and diagnostic resolution cannot safely be treated as interchangeable endpoints.

This article asks where and why the pathway can break after community-pharmacy screening and what boundary-spanning mechanisms are needed to convert referral acceptance into actual care entry and follow-up. The proposed analysis treats the pathway as a series of linked but non-equivalent states. Some transitions are patient-facing, such as interpreting risk and deciding whether to proceed. Others depend on organizational coordination, including referral transmission, receipt, scheduling, information exchange, capacity, and confirmation that the next step occurred. The resulting model is intended to clarify what should be measured, where responsibility can become ambiguous, and why a referral recommendation may appear successful at the pharmacy while preventive care remains unfinished.

Screening as the beginning rather than completion of preventive care

Screening is often documented at the point where a risk result has been generated, communicated, and sometimes accompanied by advice to seek further care. That endpoint is administratively convenient because it is visible to the screening service. Conceptually, however, it mixes two different achievements: successful detection and successful continuation into a clinically appropriate next step. A systematic review of pharmacist-led mental-health screening found substantial variation in referral and follow-up arrangements and insufficient evidence to conclude that screening consistently improved downstream clinical outcomes [5]. The implication is not that screening lacks value. It is that the value of detection should not be used as indirect proof of completed continuity.

Evidence from cardiovascular screening reinforces this distinction. In a mixed-methods evaluation of pharmacy screening, early engagement with general practitioners and sharing of screening results supported coordination, yet continuing collaboration was limited [6]. International comparisons of pharmacist screening experiences likewise show that implementation is shaped by health-system context rather than by pharmacist competence alone [7]. The same screening activity can therefore sit within very different downstream infrastructures.

Communication also begins before any formal referral is transmitted. Pharmacists delivering diabetes risk-assessment services reported difficulties with recruitment and communication even when they viewed screening as a legitimate part of pharmacy practice [8]. A patient who receives a positive result must understand what the result means, whether further assessment is necessary, and how urgent or feasible the next step is. Completion of the screening encounter therefore marks a transition into another phase of preventive care, not a terminal state.

The detection-to-care pathway

A detection-to-care pathway becomes analytically useful only when its states are separated by observable transition criteria. Referral research outside pharmacy has operationalized closed-loop referral through distinct events such as scheduling, completed specialist attendance, and return of information to the referring clinician [9]. This logic is transferable to pharmacy screening without transferring disease-specific rates: a referral is not closed merely because a recommendation was made or a message was sent.

Community-pharmacy research also shows that follow-up is a coordination activity rather than a single act. Pharmacists report using multiple practices to communicate with prescribers and care managers, while the relationships needed to sustain such coordination can be difficult to establish [10]. Pharmacy involvement may also function as a linkage role. In a collaborative psychosocial-care project, pharmacists identified people with relevant needs, informed them, and referred them toward external services, illustrating how pharmacy can initiate movement across organizational boundaries while leaving subsequent service entry as a separate outcome [11].

For this article, the pathway therefore contains eight distinguishable states: risk detection, risk communication, referral acceptance, referral handoff, scheduling or equivalent access activation, care entry, follow-up or disposition, and verified closure. These states should not be read as a rigid linear sequence. Some patients may decline further action, some may enter care through a different route, and some services may resolve risk without a conventional appointment. The key requirement is that each transition have a recognizable status and that unresolved status remain visible rather than being silently counted as success.

The distinction becomes operational when each state is defined by the minimum evidence needed to say that

progression actually occurred. **Table 1** separates pathway status from the next dependency so that a completed action at one stage cannot be mistaken for completion of the next.

Table 1. State-specific evidence required to distinguish detection, referral progression, care entry, and closed-loop resolution after a positive pharmacy screen

