

What's Now and Next

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EXECUTIVE SUMMARY

Today's senior living and care organizations are challenged by a shortage of available workers, higher expectations of residents, and too much technology presenting too little actionable insight. Generative AI (GenAI) and machine learning technologies are being deployed in limited use cases, but as tools mature, they will be able to help senior living and nursing homes in ways that early adopters see today.

Capabilities in use today include transcribing spoken and free-form notes, analyzing data to predict risk, combining data from multiple sensors to track health status. Care providers are cautious about the risks associated with GenAI, especially the use of public Large Language Models (LLMs).

Within the next five years, senior living and care organizations will find new ways to benefit from AI tools that are vetted and reliable. These will include automated creation of care plans, educating staff members via chatbots, personalized voice capabilities, better suggestions and predictive capabilities – resulting in the equivalent of a smoke detector for your health.

WHO SHOULD READ THIS REPORT?

- Senior living and nursing home companies
- Professional home and health care companies
- Vendors within or considering entry into the remote care technology categories
- Technology platform providers and resellers
- Telecommunication carriers and network service providers
- Social services and non-profits with focus on older adults
- Healthcare professionals
- Investors and funds that focus on the senior care categories
- Pharma and med tech companies

ACKNOWLEDGEMENTS

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CARE PROVIDING ORGANIZATIONS NEED AI TOOLS TODAY Multiple forces converge to precipitate need for change

Worsening health of new residents drives 'Care Inflation.' Senior living organizations acknowledge the existence of <u>acuity creep in assisted living and memory care</u>. It may be a result of the post-Covid <u>Aging in Place groundswell</u> or <u>rising prices in senior living settings</u>. The median annual cost of senior living nationally exceeds \$66,000 per year. Residents with greater needs may move through each of the levels of senior living care – Independent Living, Assisted Living, Memory Care, Skilled Nursing more quickly – just as caregiver requirements may exceed worker capability.

"Individuals are aging in place longer, supported by PACE programs, adult day care and family desires, pushing the move in date later with more care requirements. This 'Care Inflation' means the traditional senior living setting will become more clinical over time." – Dylan Conley, **LifeLoop**

Population changes exacerbate current and future risks. Life expectancy is lengthening to 77.5 years across the entire US population. But for the 65+, the average life expectancy is a daunting 20 years, more for women than men – just as the availability of people to provide the care continues to shrink. The paid caregiver support ratio, introduced in 2017, was defined as the age ratio of prospective caregivers (aged 46-64) to baby boomers aged 80+. Looked at by metropolitan statistical area in 2022, (MSA), the picture was ugly in some parts of the country. It was particularly problematic in areas with a concentration of older adults, such as retirement destinations or locations where such workers cannot afford to live. Today the situation is worse, especially for those with disabilities or dementia. With many more jobs to choose from that offer short commutes, it is even more concerning in 2024 and beyond (see **Figure 1**).

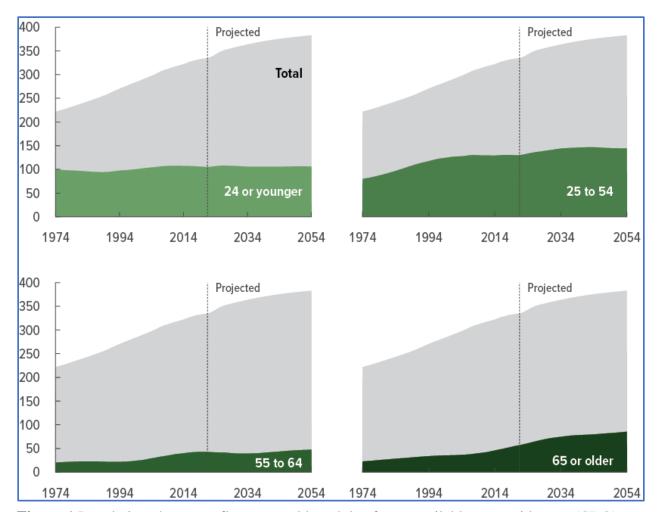


Figure 1 Population changes reflect more older adults, fewer available to provide care (CBO).

