

HEARING HEALTH

DRIVING MEMBER EXPERIENCE WITH INTELLIGENCE

A SCALABLE HEALTH WHITE PAPER



SCALABLE
HEALTH

TABLE OF CONTENT

INTRODUCTION.....	3
HEARING LOSS – A WORLDWIDE CHALLENGE.....	5
MOST HEARING LOSS GOES UNTREATED.....	6
AI NAVIGATES A COMPLEX JOURNEY.....	6
HEARING LOSS AND RISK STRATIFICATION.....	7
RISK MODELING TO IDENTIFY AT-RISK PATIENTS.....	9
BENEFITS OF RISK MANAGEMENT FOR HEARING LOSS.....	9
CREATING BETTER CARE ENVIRONMENTS.....	11
CONCLUSION.....	12

INTRODUCTION

As our population ages, the healthcare ecosystem is tasked with more and more to meet the needs of this aging demographic. Aging coupled with lifestyle choices results in a full spectrum of diseases and comorbidities impacting our quality of life. Often by the time these conditions are symptomatic, healthcare providers are left trying to catch up and treat symptoms rather than focusing on holistic wellness and preventative medicine.

Fortunately, advances in artificial intelligence and digital health are allowing doctors to gain greater insights into disease progression leading to earlier diagnostics and intervention. AI, predictive analytics and risk stratification allow care providers to identify at-risk populations for earlier intervention. By getting ahead of the problem, providers can prevent or delay the onset of many chronic conditions.

As we get older, it is natural to suffer some degree of hearing loss. However, a third of patients over 65 suffer from disabling hearing loss impacting their quality of life. Advances in hearing aids and other health tech solutions are available to offset this problem, but most of this hearing loss will go untreated further accelerating the aging process and potentially leading to a wide range of disabling conditions.

Comorbidities linked to hearing loss such as social isolation, loneliness and depression are a result of diminished communication associated with the loss. Patients often withdraw resulting in mental health concerns and a diminished quality of life. In

addition, hearing loss can also lead to other disabling conditions such as falls, cardiovascular disease, diabetes, cognitive impairment and dementia, fibromyalgia, anemia, psoriasis, rheumatoid arthritis, kidney disease, sleep apnea and even death.

Risk stratification for hearing loss will allow audiologists to identify high-risk patients for testing and treatment. Which may lead to a better quality of life. For example, patients using hearing aids for just 30 days experienced less falls as opposed to a similar group without.

But detection is just the first step on what may be a long, complicated journey. Which healthcare plans cover hearing loss and what are the coverage options available? This, coupled with over 5,500 hearing specialists nationwide and more than 2,800 hearing aid models from leading brands such as Miracle-Ear, Oticon, Phonak, Starkey to choose from, may leave many patients and caregivers confused as to what options are best. Artificial Intelligence can assist payers and providers in developing the precision care plans to meet their members' needs.

By adopting a comprehensive hearing health policy - healthcare organizations can proactively manage early intervention, encourage hearing rehabilitation, assist and train patients on how to effectively use assisted listening devices and assist members in selecting the best health plans to meet their individual needs.

COMORBIDITY FACTORS

Cardiovascular Disease (CVD)

Low frequency HL patterns seem to presage CVD

Alzheimer's & Dementia

Reduced memory and learning... dementia risk up to 5X higher

Hospital Admittance

32% more likely for older adults with HL

Depression

Diminished psychological and overall health

Diabetes

Diabetes 2X more likely, especially for those < 60 years old with HL

Social Withdrawal

People with HL tend to "drop out"

Chronic Kidney Disease (CKD)

40% increased risk for CKD

Falling

The leading cause of fatal/non-fatal injuries among the elderly



HEARING LOSS – A WORLDWIDE CHALLENGE

According to the World Health Organization, over 466 million people or approximately 5% of the world's population suffer from disabling hearing loss - hearing loss greater than 40 decibels (dB). Furthermore, nearly a third of seniors aged 65 or older suffer from disabling hearing loss. It is predicted by 2050, over 1.2 billion people will suffer from hearing loss.

When an individual suffers from hearing loss, they often feel isolated and alone. Difficulties arise in participating in group events where background noise confuses the patient. Hearing aids are often stigmatized with getting old and feeble, so more than 24% go unused. This lack of adherence furthers the isolation and the patient begins to withdraw leading to greater increases in depression

There are numerous health conditions that are associated with a greater likelihood of hearing loss, such as diabetes. Studies have shown that patients with diabetes have a 21% chance of having hearing loss, as opposed to the general population's likelihood of 9%.

