

# Positive Impact of an Educational Brochure on Follow-Up for a Formal Hearing Evaluation

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## Abstract

**Background and Objectives:** Half of older persons experience serious hearing loss, yet it remains under-assessed in primary care clinics. Providers note time constraints as barriers and patients often minimize or deny their hearing loss. We tested the effectiveness of a simple hearing screen in primary care settings and whether including a brochure describing hearing loss, its consequences, and treatment would increase referrals for formal audiometric assessments.

**Research Design and Methods:** We designed a longitudinal effectiveness study assessing three interventions: Screening alone; Screening plus a brochure handed to the person testing positive; and Screening plus the brochure with a brief review. The screening was accomplished by intake personnel. The results of a positive screen were given to the primary care practitioner. The approach was designed to enable its use across a range of primary care settings. Follow-ups occurred at 4 and 8 months.

**Results:** A total of 111 older adults attending 7 primary care clinics screened positive for having possible hearing loss by intake personnel. A total of 46 received the educational brochure. Physicians discussed test results with two-thirds yet recommended further testing for only half of the participants. Physician recommendations were strongly motivating (OR = 9.12, 95% CI: 3.54–23.52) and those receiving the brochure were still more likely to seek further testing (OR = 2.61, 95% CI: 1.07–6.36) even when physician recommendations were controlled. Additionally, when combined, the 2 options were strongly motivating: all participants receiving both a referral and a brochure sought further testing.

**Discussion and Implications:** A simple screen and educational brochure on hearing loss improved follow-up for a formal hearing evaluation which may improve hearing health care and minimize negative outcomes. The study also identified barriers to implementation, including how to motivate practitioners and assist intake personnel in integrating hearing screening into their routine intake procedures, supporting further research.

**Clinical Trials Registration Number:** [NCT02037139](https://clinicaltrials.gov/ct2/show/study/NCT02037139)

**Translational Significance:** Hearing loss remains under-assessed in primary care clinics. Findings support the impact of hearing screening to identify persons at risk for hearing loss to motivate further audiometric assessment, the value of adding educational information about hearing loss, and the feasibility of incorporating a simple screen into routine clinic intake procedures. We also identified important barriers to integration in primary care, supporting the need for further research. Since the USPSTF guidelines do not recommend routine hearing screening for persons not identifying as having problems, continued explorations on the benefits and strategies that can work in primary care are warranted.

**Keywords:** Hearing loss, Hearing screening, Primary care, Patient education

## Background and Objectives

Almost half of individuals aged 60 or older experience hearing loss serious enough to make understanding speech difficult and cause misunderstandings with prevalence increasing with age (ASHA, n.d.; Goman & Lin, 2016; Lin et al., 2011). Still, many are either unaware of their loss or minimize its importance. Unfortunately, an individual's ability to hear and understand what is said is still not routinely assessed in clinical settings. Although some data suggest screening rates may be increasing (Powers & Carr, 2022), other data suggest they remain between 20% and 30% in

primary care, even in older adults (Wallhagen & Pettengill, 2008; McKee et al., 2021).

Many reasons are given for hearing loss going unnoticed or under assessed. These include its slow onset, which allows individuals to slowly adapt and not recognize its impact, a perception that hearing loss is just another “normal” age-related change, the stigma associated with hearing loss and hearing aids, and concerns that doing something about hearing loss will be expensive and likely not very effective (Humes, 2021; Wallhagen, 2010). Health care practitioners often have these same beliefs, do not appreciate the presence of hearing

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loss when meeting someone in a small room face to face, or place priority on other clinical needs, often viewing hearing loss as either a benign condition or of less a priority than other health care concerns. Furthermore, the United States Preventive Services Task Force (USPSTF et al., 2021) has not supported the routine screening of asymptomatic persons for hearing loss. Thus, unless providers build hearing screening into their routine health assessments, a person must self-identify as having problems hearing to initiate an intervention.

Unfortunately, hearing loss is far from benign. Hearing loss is not only associated with multiple negative psychosocial events, such as depression, isolation, loneliness, and altered interpersonal relationships, but also with multiple negative clinical events such as falls, delirium, and cognitive impairment (Lin, 2011; Lin & Ferrucci, 2012; Loughrey et al., 2018; Morandi et al., 2021; Rutherford et al., 2018). Misunderstandings can also lead to negative outcomes if provider instructions are misunderstood, and hearing loss may cause individuals to be left out of discussions regarding health care preferences (Smith et al., 2016; Wallhagen et al., 2019).