The caregiver shortage is worsening across all types of care. The various types of care for older adults, including senior living (independent, assisted, memory care), skilled nursing, home care and home healthcare all view caregiver shortage issues from their own perspective. For example, separate efforts document dire <u>nursing home worker shortages</u> and lack of new <u>facilities</u>, <u>senior living worker shortages</u>, and home care, aka <u>direct care workers</u>. Ironically, the pay and likely the hiring profile in each of these environments is strikingly similar. Consider the job outlook for <u>Certified Nursing Assistants or CNAs</u>, one of the direct care groups, in which the shortage is driven by worker turnover.

Nursing homes are struggling to hire nurses and nurses' aides. All tools that assist with recruiting and hiring could offer help to this segment. According to the most recent AHCA report on the state of the nursing home sector, 7 out of 10 have fewer employees now than before the pandemic. The time it takes to hire is on average at least 3 months to fill openings, with 94% saying it has become difficult to recruit new workers. And nearly all are trying to hire new nurse aides, those that provide direct and hands-on care to residents (see **Figure 2**).

"There is a serious labor problem – and lack of understanding about how to become more profitable in a time of a shrinking workforce pool plus rising costs. But AI can learn the behavior of every resident, monitoring signs of deterioration, time to get up from a chair, go to the bathroom." – Michael Wang, **Inspiren**

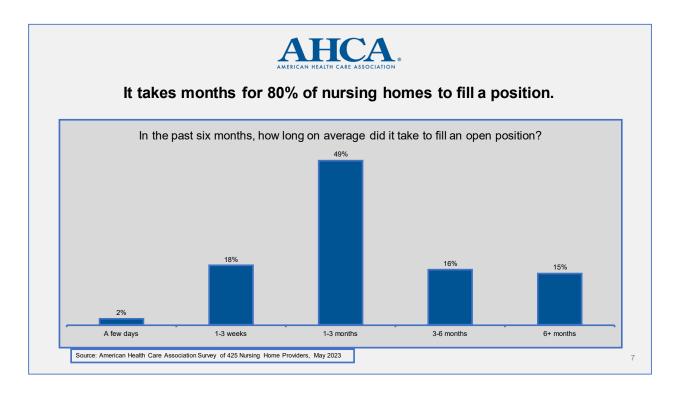


Figure 2 Staffing situations – nursing homes (Source AHCA 2024)

Senior living resident and investor expectations are rising. With the appropriate in-room technology coupled with resident smartphone ownership, the visitors and new arrivals in senior living are going to expect smarter tech capabilities. They will want to converse with the front desk about an immediate need, even when they are out and about. They will expect personalization in all interactions and know that their personal data is well protected. At the same time, the industry overall is seeking ways to better manage in a supply-constrained market.

"We are focused long-term on integration of healthcare into senior living, delivering better outcomes than can be achieved in the home. And investors in senior living want investments that will drive occupancy up, identify expense efficiencies — and achieve year-over-year rate growth that exceeds that of other markets." — Adam Kaplan, **Solera Senior Living**

Tasks are poorly served by application systems today

Too much tech, not enough information. The previous generation of applications and data structures in the senior care industry has accumulated over time. Some execs say they have as many as 18 individual applications, each with its own data structure. And as organizations have consolidated over the years, that has meant more apps. More training required to access them means less time available for resident care. A recent Argentum survey highlighted multiple issues (see **Figure 3**):

Compatibility issues with existing infrastructure and devices 75.56% ranked in top 3 Adoption and consistent use of deployed technology by staff and residents 64.44% ranked in top 3 Interoperability between software tools and access to data sets 48.89% ranked in top 3

Figure 3 From the Argentum Survey 2023-2024 ranking of issues (Source: Argentum)

Too many apps, not enough useful data or trendlines. Logging into multiple apps places a burden on staff to focus on manually combining data. Or they must invest in projects to extract data, both structured and free form notes, into another repository, as some are doing today. Some of the app vendors today, understandably, may wish to preserve proprietary formats and access. Consider how long it has taken EHR vendors to make their data easier to use or integrate, and some say it's still difficult to use for research and clinical care. And further, progress in EHR implementations may have slowed or stalled prior to achieving interoperability across systems.