Studies have shown a correlation between untreated hearing loss and an increased risk of dementia, mental illness, depression, falls and even cardiovascular diseases. Patients suffering from hearing loss have a greater likelihood of more frequent and longer hospitalizations and readmissions and more emergency room visits leading to increased health care costs by 46 percent over a period of 10 years.

Unfortunately, it is estimated that nearly 85% of hearing loss goes undetected. Interventions to prevent, identify and address hearing loss are cost-effective and can be life-changing. Research has shown the sooner hearing loss is detected, the better the outcome of a clinical intervention.

Healthcare organizations cannot afford to ignore hearing loss. Implementing hearing health strategies are imperative to enhancing the patient experience, improving care outcomes and reducing the costs associated with resulting acute care incidents.



5% of the world population
466,000,000

466 million people worldwide have disabling hearing loss



Up to **5** of every **1000** infants are born with or develop disabling hearing loss in early childhood



Nearly **1** out of every **3** people over 65 years are affected by hearing loss



91% Adults
9% Children

MOST HEARING LOSS GOES UNTREATED

The onset of hearing loss is a subtle, gradual process. Most patients are unaware that any loss has occurred. We don't just stop hearing things but lose the ability to distinguish certain frequencies making it difficult to understand certain sounds in certain conditions. Often hearing loss is gradual and may not be measured by conventional hearing tests. This is commonly referred to as hidden hearing loss. An example of hidden hearing loss would be when the patient has difficulty following a conversation in the presence of background noise.

Certain patients are more likely to suffer from hearing loss if they have had a history of exposure to loud noise conditions in the workplace or suffer have a comorbidity factor identified as increasing the likelihood of hearing loss. By identifying these at-risk patients, providers can identify hearing loss

earlier and offer assistance to compensate for the loss.

In a society that equates beauty with youth, hearing loss is another sign we are getting old. The combination of gradual onset and the stigmas associated with aging means patients do not proactively engage in managing hearing loss. Hearing aids, while effective, are often not used. Either because the patient finds them unattractive or they don't work well.

Providers need to educate their patients in the use of hearing loss aids. As a result of some degree of hearing loss, the brain develops coping mechanisms. This means that by reintroducing the lost element, the brain needs a period of adjustment. Care providers must help educate patients about new devices including setting expectations as a means to increase adherence.

AI NAVIGATES A COMPLEX JOURNEY

48 million Americans suffer from some form of hearing loss with the greatest occurrence in seniors as a result of natural aging. The cost of hearing devices can range from \$800-\$3,200 and not usually covered in most standard plans. Leaving patients frustrated and unsure of their options. Payers and providers can use AI to develop products to meet the needs of this growing population. By addressing a growing need and addressing hearing loss, payers can enhance member experience and mitigate the occurrence of comorbidity factors.

Artificial Intelligence can generate precise health intelligence based on the patient's

profile to determine the best coverage, the right provider and assist in selecting the best device that meets the holistic needs of the member. Payers can direct patients to providers in-plan. Providers will be able to real-time patient information to best select from over 2,800 commercially available options. Members will receive tailored hearing loss plans that meet both their financial and health needs. The result is greater member satisfaction, increased adherence to care plans and reduced subsequent costs as hearing loss co-factors are mitigated.

Care providers must create an environment conducive to hearing health. Through routine screening and patient education of the proper use of hearing aids and other devices, they can begin to address the stigma associated with hearing loss in seniors. Further, they must train all their staff in hearing health, so that a comprehensive approach is taken by all providers from doctors to nurses to physical therapists to home care attendants.

Patients will look to their insurance companies to help navigate the complexities of treating hearing loss. AI generated intelligence will empower payers with the insights to develop

products to best meet the growing needs of their patient populations. Further, they will be able to refer members to suitable hearing specialists and ultimately the best hearing aid to meet those needs. This offers the opportunity for new or expanded products to offer the members and a greater overall member experience as they enjoy the benefits of this patient-centric approach to hearing health.

A proactive approach to hearing health will result in greater adherence to care programs, better care outcomes, reduced costs and improved overall member experience.