Given the significance of hearing loss, strategies to promote hearing screening in clinical settings could enhance the quality of care for older adults and minimize negative psychosocial and clinical events. Unfortunately, there is no data available on successful and sustainable efforts to incorporate hearing screening and subsequent referrals into primary care. At the same time, individuals with hearing loss say they would be more likely to seek care if told to do so by their primary care practitioner rather than a spouse or friend (Popp & Hackett, 2002). Given this, we hypothesized that screening for hearing loss in a primary care setting coupled with the health care practitioners taking it seriously and referring for an audiometric test could enhance access to hearing health care. However, we also realized that many individuals with hearing loss who are referred do not follow up with the referral. We believe this is partly due to factors discussed above but also a lack of understanding of hearing loss and its impact on health and personal relationships.

Based on these various factors, we conducted a pilot study in which we worked with primary care practitioners to test a short screening procedure for hearing loss coupled with a brief educational intervention providing information to encourage patients with possible hearing loss to seek further testing (Wallhagen & Strawbridge, 2017). The educational brochure along with its discussion appeared to motivate some of the individuals to seek referrals for further testing. However, the pilot study did not have a control group for comparing those exposed to the brochure and those not, so we conducted a larger study that would provide comparative information. The current paper discusses the initial design and method, some of the barriers to implementing the full protocol, and our finding that a simple brochure provided in the context of a simple screening for hearing loss may have a positive impact on referral and subsequent audiometric testing of older adults with hearing loss.

## Research Design and Methods

### Design

Our purpose was to design an effectiveness study—that is, a protocol that was simple, sustainable, and did not involve extra technology so that clinical settings with minimal resources could incorporate it into their workflow. Furthermore, the study was based on the reality that personnel in primary care

settings experience multiple demands on their time. Therefore, we developed a protocol that could be integrated into the intake assessment workflow of the medical assistants or nurses who would then include the results in their usual screening reports sent to the health care provider. Issues encountered related to this approach are discussed below.

The goal was to assess three approaches: Screening along with results of a positive test given to the health care practitioner; Screening with a brochure handed to the person testing positive and the results provided to the practitioner; and Screening plus the brochure with the addition of a brief review by the intake personnel to emphasize the importance of hearing loss to health. The latter is based on awareness from our pilot that individuals often do not read the materials that are provided to them without an understanding of why it's important. In addition, because the study was designed to be an effective study, the protocol was developed to minimize any change in the routine workflow. Thus, study personnel, except for during training of staff on the protocol, were not present in the clinic, and consenting was accomplished as described below. The study was approved by the Committee for Human Research, University of California, San Francisco. Clinical trial: NCT02037139.

We recruited 7 primary care clinics located in the San Francisco Bay area to take part in the study. Three were large suburban clinics, two were inner city clinics primarily serving low-income minority residents, one focused on low-income suburban residents, and one was in a large rural area with three sites served by rotating physicians. The research nurse provided training on how to perform the hearing screening to all staff followed by having the staff practice doing the hearing screening.

Patients aged 60 or older coming to the clinics for routine procedures or checkups and who had not worn hearing aids for at least a year were screened for possible hearing loss by intake personnel both with a direct question (“Do you have any difficulty hearing?”) and with the finger rub test, as described below (Strawbridge & Wallhagen, 2017). If either or both tests were positive for possible hearing loss, the patients' providers were informed of the test results, and the patients were asked if they were interested in taking part in a hearing study. Those who expressed an interest were given a contact sheet to fill out that would be given to the study's research nurse for subsequent contact after the visit. They were also given a study flyer and an informed consent to take home. Clinic physicians were informed of the study and asked to follow their normal procedures for patients with possible hearing loss when provided the results of the screening.

The screening procedure initiated (question and finger rub) was followed for all patients, but then the intake personnel followed one of three different protocols to assess the value of distributing a brochure concerning hearing loss with or without a brief review of the brochure. The three protocols were:

1. Screening only. No brochure.
2. Screening plus handing the patient the brochure.
3. Screening plus the brochure plus a very brief educational review of the brochure.

