Global Falls Innovation Report

The Aging2.0 Collective in partnership with Essence Smartcare

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This report was produced by the Aging2.0 Collective together with Essence Smartcare. It's one of a number of reports and workshops designed to enhance understanding, build business opportunities and partnerships, and bring solutions to critical social issues.

The Report
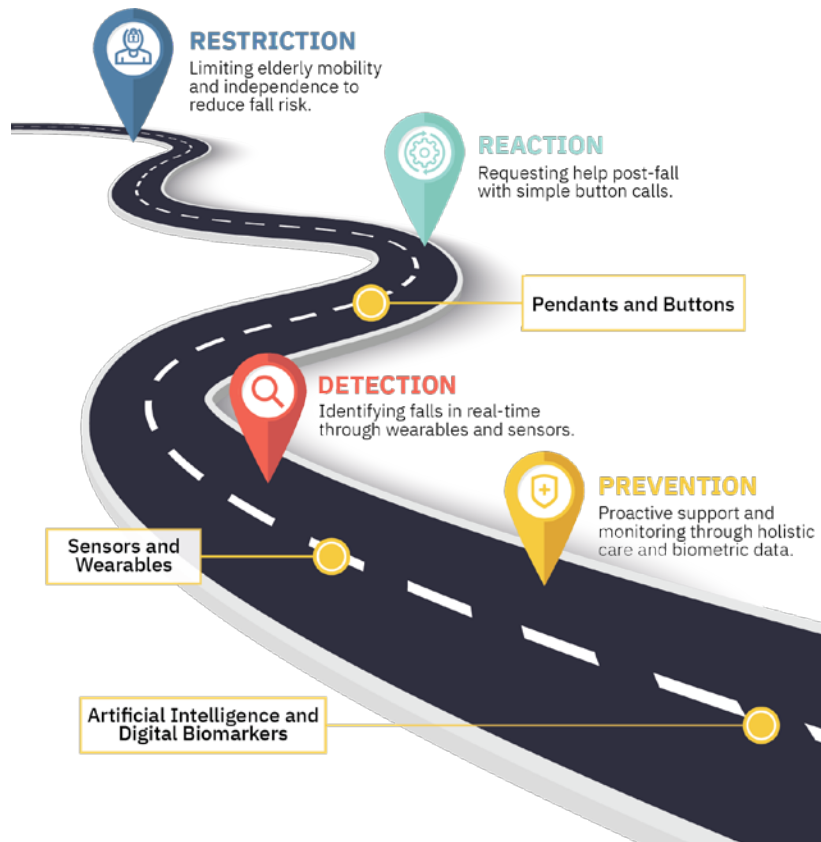
The Global Falls Innovation Report is brought to you by Aging2.0 The Collective, in partnership with Essence Smartcare.

The report reviews trends, challenges and opportunities related to global innovation for falls, with a focus on the strengths and weaknesses of various solutions currently in the global falls market.

The Covid-19 pandemic exacerbated the pre-existing fall-related challenges and issues which older adults faced, and confirmed the dire need for new breakthrough solutions. From pendants, to sensors, to digital biomarkers, global fall solutions have rapidly evolved and shed light on new innovation opportunities.

This version of the report is based on extensive industry research from the Global Falls Innovation 2021 Research Report.

Evolution of Global Fall Management

RESTRICTION
Limiting elderly mobility and independence to reduce fall risk.

REACTION
Requesting help post-fall with simple button calls.

Pendants and Buttons

DETECTION
Identifying falls in real-time through wearables and sensors.

PREVENTION
Proactive support and monitoring through holistic care and biometric data.

Sensors and Wearables

Artificial Intelligence and Digital Biomarkers

Globals falls are catastrophic, especially for older adults.

Falls are devastating. Globally, falls represent the second leading cause of accidental or unintentional injury deaths worldwide. The risk is highest among individuals over 65, as falls are the leading cause of injury, hospital visits due to trauma, and death from an injury.

Falls are everywhere. 60% of falls occur in the home, 30% outside the home but within a community setting, and 10% in a health care center, like a hospital or clinic.

Falls are fatal. Falling is one of the most serious life-threatening events that can occur for the older adult demographic and, each year, an estimated 646 000 individuals die from falls globally of which over 80% are in low- and middle-income countries.

Falls are increasing. In 2019, there were 703 million people aged 65+, a number that is projected to reach 1.5 billion by 2050. For this age group, if preventive and proactive measures are not taken in the immediate future, catastrophic consequences will ensue.

73 people die every hour around the world from falls

37.3 million yearly global falls from those aged **65+** that are severe enough to require medical attention.

2x increase in injuries and potential fatalities caused by falls by 2030

Risk Factors and Consequences

Global Risk Factor Model for Falls in Older Age (WHO)

Key Consequences Related to Elderly Falling

Fall Detection Innovation

Wearable Devices

Wearables are commonly used to collect data about a person's motion characteristics and measure body inclination and movements. As technology advances, researchers and companies have evolved to utilizing more comprehensive solutions which link wirelessly, such as tri-axial accelerometers at separate body locations, in order to rapidly detect fall risk and recognize various kinds of static postures including standing, bending, sitting, and lying.

Environmental Sensors

These sensors leverage ambient sensing technology and are extremely effective for remote monitoring capabilities through non-invasive methods. They rely on wireless Internet-of-Things (IoT) networks that enable sensors and devices to communicate in a variety of network topologies. Weight-sensitive, floor-vibration, infrared, acoustic and pressure sensors are leading examples of environmental sensors, among others.