Too little actionable insight. Managers and staff of senior living communities have plenty of work to do without scanning multiple reports to learn that a resident has a problem. And alerts have their own issues – if too many are false, staff will begin to ignore them, as <u>research has shown</u>. Yet repeated alerts may point to a larger and more insidious problem – frequent toileting requests can point to a UTI; frequent falls can mask onset of specific diseases like Parkinson's; frequent calls to the front desk can be a sign of worsening dementia.

"By merging long-term and short-term trends, we can generate profound insights into residents' well-being – such as fall prevention, early indications of diseases, medication side effects – customized to their unique living environments." – Ashutosh Saxena, **Caspar.ai**

Lack of proactive or predictive recommendations. Argentum, the association of Senior Living Operators, surveyed its members in 2023 and published a report in early 2024 about the opportunities for more effective use of technology (see **Figure 4**). Today, there are encouraging signs that senior living firms are beginning to deploy AI-enabled assistants and considering other emerging AI technologies to help meet the challenges these opportunities represent.

"Senior living organizations create vast amounts of data from call systems, marketing systems, EHRs, and notes – but firms don't know what to do with it. The hope is that AI tools can tell them what they need to know." – Steve Moran, **Senior Living Foresight**

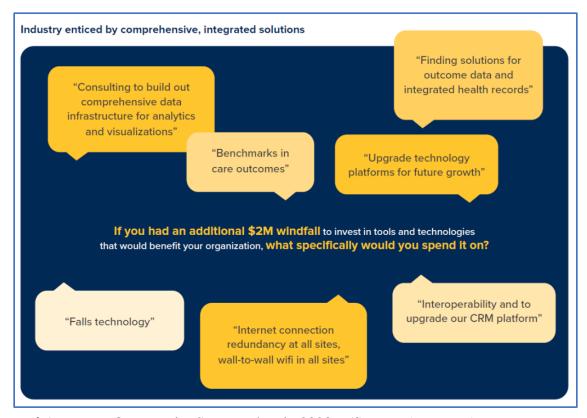


Figure 4 Argentum Opportunity Survey taken in 2023 (Source: Argentum)

Startups are emerging in multiple categories to address challenges. AI-enabled offerings are helping senior care organizations cope with ever-present constraints, combined with growing longevity of individuals who move in later and with greater frailty. Over the next few years, as these offerings mature and well-publicized successes are presented, expect more companies to emerge and utilization to grow.

"I see AI helping older adults and especially the staff that cares for them in addressing five areas: physical challenges and limitations, including ADLs such as hygiene; cognitive and intellectual challenges; hearing; vision; and mobility." – John Reinhart, CNAOnline

Today's definitions for AI in senior living and care

What are Generative AI (GenAI) and LLMs? A subset of AI that generates new content by learning patterns from existing data. In addition to creating original outputs such as text, images, audio, and code, GenAI has been trained extensively on language data, enabling it to understand and engage in natural, conversational interactions. Large Language Models (or LLMs) can represent the training data that is used to enable GenAI to work.

This makes it particularly effective for applications like virtual assistants, chatbots, and customer support systems. Furthermore, GenAI is valuable in transcription tasks, such as when medical professionals dictate notes for medical records. It can also assist with data interpretation, for example, by analyzing hospital discharge reports to determine if a patient aligns with the services offered by a nursing home, making it easier to identify suitable candidates for admittance.

"Using GenAI for call transcription and intelligent summarization, ECGs ClinOps team realized a 100% improvement in workflow efficiency, doubling patient management capacity, increasing quality and enabling clinicians to practice at the top of their licenses." – Mark Francis, **Electronic Caregiver Group**

Machine Learning: A branch of AI that enables computers to analyze large amounts of data, learn from it, and improve over time without being explicitly programmed for every scenario.

In senior living environments, machine learning can be used in applications like fall detection systems, which can recognize patterns of behavior and notice when a resident has fallen, thus triggering an alert. It is also employed in monitoring systems that track residents' health-related behaviors and detect unusual patterns, such as changes in mobility or sleep, which may indicate underlying health issues requiring attention.