Initially planned as a randomized trial whereby different clinics would use one of the 3 protocols, we realized that the variability in clinics would make comparisons impossible. Therefore, we designed a sequential design. Each clinic started with the

first protocol and then switched to two and three in order when the research nurse determined that about one-third of likely patients had been screened. Training was also sequential so that the first protocol would not be contaminated by awareness of the second or third protocol. Training on the performance of the finger rub screening and each protocol was accomplished by the research nurse. The finger rub protocol was based on the CALFRAS-Strong procedure for the finger rub (Torres-Russotto et al., 2009). This procedure was found to be highly sensitive (91%) and moderately specific (68%) in an earlier pilot we accomplished (Strawbridge & Wallhagen, 2017). The protocol involves the assessment of hearing at 70 centimeters or about 27 inches distance from each ear. This is generally equivalent to an outstretched arm. We made one modification—rather than have the screener stand “nose to nose” less than a foot from the patient as described for CALFRAS, we had screeners stand behind the person being screened. Prior to proceeding, the patient is seated comfortably in a chair and the practitioner rubs their fingers briskly together close to patient’s ear so they understand what to listen for. They are then told to raise their hand on the side when they hear the sound. The practitioner then stands behind the patient with their arms extended to each side at ear level, asks the patient to close their eyes, and tests each ear individually by rubbing their fingers very firmly. If the patient does not hear the sound on the first finger rub, it is repeated. If heard on the second, a third rub is performed. Those who either cannot hear the first two rubs or only hear one of the three are considered to have tested positive for possible hearing loss in that ear.

Participants who expressed an interest and provided contact information were called shortly after their clinic visits by the study nurse. The study was explained, and informed consent was obtained from those willing to take part. Participants mailed in the signed consent form in a stamped, addressed envelope, and only data from participants whose consent was obtained were used. After the informed consent was obtained, the research nurse asked what their physicians had said and done about their screening test. Follow-up interviews occurred at 4 and 8 months to ascertain what actions if any they took to address their possible hearing loss. Interviews were conducted by telephone or in-person depending upon the extent of the participant’s hearing loss. Because we felt an ethical commitment to having participants understand the importance of hearing loss, protocol 1 participants were sent the brochure after the first follow-up and those from both protocols 1 and 2 were offered the same educational review received by those in protocol 3 at the end of the final interview. We used the 4 months follow-up as the time to provide the brochure to those in protocol 1 based on the belief that any follow-up action should have occurred within the first 4 months of the screening.

## Participants

A total of 155 individuals whose screening indicated possible hearing loss enrolled in the study. At 8 months two had died and 15 others could either not be located or no longer wanted to participate. We also eliminated two who had been referred for hearing tests in the year prior to enrollment and 25 who were still considering whether to schedule referral appointments. The analyses here are based on the remaining 111 who completed all interviews and were firm in their decision on whether to schedule a subsequent hearing test. Sixty-five participants were from protocol 1, 36 from protocol 2, and 10 from protocol 3. Given the small number in protocol 3, we combined them with protocol 2 since both groups had received the brochure. The larger number included in protocol 1 was the result of issues at the recruitment sites, difficulty getting a response from the contact at one site, fewer unscreened persons across time according to clinic staff, and delays in study initiation because of construction and related noise or other limiting issues at the clinic sites. These issues are further considered in the discussion.

## Data Analysis

We first examined the results of physician actions by patient actions for the entire sample. Then we compared physician actions by patient actions for each of the two cohorts. Finally, we used logistic regression to analyze differences in seeking referrals for physician recommendations versus no recommendation and receiving a brochure versus not receiving one. Because protocol 1 had slightly fewer females than the combined protocol 2 (58% compared with 65%) and fewer patients aged 70 or more (53% compared with 63%), these logistic analyses adjusted for age and gender.

## Results

### Sociodemographic Data

Participants varied in age from 60 to 94 with a mean of 71.2. 61% were women, 39% men. Minorities (Black, Asian, and Hispanic) constituted 22%. A total of 82% had Medicare coverage, and 24% had MediCal, California’s version of Medicaid. Typical of California’s Bay Area population, 46% were college graduates.

### Physician Referrals

Table 1 shows physician actions to the screening results with subsequent patient actions. Physician responses were nearly evenly divided among not saying anything about the hearing

**Table 1.** Physician Action Following Screening for Possible Hearing Loss (*N* = 111)

Physician actions	N	Patient actions	
		Sought referral	Did not seek referral
Hearing loss not discussed with patient	37	24.3%	75.7%
Discussed and recommended further testing	36	75.0%	25.0%
Discussed but did not recommend further testing. Instead checked ears, talked about the hearing study, or talked about hearing loss	38	23.7%	59.5%
Totals	111	40.5%	59.5%