Detection-to-care state	Minimum evidence that this state occurred	Boundary still unresolved at this point	What must become possible for the next state	Misclassification created by stopping measurement here
Positive risk detected	Screening result meets the programme's criterion for further assessment	Whether the patient understands the meaning and need for action	Clear, usable communication of risk and next step	Treating a positive result as completed preventive care
Risk communicated	Patient receives an interpretable explanation of the result and recommended action	Whether the patient is willing and able to proceed	Acceptance plus an actionable route into another service	Counting information delivery as referral success
Referral accepted	Patient indicates willingness to pursue recommended follow-up	Whether the receiving system has actually received and can act on the referral	Transfer of required information, ownership, and contact route	Treating intention as care entry
Handoff received	Receiving service can identify the patient, reason for referral, and required next action	Whether capacity and workflow can convert receipt into access	Scheduling, triage, or another explicit activation step	Counting message transmission as closed-loop referral
Access activated	Appointment, triage slot, or equivalent next step is offered or arranged	Whether the patient enters the intended care process	Attendance, remote assessment, or another clinically valid encounter	Treating scheduling as attendance
Care entered	Patient reaches the receiving clinical service	Whether the risk is assessed, acted on, or deliberately resolved	Diagnostic or management disposition	Counting attendance as completed follow-up
Disposition established	Receiving service determines the appropriate clinical response	Whether that outcome returns to the originating pathway when needed	Feedback, documented resolution, or reassigned responsibility	Losing visibility after the encounter
Closed-loop resolution	Progression or justified resolution is verifiably documented	Whether new risk requires renewed surveillance	Feedback or re-entry mechanism where appropriate	None if terminal status is clinically justified and visible

Pharmacy–health-system boundary crossings

Once the pathway moves beyond the pharmacy encounter, progression depends on crossing organizational boundaries that distribute information, authority, resources, and responsibility. Pharmacy–primary-care integration is not a binary condition. A narrative review describes integration in terms of different levels, intensities, and enabling arrangements [12]. This matters because a screening referral may need only basic information transfer in one setting but active shared management, digital interoperability, or repeated communication in another.

Realist evidence on extended community-pharmacy services further indicates that funding, workforce capacity, professional recognition, and collaboration can trigger or inhibit service development [13].

Interprofessional collaboration studies likewise show that pharmacist participation in primary care is heterogeneous and concentrated in particular clinical contexts [14]. The boundary-spanning problem is therefore not solved by labeling two professions “collaborative.” What matters is whether the specific transition required by the screening pathway has an actor able to perform it, an organization willing to receive it, and enough information and capacity to complete it.

A recent realist review of collaboration between general practice and community pharmacy identifies remuneration, organizational culture, information technology, infrastructure, trust, and professional relationships as interacting mechanisms that can support or impede integration [15]. In the present model, these factors are not universal prerequisites with fixed effects.

They are candidate conditions that determine whether a boundary crossing is executable and observable. Their theoretical role is to explain why the same referral intention can produce different downstream trajectories across settings.

Risk communication and referral acceptance

A referral pathway begins to cross boundaries before an external organization acts, because the patient must interpret the screening result and decide whether to proceed. Formal programme structures can shape this step. National colorectal-cancer screening arrangements involving community pharmacies vary in which phases of the screening process are covered by regional agreements [16]. Such variation implies that responsibility for explaining results, activating follow-up, and ensuring continuity may be explicit in one programme and ambiguous in another.

Patient acceptance is also conditional. In a qualitative study of community-pharmacy hyperglycaemia screening among people with cancer, perceived benefits and barriers influenced willingness to participate [17]. Evidence concerning services tailored to minoritized populations further shows that tailoring and co-design remain uneven and that effectiveness is incompletely evaluated [18]. These findings caution against treating “referral accepted” as a simple behavioral endpoint. Acceptance may reflect trust, perceived seriousness, cultural and linguistic fit, expected burden, previous experience with healthcare, and whether the proposed next step appears realistically accessible.

For the model, referral acceptance means willingness to pursue a recommended next step, not proof that the next step is operationally available. A patient may agree immediately yet still face an inaccessible booking system, missing referral information, transport problems, unaffordable care, or an unknown waiting period. Conversely, declining the recommended route may sometimes be informed and clinically reasonable. The analytical task is therefore to separate the patient’s decision from the health system’s capacity to enact that decision.

From referral acceptance to successful care entry

The transition after acceptance is where intention becomes organizational work. Cross-institutional referral research shows that referring clinicians and consultants encounter missing or delayed information, unclear responsibility, and policy or workflow barriers that

interfere with referral closure [19]. Human-factors analysis of referral work similarly demonstrates that information flow and workflow are distributed across multiple people and systems, creating opportunities for failure even after a referral has been initiated [20]. These studies are not pharmacy-screening studies, but they clarify mechanisms that become relevant whenever a pharmacy transfers responsibility to another organization.

Scheduling is one such mechanism. Research on screening mammography shows that self-scheduling and self-referral pathways can change how patients reach appointments, while their use varies across sociodemographic groups [21]. The implication is not that digital self-scheduling is inherently superior. It is that the design of the access step can determine whether referral acceptance becomes an executable opportunity for care entry.

