

From available to usable: a minimum accessible information pathway for people with visual impairment in oral health care

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ABSTRACT

Physical availability of dental services does not guarantee usable care when patients cannot perceive, retain, or act on information. People with visual impairment are especially exposed because oral health care depends heavily on printed forms, chairside images, small labels, kiosks, and visually formatted digital content. This point of view proposes the Minimum Accessible Information Pathway for Oral Health Care, an evidence-informed service specification covering booking, preparation, history taking, consent and treatment, discharge, medication and home care, and follow-up. The pathway requires services to identify and record each patient's preferred communication modality; deliver information in that modality; explain safety-critical content without relying on vision; confirm understanding; provide an accessible action summary; and use accessible channels for recall and escalation. A minimum data set and eight auditable indicators are proposed to move accessibility from an aspirational statement to a measurable quality function. The framework also includes safeguards against common failures, such as offering Braille as the only alternative, substituting caregiver communication for patient participation, creating inaccessible digital documents, and recording preferences without acting on them. The pathway is a proposed operational framework, not an evaluated intervention, and no claim of effectiveness is made. Co-design and prospective testing with people who are blind or have low vision are needed to assess feasibility, fidelity, understanding, autonomy, continuity, safety, and resource use. Treating accessible information as a routine clinical workflow may help oral health services move from nominal availability to effective access.

Keywords Accessibility, Health equity, Oral health, Patient education, Visual impairment, Workflow.

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INTRODUCTION

From nominal availability to effective access

The World Health Organization has placed oral health equity for persons with disabilities on the policy agenda and has called for disability equity to be integrated into oral health action rather than treated as an optional accommodation (1). This direction is consistent with the broader health-system responsibilities described in the Global report on health equity for persons with disabilities and with the rights to accessibility, information, and health established in the Convention on the Rights of Persons with Disabilities (2, 3). Yet access is still commonly measured by whether a clinic exists, can be reached, and can be afforded. Those dimensions are necessary, but they do not establish that care is usable.

A service is only effectively accessible when a patient can complete the information-dependent work surrounding care: finding the service, booking, preparing, navigating check-in, communicating a history, understanding options, giving informed consent, following post-treatment instructions, using medicines safely, recognizing warning signs, and returning through an appropriate channel. Failure at any one of these points can weaken the benefit of a technically available service. The distinction

is therefore between nominal availability and effective access.

Visual impairment makes this gap unusually visible. At least 2.2 billion people worldwide have near or distance vision impairment. Still, their needs are heterogeneous: some people use magnification or large print, some use screen readers or structured audio, some use Braille, and some have recently acquired impairment and do not yet use assistive technology confidently (4). Oral health care, meanwhile, routinely depends on printed forms, chairside images, colour-coded demonstrations, small medication labels, touchscreen kiosks, quick-response codes, and visually formatted portals. The global oral health action plan emphasizes people-centred care and integrated service delivery. Still, those aims cannot be achieved when critical information is delivered through a channel the patient cannot use (5).

This point of view converts the general principle of accessible communication into an operational service pathway. The proposed Minimum Accessible Information Pathway for Oral Health Care (MAIP-OH) specifies what should happen, what should be recorded, and what can be audited across an oral health episode. It is intended as a minimum specification for co-design and testing, not as a validated clinical standard.

Why an operational pathway is needed

Reviews of dental access for persons with disabilities repeatedly identify communication and information barriers alongside cost, transport, physical access, service availability, and workforce factors (6, 7). Adults with visual impairment have reported unmet oral health information needs, and qualitative work has described difficulties in acquiring knowledge, navigating services, and communicating within care settings (8, 9). These findings are important, but barrier lists alone do not tell a clinic which field should be added to a record, who should act on it, what must be delivered before discharge, or which denominator should be used to monitor performance.

A pathway is useful because accessibility failures are usually cumulative rather than isolated. An accessible booking call does not compensate for a print-only consent form. A careful chairside explanation does not create a usable record after the patient leaves. A screen-reader-compatible portal does not help when an appointment reminder is sent as an image. Accessibility therefore has to travel with the patient across administrative, clinical, pharmacy, and follow-up processes. The MAIP-OH also separates information accessibility from an individual-deficit interpretation of health literacy. Patients differ in prior knowledge and confidence, but services control the format, timing, structure, and continuity of information. A technically accurate handout is not accessible merely because it exists; spoken information is not durable merely because it was heard once; and a digital link is not usable merely because it opens. The quality question is whether the system enabled the individual patient to perceive, understand, retain, and act on the information required for safe participation.