HEARING LOSS AND RISK STRATIFICATION

With a rapidly aging population, the prevalence of hearing loss is an ever-increasing challenge. This requires healthcare providers to develop strategies for early detection and intervention through stratification of at-risk patients for hearing loss. Several conditions such as cardiovascular risk factors (hypertension, smoking, diabetes) and noise exposure (occupational, recreational, firearm) increase the likelihood of hearing loss and should be considered in stratification models.

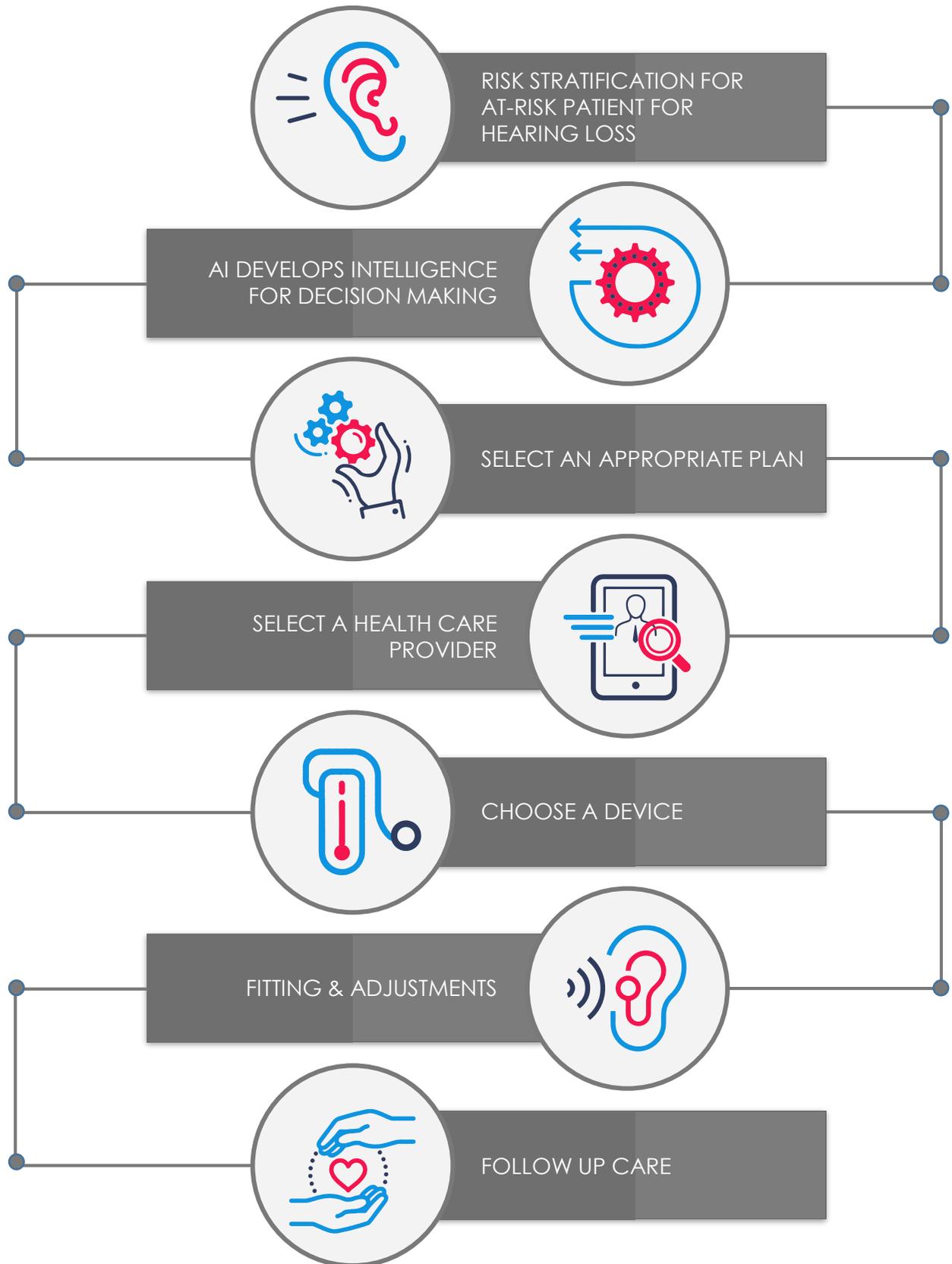
For example, smoking or diabetes nearly doubles the likelihood of hearing loss. Furthermore, it is widely understood that

certain pre-existing medical conditions can further exasperate the effect of noise exposure on hearing. Risk stratification should guide our counseling of patients regarding hearing loss for better care outcomes.