Successful care entry therefore requires more than a positive attitude toward referral. At minimum, the receiving pathway must have enough information to recognize the reason for referral, a visible owner for the next action, a feasible route for the patient to obtain that action, and a way to distinguish completed entry from unresolved status. Where these elements are absent, the pharmacy may have performed its immediate task correctly while the larger preventive-care process remains incomplete. This distinction sets the stage for the Boundary-Spanning Detection-to-Care Model developed in the next section, where pathway states, organizational crossings, and feedback requirements are integrated into a single theoretical account.

Development of the boundary-spanning model

The preceding sections identify a recurring problem: a positive screen can be clinically meaningful while still failing to become an executable episode of care. The model developed here treats that problem as one of distributed transition responsibility. Pharmacy and receiving services divide responsibility for converting detected risk into a verified disposition. Three elements therefore govern each transition: visibility of status, ownership of the next action, and practical capacity to perform it.

Community-pharmacy integration literature emphasizes connectivity, communication, and trust as conditions for working across primary-care boundaries [22]. Network research similarly suggests that broader interorganizational ties can support implementation of

enhanced pharmacy services [23]. Care-coordination theory adds that complex transitions frequently involve several professionals, patients, family members, and organizational components whose actions are interdependent [24]. Applied to screening, failure can arise from the configuration connecting pharmacy, patient, and receiving service.

The Boundary-Spanning Detection-to-Care Model therefore distinguishes two layers. The first is the observable care-state layer: detection, communication, acceptance, handoff, access activation, care entry, disposition, and closure. The second is the transition-capability layer: information visibility, assigned ownership, scheduling or triage capacity, patient usability, and feedback. A state may be completed while the next transition remains impossible. Referral

acceptance, for example, creates willingness without guaranteeing that a receiving service has the information, authority, or capacity needed to act.

The model permits clinically legitimate exits. A patient may decline after informed discussion, another service may resolve the issue, or subsequent assessment may establish that no further action is required. These differ from unresolved loss because their disposition is visible. Closed-loop referral is therefore defined as verified progression or verified resolution. The theoretical distinction is between a pathway whose status is known and one whose status disappears at a boundary.

These relationships are integrated in **Figure 1** as a layered sequence in which care states remain distinct from the capabilities that enable movement between them.