Evidence-informed construction of the pathway

The framework was developed through a purposive,

evidence-informed synthesis rather than a systematic review. First, information-dependent tasks were mapped across a generic oral health journey: discovery and booking, preparation, arrival and history, consent and treatment, discharge, medication and home care, and recall or urgent follow-up. Second, recurring barriers and user needs were identified from disability and oral health reviews, studies involving people with visual impairment, and cross-setting guidance on accessible communication (6-10). Third, each barrier was translated into an observable service requirement rather than a broad aspiration. Fourth, a minimum data structure and candidate indicators were specified so that implementation could be audited. Finally, safeguards and balancing measures were added to reduce the risk that a nominal accommodation creates a new burden or compromises autonomy.

The pathway adapts, rather than reproduces, the logic of the NHS Accessible Information Standard, which asks services to identify, record, flag, share, meet, and review information and communication needs (10). It also draws on Web Content Accessibility Guidelines 2.2 for digital materials and interfaces (11), evidence on accessible medication information for people with visual impairment (12), and practical recommendations from healthcare settings outside dentistry (13). The oral health-specific contribution is the linkage of those principles to consent, procedure-related sensations, bleeding and swelling advice, medication, self-care technique, recall, and urgent escalation.

The Minimum Accessible Information Pathway for Oral Health Care

MAIP-OH has six linked functions: identify; record and flag; deliver; explain and confirm; summarize and act; and recall and escalate (Fig. 1). A breakdown at any function can make later information unusable. The patient's pre-

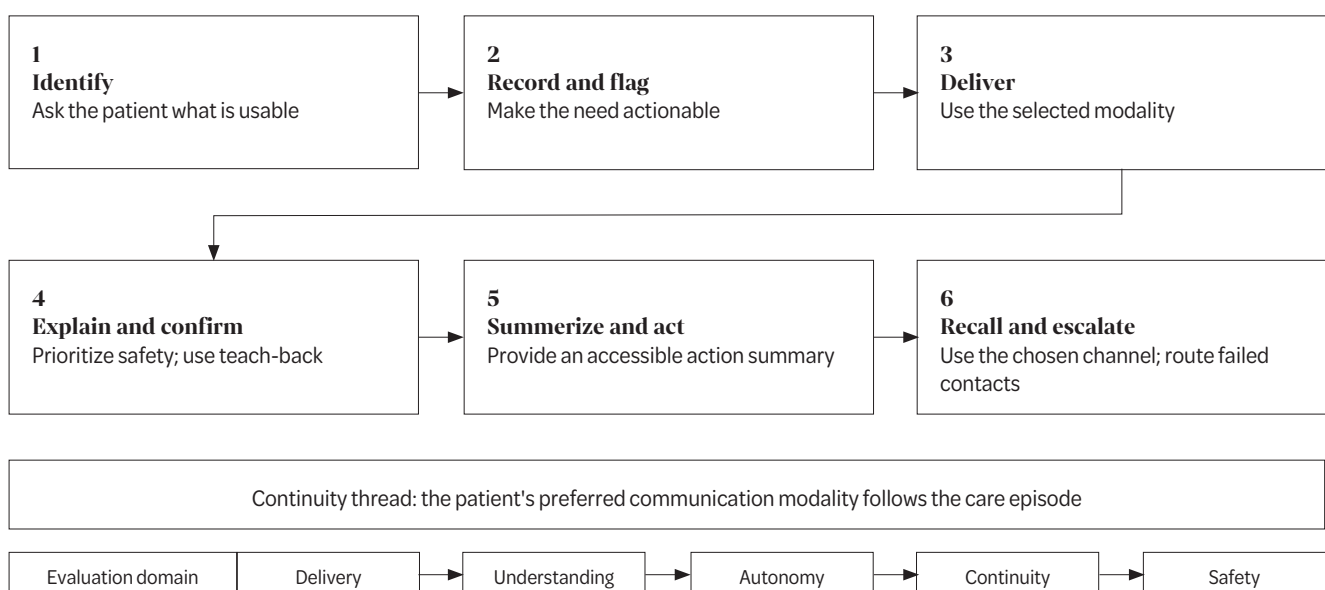


Fig. 1 Minimum Accessible Information Pathway for oral health care. The six service functions are linked by the patient's preferred communication modality. The framework is conceptual and has not been validated as a causal model or clinical standard.

ferred communication modality is the continuity thread across all six functions.