**Table 2.** Physician Recommendation and Patient Action by Protocol

Physician actions	Protocol 1: Testing only			Protocol 2: Testing and given brochure		
	N	Patient actions		N	Patient actions	
		Sought referral	Did not seek referral		Sought referral	Did not seek referral
Recommended further testing	19	52.6%	47.4%	17	100.0%	00.0%
Did not recommend further testing	46	23.9%	76.1%	29	27.6%	72.4%
Totals	65	32.3%	67.7%	65	54.3%	45.6%

**Table 3.** Logistic Regression Showing Relations Between Physician Recommendations, Brochure Distribution, and Patients Seeking Referrals for Further Hearing Testing

Model and covariates	Patients sought referrals		
	Odds ratio	95% confidence interval	p Value
Age 70 or older	0.81	0.33–1.98	.863
Women	1.23	0.49–3.05	.633
Physician recommended referral	9.12	3.54–23.52	.000
Patients given brochure at screening	2.67	1.09–6.53	.035

screening test, discussing the test and recommending further testing, or taking other actions short of recommending further testing. Participants in the third category who said their physicians examined their ears nearly all reported that the physician told them their ears “were clear.” Those saying their physicians talked about the study said the physician encouraged them to stay in the study but made no other recommendation. Those saying the physicians talked about hearing loss said they were told that hearing loss increases with age.

When physicians did recommend further testing, Table 1 shows that 75% of the participants followed through on that recommendation. Less than 25% did so when their physicians either said nothing about the screening test or did respond but did not recommend further testing. Clearly, physician recommendations carry substantial weight with their patients, but it is interesting that nearly a fourth sought further testing in the absence of a recommendation.

Table 2 shows physician recommendations for further testing with patient actions for each of the two study protocols. Two findings are evident. First, over half the patients receiving a brochure sought further testing compared to less than a third of those not receiving a brochure. Second, the difference appears to lie in with combining the physician’s recommendation with the brochure. One hundred percent of the patients receiving both the brochure and a recommendation for further testing sought a referral compared with only about half of those recommended for further testing but not receiving the brochure.

Table 3 shows the logistic regression results with both physician recommendations for further testing and participants receiving the brochure in the same model along with adjustments for age and gender. Not surprisingly, the physician referral results were strong with an odds ratio of 9.12, but the relationship between receiving a brochure and seeking further testing was also statistically significant with an odds ratio of 2.67 even when physician referrals were taken into account.

## Discussion and Implications

Data from the current study supports and amplifies the findings of the pilot study. Persons with hearing loss are more likely to follow-up on a positive hearing screen when referred by a health care practitioner but this effect is amplified when they are provided information on hearing loss, its impact on health and well-being, and options for treatment. Indeed, all the patients who received both a referral and a brochure sought further testing.

A major strength of the current study is its emphasis on addressing the realities of primary care and managed care settings, including areas with and without significant financial resources, and its longitudinal follow-up. It was also designed to be incorporated into the ongoing workflow of a given setting. As a result, our data provide additional insights into the barriers to carrying out a clinically based study and integrating hearing screening into primary care settings. Although physicians discussed test results, sometimes briefly, with two-thirds of the patients who screened positive for possible hearing loss, they only recommended further testing for half of them. Indeed, a third never mentioned the positive screen at all. We were unable to get additional qualitative data for their reasons but further study of how to overcome this barrier is certainly warranted.

Additionally, current mandated screening and assessments place significant time demands on intake personnel who are often under pressure to get patients into exam rooms and ready to be seen. This is especially true in practices with only one exam room per practitioner. Adding even a simple screening assessment for the intake staff to perform when it was not part of the required protocol required training and motivation from physicians. As already noted, the first two protocols (screening only, screening plus brochure) were more readily incorporated into the settings, adding the education in protocol three appeared to be perceived as too burdensome.

Including hearing screening as one of the mandated intake assessments would promote screening, especially if appropriately scheduled reminders (e.g., annually or biannually depending on age) could be built into the electronic health record. However, this still does not address the ongoing and growing demands on primary care settings. Additional studies, including quality improvement and implementation science studies, are needed to consider how to best overcome the barriers to hearing screening and ensure that it can be easily incorporated into a clinic's workflow. Ways to encourage practitioners to refer patients with possible hearing loss for further testing also need to be addressed. Given the growing recognition of the impact of hearing loss on psychosocial, physical, and cognitive health, such studies need to be encouraged and supported.

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## Conflict of Interest

None.

## Data Availability

At the time of and during this clinical study, participants did not provide consent for their data to be shared publicly. This study was not preregistered.

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