Risk stratification helps payers optimize spending and group patients based on health risk. Modeling supports the identification of high-risk patients for prevention, early diagnosis, long-term treatment and rehabilitation of hearing loss, as well as the detection and prevention of cognitive decline and the improved socioeconomic inclusion of hearing-impaired individuals.

PLANNING FOR BETTER HEARING HEALTH OUTCOMES

Payers Driving Member Experience



RISK MODELING TO IDENTIFY AT-RISK PATIENTS

Risk Modeling will be used to identify predictors of hearing loss, cognitive decline, and will enable the development and eventual validation of auditory training benefits for an increased quality of life for hearing loss suffers.

Risk Stratification coupled with Big Data Analytic techniques will assist providers to –

- Determine the effectiveness of assessment and diagnostic tools.
- Identify correlations between comorbidities affecting hearing loss.
- Measure adherence to treatment plans (24% of hearing aids provided are not used).
- Develop retrospective insights from hearing-aid users to assist in future treatment and device recommendations based on correlating patient conditions.

- Develop population health guidelines (e.g., descriptive statistics, statistical testing, and inference techniques) and predictive tools (e.g. clustering and prediction) to assist public health policy-makers.

Risk Solutions deliver actionable insights for improved population health management:

- Risk stratifies provide the opportunity for intervention at-risk patients to reduce or delay the onset of hearing loss.
- Allows for data integration from various sources - Integrate unstructured and structured data from multiple sources for predicting population health needs.
- Offers performance tracking metrics – an analysis of the overall program across the care continuum (e.g. the number of clinic visits, inpatient hospitalizations, observation, readmissions, etc.).

BENEFITS OF RISK MANAGEMENT FOR HEARING LOSS

Benefits of Risk Management for Hearing Loss

Through risk stratification, healthcare organizations can identify at-risk patients for hearing loss, who have otherwise gone untreated.

- improves a patient's health across the full continuum of care from low-risk, healthy individuals to high-risk individuals with one or more chronic condition for greater Population Health Outcomes.

- Develops a culture of measurement & problem-solving. Clinicians develop the skills to use Data to inform Care Provision/Decision Support/ Evidence-based Medicine care plans.
- Offers actionable insights for better hearing health management by identifying at-risk patients, allocating appropriate resources to meet future hearing health needs and driving efficiencies throughout the organization.