1. **Identify.** At the first contact, staff should ask whether the patient has an information or communication requirement and which format or channel is usable. The question should be neutral and practical: "What is the best way for us to provide appointment and treatment information to you?" Diagnostic labels should not be used to infer a preference. Options can include accessible electronic text, large print, structured audio, Braille where used, telephone contact, staff-assisted completion of forms, or another patient-defined method.
2. **Record and flag.** The selected modality, accessible contact channel, support requirement, and permission for information sharing with a companion should be recorded in a structured field and displayed as an actionable flag. A flag that does not trigger a task is insufficient. The record should specify what staff must do, such as "send accessible text before visit" or "provide verbal orientation and electronic discharge summary." Preferences should be reviewed periodically and whenever vision, technology use, or care context changes.
3. **Deliver.** Appointment details, directions, preparation instructions, consent material, fee information, and patient education should be delivered in the recorded format early enough to be used. Digital content should be navigable by keyboard and screen reader, preserve meaningful reading order, include text alternatives, avoid image-only instructions, and not depend on colour alone (11). Services do not need to pre-produce every item in every format, but they do need a reliable method for generating or providing the requested format without exceptional negotiation.
4. **Explain and confirm.** Treatment discussions should describe location, sequence, expected sensations, alternatives, benefits, risks, and costs without relying solely on images. Safety-critical content should be presented first and in plain language. Teach-back should be used selectively to confirm the service's explanation, not to test the patient. For example, the clinician might ask, "I want to make sure I explained this clearly. Could you tell me in your own words how you will care for the treated area when you get home and when you would contact us?" (19) This is especially important because recall of medical information is often incomplete and worsens when information is dense or anxiety is high (14).
5. **Summarize and act.** Before discharge, the patient should receive a concise, clinician-approved action summary in the recorded modality. It should state

Care stage	Common failure	Minimum service requirement	Minimum deliverable
Finding and booking	Service information is image-based, visually complex, or available through one channel only.	Describe eligibility, fees, location, transport, and accommodation options through accessible web content and telephone support.	Booking information in the recorded accessible channel.
Preparing for the visit	Directions, forms, medication advice, or expected costs are print-only or arrive too late.	Send preparation information early in the preferred modality and offer staff-assisted form completion.	Accessible pre-visit information and confirmed assistance plan.
Arrival and history	Kiosks, signage, and forms assume visual navigation; staff communicate through a companion.	Provide an identifiable staff-assisted route, accessible forms, privacy, and direct communication with the patient.	Completed history and updated communication preference.
Consent and treatment	Explanations depend on diagrams, monitor images, colour, or dense text.	Use plain spoken description, accessible documents, nonvisual orientation, and selective teach-back.	Documented consent process and confirmation of safety-critical understanding.
Discharge	Instructions are delivered rapidly or handed over in small print only.	Provide a concise, clinician-approved action summary in the recorded modality before departure.	Accessible action summary with warning signs and follow-up plan.
Medication and home care	Labels and demonstrations rely on print size, colour, packaging position, or images.	Use explicit verbal instructions plus accessible text, audio, labels, or another chosen format; describe techniques step by step.	Usable medication schedule and nonvisual home-care instructions.
Recall and urgent follow-up	Reminders, results, and escalation messages use an inaccessible or unmonitored channel.	Use the chosen channel; state what action is required; route failed automated contacts to an alternative process.	Accessible reminder or escalation message with documented delivery outcome.
<i>Note: This table is an original minimum service specification proposed for co-design and prospective testing. Local legal duties, formats, and workflows may require additional elements.</i>			

Tab. 1 Minimum accessible-information specification across an oral health care episode

what was done; expected pain, bleeding, swelling, or numbness; medicine names and schedules; oral hygiene and dietary actions; warning signs; whom to contact; and the follow-up plan. Medication and home-care instructions must not depend only on print size, colour, package position, photographs, or silent demonstration. Accessible written medication information and nonvisual step-by-step instructions are practical components of safer self-management (12).