"We are using a sensor-based fall detection system in short-term rehabilitation. We do an assessment, then leave the system on and get the right number of alerts, getting to the room before a resident gets out of bed." - David Finklestein, RiverSpring Living

AI CAPABILITIES CAN ASSIST SENIOR LIVING AND CARE

The interviewees for this report acknowledged that AI-enabled tools, whether in machine learning or generative AI (GenAI) are emerging and can be applied to multiple functions in senior living and care operations. These categories include:

Turnover and recruiting new staff. Turnover and recruiting are the behind-the-scenes struggles many senior living and care organizations face. One example: Znest uses natural language processing (NLP) engagement to personalize contact with prospective employees such as cooks, servers or drivers awaiting background checks, providing instructions, reminders, and follow-up hoping to keep them engaged throughout a lengthy process.

"Maintaining contact and response times with prospective employees during the time from offer letter to start date can help with recruiting without requiring massive integration with an HR system. This is a narrow, but critical, wedge that requires no behavioral change." – Bennett Kim, **ZNest**

Paperwork intensive tasks can be done more effectively with AI. Skilled nursing facilities must meet multiple state requirements, including completion of state reporting to the federal government. Nazareth Homes found an AI tool to help with compliance reporting, <u>ClearPol</u>, which offers a 'compliance assistant' Pete to help staff. For example, asking Pete: Can you provide insights into the survey process for infection control and prevention, and recommend strategies?

"The tool shows any of the changes to regulations required to remain in compliance between surveys. The alternative, creating a post-survey plan of correction, can be extremely expensive." – Tracy Fluhr, Nazareth Homes

Identifying resident needs prior to a crisis can be assisted by machine learning. Software like PointClickCare's <u>Predictive Return to the Hospital</u> already uses machine learning to predict risk of falls or hospital readmission. <u>Researchers are also using AI to identify early signs of Alzheimer's Disease.</u> Other machine learning tools applied to data can confirm an issue or predict a problem. One example: Data helps with family members who may resist moving their parent to a higher level of care, for example, whether it is from repeat falls or signs of dementia.

"You may need to move a resident into a different level of care in assisted living because they may have early onset dementia. Analytics can examine all a resident's calls to the front desk, summarize them and produce a chart for the family – Mom called to seek help in finding the TV remote 17 times." – Nick Lindberg, **HumanGood**

What AI capabilities are in use or planned today?

AI everywhere in senior living and care is more of a vision than a reality today. However, from large to small senior living settings, execs want tools to solve problems that otherwise would be vexing or intractable (see **Figure 5**). They know that they must overcome the limitations that result from too much data in too many places. As a result, they are:

Organizing and consolidating data as a prerequisite to broader use. Occupancy, billing, care management, and sales data in senior care enterprises reside in multiple application software systems and related structures. To benefit from AI, executives see the need to extract it from those apps into what is known as a 'data lake' that accommodates both structured and unstructured data like free form notes.

"We do not have enough people to look at data that is being generated today, yet we have significantly higher consumer expectations, combined with an unprecedented staffing crisis." -Joe Velderman, Cypress Living

Transforming documentation of spoken and freeform notes. Tools for automating note taking and transcribing doctors' notes have been in the market from companies like Nuance's Dragon tools (now part of Microsoft) for quite a while. But AI tools can offer more accurate, faster and less expensive transcription capabilities. Today's versions of these tools, such as Heidi Health, dubbed 'Clinical AI', or FreedAI in addition to voice dictation of so-called SOAP notes, enable combining dictated notes with health records and text from other tools.

"There is opportunity for enhanced natural language processing – much of our data is in free text. Consider elopement risk – an unaccompanied resident walking out of the building. If you looked only at the structured data, you wouldn't see anything, but notes would reveal problems ahead." - Matt Meyers, Arrow Senior Living

Analyzing risk more effectively than with traditional analytic tools. Risk for senior living communities encompasses patient wellbeing risks, like falls or undetected health conditions. But AI tools are beginning to offer ways to detect if some residents need more care than others. Communities could use AI's presence detection coupled with contextual analysis – for example if multiple unauthorized people in a resident's room at night is a sign of wandering – or no visits to a room could indicate neglect.

"We are looking at machine learning for skilled nursing and memory care. We use SafelyYou now for camera-enabled fall detection, but our plan is to identify if any resident needs more attention." - Travis Gleinig, United Methodist Communities

Using AI to screen proposed admissions from hospitals. Today several interviewees confirmed that AI can rapidly examine data feeds from a hospital and suggest whether the prospective admission is appropriate given available openings and staffing.