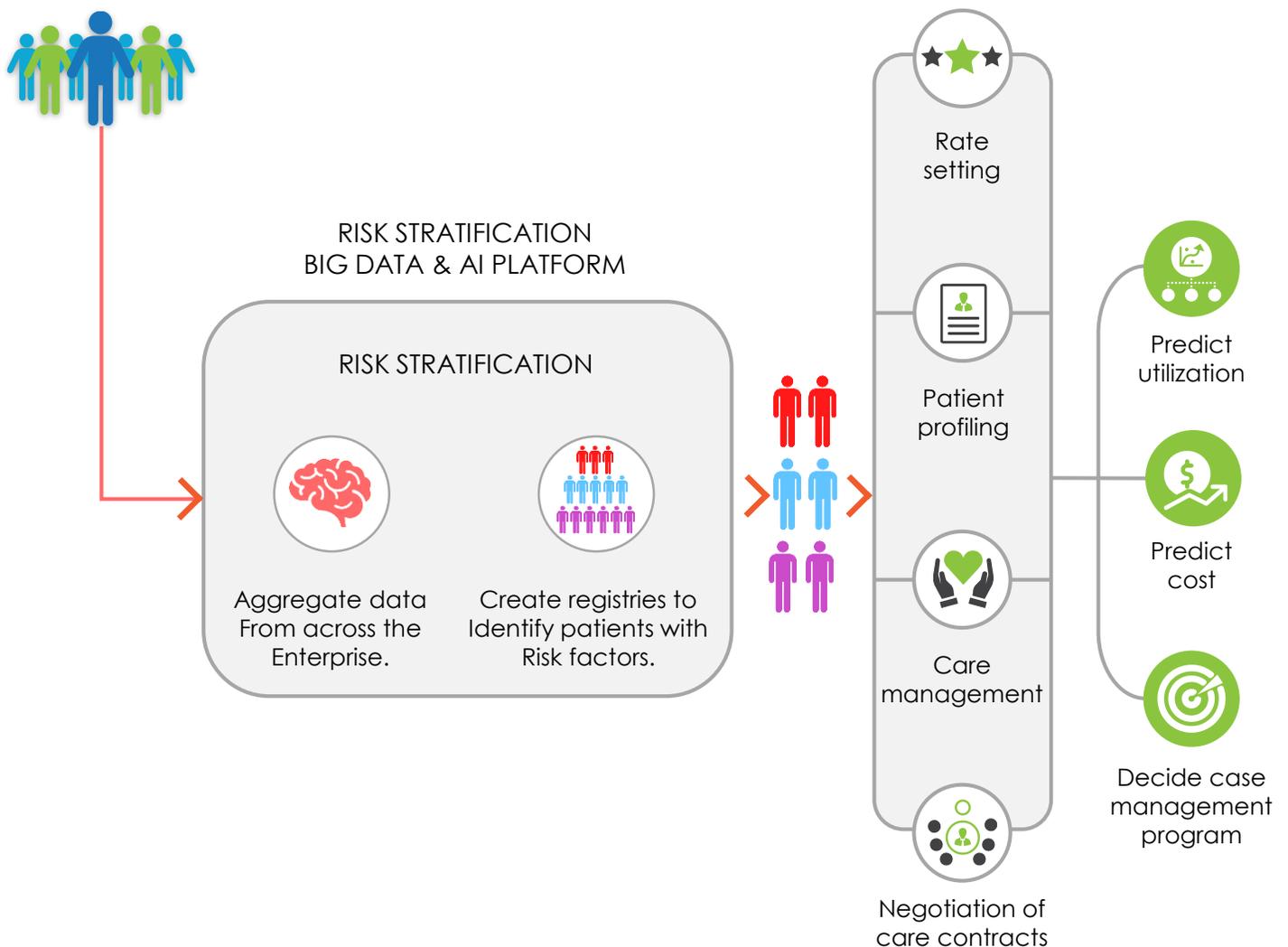
Risk stratification scoring assists in

- Developing personalized care plans for at-risk patients.
- Creating financially efficient population management
- Prioritizing clinical workflow

- Reducing system waste

Proactively addressing hearing loss will allow healthcare organizations to offer better outcomes for patients suffering from hearing loss, reduce costs of hospitalizations and readmissions and create efficiencies as resources are targeted to those with the greatest needs.

RISK STRATIFICATION BIG DATA & AI PLATFORM



CREATING BETTER CARE ENVIRONMENTS

Healthcare providers need to understand the impact of hearing loss and educate their patients on how to address such a loss.

- Healthcare environments are often confusing and loud. There are multiple conversations taking place with machinery beeping in the background,
- Patients suffering from hearing loss find these environments challenging and as a result tend to withdraw resulting in diminished care,
- Clinicians need to be sensitive to the hearing needs of older patients, creating quiet spaces to facilitate better communication.
- Hospitals should routinely screen older patients for hearing loss, and develop hearing health options for those who

might be hearing impaired. The management of hearing loss requires an understanding of the contributing factors intrinsic to the patient coupled with evidence-based solutions for better care outcomes.

Care providers must create an environment conducive to hearing health. Through routine screening and patient education of the proper use of hearing aids and other devices, they can begin to address the stigma associated with hearing loss in seniors. Further, they must train all their staff in hearing health, so that a comprehensive approach is taken by all providers from doctors to nurses to physical therapists to home care attendants. This will result in greater adherence to care programs, increase care outcomes and improve the overall patient experience.

CONCLUSION

Risk Stratification and Improved Quality of Life

For many care givers, hearing loss is simply a byproduct of getting old. Unfortunately, diminished hearing is linked to a whole host of serious, disabling conditions. Furthermore, addressing the loss through hearing aids and other advances have demonstrated a positive impact on these conditions. Patients overall psychological health improves, there a less falls (a leading cause of death in seniors) and better communications allow them to actively engage in healthcare decisions.

Through risk stratification, healthcare organizations can identify at-risk seniors and offer them treatment alternatives for a better quality of life.

About Scalable Health

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