6. Recall and escalate. Recall reminders, test results, appointment changes, and urgent escalation instructions should use the chosen channel and make the required action explicit. A failed contact should be treated as a process event, not automatically as patient non-adherence. When a portal or automated messaging platform cannot produce an accessible message, the workflow should route the task to an alternative channel.

Table 1 translates these functions into minimum deliverables at seven care stages. The specification is deliberately small: it defines a floor that a service can test, rather than an ideal catalogue that is too complex to implement.

Minimum data structure and auditable indicators

Accessibility cannot be governed if it is recorded only in free text or remembered by individual staff. A minimum data set should include: preferred information modality; accessible contact channel; assistance needed for navigation or form completion; consent for sharing information with a named companion; format used for pre-visit information; communication support used during the encounter; whether safety-critical understanding was confirmed; format of the action summary; preferred follow-up channel; patient-reported understanding and autonomy; missed appointments, failed contacts, and unplanned post-treatment contacts or returns; and the date the preference was last reviewed.

Table 2 proposes eight candidate indicators. They are intentionally process-dominant because an early implementation phase must first establish whether the pathway was delivered. Each indicator has an explicit numerator and denominator to prevent a high percentage from concealing a small eligible group. Local protocols should predefine eligibility, exclusions, the time window for post-treatment events, and the method for identifying failures attributable to an inaccessible channel. Results should be stratified, where numbers permit, by impairment pattern, preferred modality, age, and care setting so that an average improvement does not conceal exclusion of a subgroup.

The indicators are not validated quality measures and should not be used immediately for punitive comparison. Their first purpose is learning: to identify where the pathway breaks, whether staff can deliver it reliably, and whether the requested format reaches the patient in time to influence care.

Candidate indicator	Numerator	Denominator	Primary interpretation
1. Communication-preference recording rate	Eligible encounters with a current preferred modality documented	All eligible encounters	Whether the service identifies and records the need.
2. Requested-format delivery rate	Encounters in which the requested alternative format was delivered	Encounters in which an alternative format was requested	Whether recorded preferences are acted on.
3. Accessible pre-visit information rate	Planned visits with information delivered through the recorded accessible channel	Eligible planned visits	Whether access begins before arrival.
4. Safety-critical teach-back rate	Eligible encounters with confirmation of understanding documented	Encounters requiring safety-critical instructions	Whether explanation is checked rather than assumed.
5. Accessible action-summary rate	Eligible discharges with a summary delivered in the recorded modality	Eligible discharges	Whether the patient leaves with a usable record.
6. Chosen-channel follow-up rate	Follow-up messages sent through the recorded accessible channel	Eligible follow-up messages	Whether accessibility continues after treatment.
7. Accessibility-related failed-contact rate	Failed contacts attributable to an inaccessible or unusable channel	All attempted contacts to eligible patients	Where communication systems break; lower is better.
8. Unplanned post-treatment contact or return rate	Unplanned calls or returns within the locally defined window	Eligible treatment episodes	Potential continuity or safety signal; requires clinical interpretation.
<i>Note: Each rate is multiplied by 100. Eligibility, exclusions, time windows, and attribution rules should be defined locally before measurement. These indicators are proposed for implementation learning and are not validated performance measures.</i>			

Tab. 2 Minimum accessible-information specification across an oral health care episode.

Implementation sequence

A practical implementation sequence has five stages. First, establish governance and co-design. One accountable clinical or service lead should work with people who are blind or have low vision, accessibility specialists, dental professionals, administrative staff, and caregivers where appropriate. Second, map one existing high-volume pathway from booking to follow-up and identify where information changes format or ownership. Third, build the minimum infrastructure: structured record fields, actionable flags, accessible versions of the most frequently used documents, a clinician-approved action-summary template, and a defined alternative when automated systems fail.

Fourth, test the pathway in a small Plan-Do-Study-Act cycle. A pilot can begin with one procedure, one clinic, or one population and measure fidelity, completion time, patient understanding, autonomy, and staff burden. Fifth, revise and scale while auditing the eight indicators. Training should be task-based: staff should be able to identify a need, generate or obtain the selected format, communicate directly with the patient, use teach-back appropriately, and document delivery. Interdisciplinary oral and primary care models for people with disabilities offer a relevant precedent for testing this type of shared workflow (15).