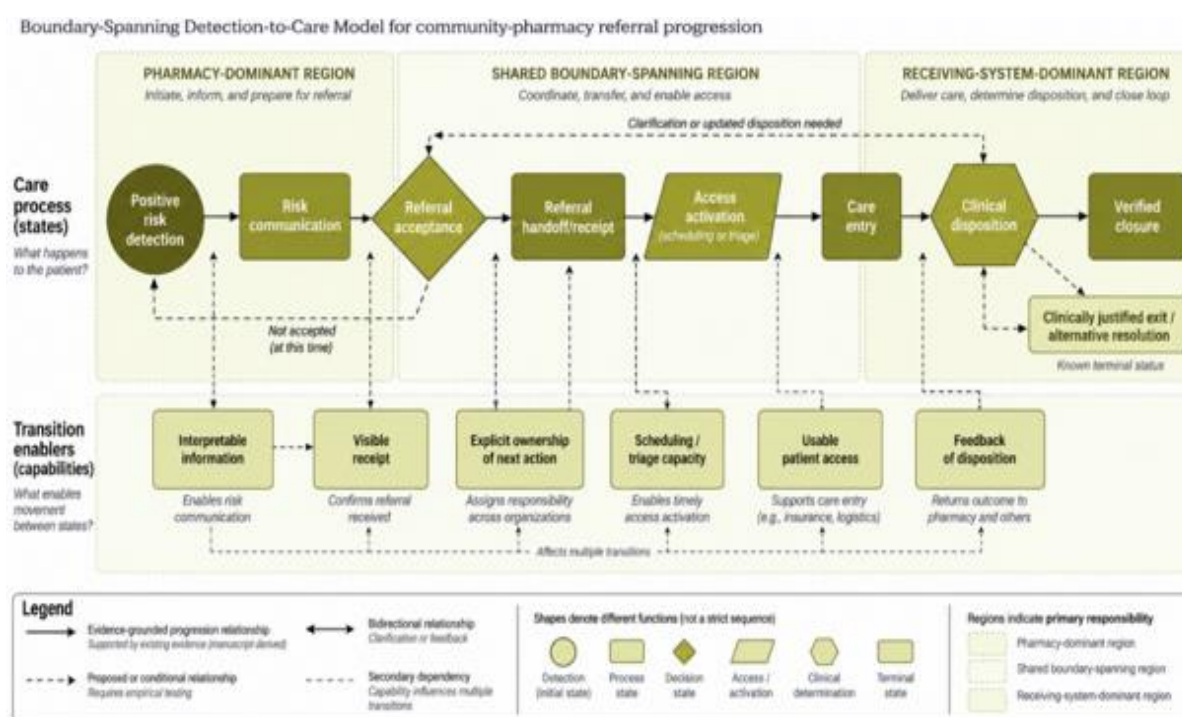


Figure 1. Visibility, ownership, and closure across the post-screening care sequence

Failure points across detection, handoff, scheduling and follow-up

The model predicts that pathway failure should be diagnosed at the last verified state rather than summarized as a single referral-completion rate. Referral research demonstrates why this matters. Scheduling and completed attendance can differ substantially, and disparities can emerge at both stages [25]. Qualitative evidence from Medicaid care similarly shows that

insurance rules, administrative processes, transportation, and other system-level barriers can obstruct access after referral initiation [26]. These mechanisms disappear when every unresolved case is combined into one noncompletion category.

At detection-to-communication, risk may be identified without an understandable next step. Between acceptance and handoff, the patient may agree to follow-up while no receiving organization receives an actionable referral.

After handoff, the referral may be visible but not schedulable because no owner, appointment capacity, or triage process exists. An appointment can also be created while transport, work, cost, language, caregiving, digital access, or changing priorities make attendance impracticable.

Failure can also occur after care entry. Attendance does not guarantee that a disposition is made, communicated, or returned to the originating pathway. The pharmacy

may therefore remain unaware whether a positive screen was confirmed, ruled out, managed elsewhere, or left unresolved. This final information failure matters because a system can appear successful when measured at referral or attendance while still lacking verified closure.

Table 2 organizes these failures by the last state that can be verified, the dependency that remains hidden, and the metric that could falsely imply success.

Table 2. Failure configurations that can remain hidden when post-screening performance is measured at the wrong state

Last verified state	Hidden dependency	Operational signature	False-success metric	Closure-oriented response
Positive risk detected	Comprehension and actionable communication	Result recorded but next step unclear to patient	Number or percentage screened	Confirm understandable communication and next action
Referral accepted	Receiving-service receipt and ownership	Patient agrees but no accountable recipient is visible	Referral acceptance rate	Verify receipt and assign next-action ownership
Handoff received	Triage or scheduling capacity	Referral exists but no access event is generated	Referrals transmitted	Track offer, triage, or scheduling activation
Access activated	Practical ability to enter care	Appointment arranged but patient cannot or does not attend	Appointments scheduled	Record attendance and reason for non-entry where available
Care entered	Clinical disposition	Encounter occurs without visible resolution of screened risk	Attendance rate	Capture diagnostic or management disposition
Disposition established	Feedback and responsibility transfer	Receiving service acts but originator cannot see outcome	Completed consultation	Return disposition or document where responsibility now resides
Alternative/declined pathway	Visibility of justified exit	Original route stops for a clinically or personally valid reason	Raw noncompletion rate	Distinguish verified exit from unresolved loss

Inequitable attrition along the pathway

Attrition is not necessarily distributed evenly. Direct-access and self-referral systems can improve access for some groups while widening inequality for others, depending on who can recognize need, navigate the pathway, and use the access mechanism [27]. Community-based research with Māori participants likewise emphasizes that equitable pharmacy services depend on how communities experience and define appropriate care, rather than on physical proximity alone [28]. Equity is therefore a property of transitions, not only initial reach.

Differential loss may begin before a formal referral. Evidence from medication-review programmes shows that people who are technically eligible for a pharmacy-related service are not always equally likely to be offered

that service [29]. After a positive screen, further differences can appear in understanding the recommendation, accepting it, receiving a usable referral, obtaining an appointment, attending, or completing follow-up. The key question is where trajectories start to diverge, not only whether final completion differs.