Image Detectors

Image detectors include vision-based systems, multiple camera and depth-based fall detection methods, and are increasingly applied to in-home settings with the support of big tech investments (Google Nest, Best Buy Health and Amazon Care). Single use cameras are often inefficient in accurately detecting falls, so leveraging omnidirectional cameras remain attractive; they rely on advanced machine learning algorithms to analyze captured data and subsequently act on the measured outcomes.

Fall Detection Innovation

	ADVANTAGES	CHALLENGES
Wearable Devices	+ Cost-effective + Versatile, compact and small + Wireless compatibility	- Limited battery life and broadband - Obtrusiveness and discomfort - Symbolism of frailty and weakness
Environmental Sensors	+ Non-Invasive + Ambient, constant sensing + Effective in-home RPM	- High fixed cost - False & mis-detections - Occlusion
Image Detectors	+ Superior depth perception + Granular detection + Better actionable insights	- Invasive - Computational intensity - Lack of data for AI and ML

Fall Prevention Innovation

Stick to the Basics

The most evidence-based solution to reduce fall risk is exercise. Physical activity increases functional ability, and group and home-based exercises can prevent and reduce falls by 17–31%.

Exercise also provides increased physical autonomy to stay socially engaged, which is paramount to reducing fall susceptibility. Combining fundamental prevention solutions with digitally innovative platforms to support physical activity shows significant promise.

Clinical Prevention

In more acute settings, prevention tools, including hip protectors, low beds, and visual cues for nursing staff have proven efficacy, as well as medication management. Hardware products, such as gait training and ambulatory orthotic devices, proactively support older adults as they become more physically dependent.

Rehabilitation centers also play a key role in reducing fall-risk, especially during post-acute care following a hospitalization.

Home Modifications

As older adults age-in-place, simple yet impactful changes such as adding handrails, shower posts and grab bars, improving lighting, decreasing slippery surfaces (i.e. rugs) and training pets are cost-effective fall prevention strategies.

Leveraging shoe insoles to enhance somatosensory function can improve gait and balance. Designing safe, low-risk spaces through inclusive home design is an increasingly crucial innovation opportunity.

Fall Prevention Innovation

	ADVANTAGES	CHALLENGES
Stick to the Basics	+ Evidence-based outcomes + Actionable solutions + Low cost and feasible	- Behavior change difficulty - Rise in obesity and sitting - Fear of falling
Clinical Prevention	+ Reimbursable tools and hardware + Clinically trained support + Transitional care services	- Medication reconciliation difficulty - Symbolism of frailty and weakness - Unequal access and health inequity
Home Modifications	+ Simple yet impactful results + Cost-effective + Immediately solvable	- Mainly for aging-in-place elderly - Principal downstream solution - Lack of products and services

Barriers to Scale

Digital Nativity. Low tech adoption and digital isolation among older adults. One study determined that 22 million American seniors lacked broadband internet access in 2021.

Compliance and Privacy. Protecting user privacy and health data is paramount, especially when dealing with sensitive video footage. With the rise of in-home remote patient monitoring (RPM), EU's GDPR and U.S.'s HIPAA policies.

Inaccurate Detections. Prevalence of false and mis-detections. False negatives and positives are unfortunately common for fall detection devices.

Lack of Interoperability and Aggregation. Fall-related innovations are most efficient when communicating on connected, interoperable and compatible wireless sensor networks that must be easily deployed, even within constrained environments.

WHAT'S NEXT

Opportunity Areas

Artificial Intelligence

Increased accuracy and reliability of fall detection systems will be dependent on the advancement of AI through machine learning (ML). Developing a lean ML model which offers extremely efficient processing of videos to combat the challenges currently faced in both fall detection and prevention around accuracy, computational efficiency, and financial cost.

Home as Hospital

Over 80% of older adults want to remain in their communities and/or homes as they age. Factors related to the physical environment are the most common cause of falls in older people, responsible for between 30 to 50% of them. Innovation in the home must consider the health services and supports, such as telehealth, RPM and in-home skilled care, which affect older adult's daily lives and wellbeing.

VR and Robots

The growing technological capabilities of VR can fully immerse an older adult and provide actionable programs and insights to improve movement, stability and lower body strength through gamified VR content. Within both personal and inpatient settings, robotic devices such as exoskeletons help improve and correct gait, balance, posture and lower motor functions.

Opportunity Areas

Sensor Fusion

Interconnected sensor networks which can combine multiple data sources for better analysis and decision-making will increase both accuracy and outcomes. Implementing multi-modal frameworks will help avoid noisy data and increase reliability and certainty, and will also be dependent on human-computer interactions and advanced yet lean machine learning algorithms.

Datafication

The rise of smart devices, Internet-of-Things, and RPM creates new channels for ambient collection of health insights. As care delivery shifts to the home, technologies which efficiently collect vital signs and biometric data can serve as compatible data sources to utilize for fall risk management. Leveraging the new sources of digital biomarkers will be crucial for improving prevention and detection innovations.

Proactive Prevention

More individualized, proactive care and support of older adults for fall management will lead to improved outcomes. Community-medical models centered around the individual which weave together social and care resources are promising. Including social determinants of health as metrics for care will also enable more holistic support for fall reduction.

Learn More and Join Us

Global falls represent a devastating health crisis that disproportionately affects older adults.

The Covid-19 pandemic has highlighted the deep-rooted issues related to falls, increased fall risk and worsened health outcomes for elderly, which is why we must immediately tackle the core challenges within fall prevention and detection.

The objective should not be to simply prevent falls, but to also increase overall function, independence and quality of life for older individuals.

Global innovation plays an essential part in helping us achieve this goal. We must strive for holistic prevention to better support and empower older adults, and to combat the global fall crisis.

To access the official Global Falls Innovation 2021 Research Report, click below:

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