The pathway does not require a new application. Implementation should be proportionate to organizational capacity. In a small, resource-constrained private practice, a feasible starting package could consist of one designated lead, a visible preference field, a small set of reusable accessible templates, and a telephone or staff-assisted fallback; larger public institutions can support the same core functions through enterprise records, centralized format conversion, multidisciplinary ownership, and routine cross-site audit (20). In either setting, the minimum requirement is that a recorded need triggers timely delivery in a usable format and a documented fallback when the initial channel fails. In many settings the first improvements will be governance and format changes: adding a structured preference field; stopping print-only correspondence; making the discharge summary screen-reader compatible; assigning responsibility for alternative formats; and ensuring that a failed automated contact produces a human follow-up task.

Safeguards and balancing measures

Implementation can fail even when an accessibility label is present. Braille should not be treated as the universal alternative because many people with visual impairment do not use it. A caregiver can support navigation, memory, or home care, but communication and consent should remain directed to the patient unless the patient requests otherwise or a lawful decision-making process applies. Reviews of dental care use among children with disabilities show that caregivers can be essential facilitators while also introducing practical constraints; the role therefore requires explicit agreement rather than default

substitution (16).

Digital conversion is not equivalent to accessibility. A scanned portable document format file, an image inside a message, a poorly structured document, or an inaccessible authentication process may preserve the same barrier in a new channel. Any automatically generated or translated clinical summary should remain subject to clinician approval. Emerging text-to-speech and automated voice tools may help deliver clinician-approved instructions and reminders when audio matches the patient's recorded preference, but they should remain a delivery layer rather than a source of unverified clinical content. Safety-critical voice output should be checked against the approved source and paired with a route to human assistance or another accessible format (11, 20). Privacy should also be protected: accessible communication must not require disclosure to a companion, shared device, or public-facing channel.

Balancing measures should include staff time, delay in providing the requested format, rate of incorrect or outdated preferences, privacy incidents, duplicate contacts, and patient-reported burden. These measures prevent the service from improving a headline process rate by shifting work or risk to patients and staff.

Evaluation and research agenda

The next step is co-designed prospective evaluation, not immediate claims of effectiveness. Feasibility outcomes include the proportion of eligible encounters in which the pathway can be completed and the time required. Fidelity outcomes assess whether each function was delivered as intended. Patient-reported outcomes should include understanding, confidence in self-care, autonomy, respect, and the usability of the received format. Service outcomes can include missed appointments, failed contacts, medication or home-care errors, completion of follow-up, unplanned calls or returns, and preventable complications.

Testing should include people with different degrees and onset of visual impairment, different assistive-technology experience, and intersecting needs such as older age, hearing loss, low literacy, or language discordance. Nonvisual oral health education has shown promise in school settings, but transfer to routine adult clinical pathways cannot be assumed (17). Older work also indicates that visual impairment can affect recognition of oral disease and maintenance of oral health, reinforcing the need to examine self-management outcomes rather than communication satisfaction alone (18).

A stepped implementation or cluster design could compare usual care with MAIP-OH-supported care while minimizing contamination. Qualitative interviews should accompany quantitative outcomes to identify unintended burdens and situations in which the recorded modality did not match actual use. Economic evaluation should distinguish one-time conversion and training costs from recurrent delivery costs. The most important criterion is not whether an organization possesses accessible materials, but whether the correct patient received usable,

timely, clinician-approved information and could act on it.

Limitations

MAIP-OH was developed from a purposive synthesis and is not a systematic review, consensus guideline, or validated intervention. The framework has not yet been co-designed or tested with people with visual impairment, and the proposed indicators have not undergone reliability, validity, or risk-adjustment assessment. Evidence specific to oral health information interventions remains limited, and several supporting sources come from broader healthcare settings. Local legal duties, record systems, languages, resources, and available formats differ. The pathway should therefore be adapted transparently and evaluated before it is used for external performance judgement.

CONCLUSION

An oral health service can be physically reachable yet functionally inaccessible. Moving from nominal availability to effective access requires a continuous information pathway that identifies and records patient needs, delivers information in a usable modality, confirms safety-critical understanding, provides an accessible action summary, and preserves accessibility through recall and escalation. MAIP-OH offers a minimum data structure, candidate indicators, implementation sequence, and safeguards that can be tested rather than merely endorsed. Its value now depends on co-design and prospective evaluation with people who are blind or have low vision.

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Disclosures

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