Design principles for closed-loop referral

The model yields five design principles. First, every positive result requiring external action should have an explicit next-state definition: what must occur before the pathway can be considered to have progressed. Second, referral transmission should be separated from referral receipt. Third, ownership should move visibly with the pathway rather than becoming assumed at institutional boundaries. Fourth, access mechanisms should be

designed for usability as well as technical availability. Fifth, the pathway should produce a terminal status that distinguishes completed care, clinically justified resolution, informed decline, alternative care, and unresolved loss.

These principles depend on capacity. Implementation research on community-pharmacy fall-prevention services shows how staffing, time, and multidisciplinary collaboration can constrain otherwise plausible services [30]. Closing a loop therefore cannot mean adding unlimited follow-up work to community pharmacies. Responsibility should correspond to the actor with authority and resources to perform the next action.

Equity also requires multilevel design. Pharmacist action on social determinants can occur at patient, practice, and community levels, but structural constraints often lie beyond pharmacy control [31]. Closed-loop design should consequently include escalation routes when individual navigation cannot overcome insurance, transport, language, workforce, or geographic barriers. The aim is to prevent responsibility from becoming invisible without making pharmacists accountable for every downstream outcome.

Evaluation measures

Evaluation should mirror the model's states. At minimum, programmes should distinguish the number screened, the number with positive or actionable results, the number informed, the number accepting referral, the number whose referral was received, the number offered or scheduled for follow-up, the number entering care, the number reaching a documented disposition, and the number achieving verified closure. The denominator should be stated for every transition.

Time also matters. A pathway may eventually close while producing clinically important delay. Programmes should therefore record transition intervals where feasible, while avoiding universal thresholds unsupported by evidence. Unknown status should remain a reportable category rather than being merged with decline or successful care elsewhere.

Equity analysis should be stage-specific. Differences in overall completion can conceal the point at which disparities emerge. Stratifying transition measures by relevant sociodemographic and access variables can show whether divergence occurs at communication, scheduling, attendance, or follow-up. Evaluation should also examine whether eligibility and service offer differ before referral progression begins.

Results and Discussion

The central contribution of this article is to relocate the meaning of a positive pharmacy screen from an isolated service event to a distributed episode of preventive care. Existing integration research already shows that pharmacy-primary-care collaboration depends on interacting mechanisms such as trust, information infrastructure, organizational culture, and remuneration [15]. The present model specifies how those mechanisms matter after screening: they influence whether one observable care state can be converted into the next and whether responsibility remains visible across institutional boundaries.

The model also has clear evidentiary limits. Screening evidence remains heterogeneous, and downstream clinical benefit cannot be inferred simply from successful detection or referral activity [5]. The proposed transition capabilities require empirical testing. Different screening conditions may need different endpoints, and some pathways may legitimately terminate before a conventional follow-up encounter.

A second limitation concerns equity. Removing a gate or adding direct access does not necessarily benefit all groups equally; systematic-review evidence shows that such arrangements can narrow or widen inequality depending on context [27]. The model therefore rejects the assumption that more direct access is automatically more equitable. Its stronger prediction is stage-specific: pathway design can redistribute friction, and evaluation should identify where that redistribution occurs.

A boundary-spanning model should not become pharmacy-centric. Pharmacists can contribute to patient-, practice-, and community-level responses to social determinants, yet many constraints remain structural [31]. The model assigns pharmacies an important role in detection, communication, referral initiation, and where feasible follow-up visibility, but it does not make them accountable for resources or decisions controlled by receiving organizations, payers, or public systems.

The model is most applicable when a pharmacy identifies risk that requires action elsewhere. It becomes less informative when the pharmacy can complete diagnosis and management itself, when a receiving service is fully integrated with the pharmacy workflow, or when no external clinical step is indicated. These boundary conditions are theoretically useful because they define when boundary spanning is genuinely necessary rather than universally assumed.

Conclusion

A positive pharmacy screening result can leave preventive care unfinished because detection and care entry are separated by several distinct transitions that depend on patients, pharmacies, receiving services, and health-system infrastructure. Referral acceptance resolves only one of those transitions. Preventive care remains incomplete when the next action cannot be executed, responsibility becomes unclear, or pathway status disappears after a boundary crossing.

The Boundary-Spanning Detection-to-Care Model therefore defines success as verified progression or justified resolution rather than referral issuance alone. Its practical implication is to make each transition visible, assignable, and measurable while preserving legitimate patient choice and recognizing structural limits on pharmacy responsibility. The central theoretical claim is conditional: screening is more likely to function as effective preventive care when cross-organizational pathways can convert detected risk into an observable, usable, and accountable next state through to resolution.

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