"There are things you couldn't do even a year ago – looking at 100 pages of background to decide to admit someone. AI can look through the background of these proposed admissions and help a staff member make a decision in minutes." – Nick Lindberg, **HumanGood**

Using a variety of AI-enabled sensors to identify and/or predict problems. Sensors for remote monitoring have long been a mainstay in senior living and care organizations, particularly useful to detect issues that occur overnight. But aggregating data from multiple sensors can deliver insights that were difficult to obtain previously. And Toi Labs Truloo analysis of toilet contents has enabled senior care providers to proactively detect health issues like UTIs before they become crises.

Understanding medication delivery and compliance. The capabilities of AI today enable staff to identify worrisome changes and correlate them with information from other data sources. Reviewing the data from multiple reports and systems has not been feasible. However, now when data is uploaded and compared to other data, needed changes can be made to correct a problem.

"One resident was receiving insulin, and blood glucose levels were unstable. I uploaded redacted information into ChatGPT and combined it with menus – looking for and finding a time-of-day trend." – Veronica Carr, **Avendelle Assisted Living**

Organization	What they are doing	What is the benefit
Avendelle Assisted Living	Generating care plans from health and interview data	Saving hours of time freed up for care
RiverSpring, Nazareth Homes, HumanGood	Identifying appropriate admissions from hospitals	Matching to available openings and staffing
United Methodist Communities	Utilizing camera—based fall detection	Identifying problem that a resident can't describe
Wellpoint, Arrow	Recording behavioral data linked to EHR with Inspiren	Alerting to medication- related health issues
Caspar.ai, Toi Labs	Using sensors to track Resident frailty scores, health monitoring	Reports guide staff intervention

Figure 5 Examples: From this research, who is doing what today and what is being done?

[&]quot;Begin helping with the things that we are required to do. Tech is valuable when it can help with those requirements and free staff to enable a more personal, dignified, and respectful experience for elder, patient or family." – Mary Haynes, Nazareth Homes

Risks Associated with GenAl and Machine Learning

Organizations interviewed noted risks associated with the in-market versions of AI software today, and several were explicitly taking actions to avoid them, including concerns about avoiding generally available data, placing guardrails around the use of data, and ensuring that appropriate AI policies are in place. Interviewees' concerns can be summarized in a graphic about AI challenges in healthcare (see **Figure 6**), underpinned by consumer concerns about AI in healthcare (see **Figure 7**).

Limiting data to only that generated in and managed by the organization. Senior living interviewees expressed caution about current security risks with use of generally available large language models (LLMs) and as a result deliberately limit their AI initiatives to their own internally collected data.

"Organizationally, there is barely any use of AI, but individually there is. No enterprise accounts, no guidelines, but staff is using pretty often." – Raphael Rubens, **MemoMate**

Data management and protections are not ready for prime time. Others like Kory Nadeau, Presbyterian Homes & Services, are using existing predictive analytics within systems like PointClickCare but are not planning to use current generally available versions of AI tools in the near future. Instead, they are awaiting subsequent versions that have been proven to their satisfaction.

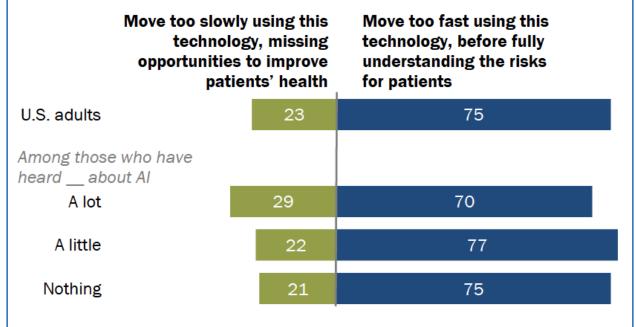
"As a company we have the stance of trust but verify and do not authorize use of resident data in any public AI engine at this time. The security of the solutions is not ready." – Kory Nadeau, **Presbyterian Homes & Services**



Figure 6 AI Adoption Challenges Span Four Categories Source: Acropolium.com

Americans more concerned that health care providers will adopt AI technologies too fast than too slowly

% of U.S. adults who say that, thinking about the use of artificial intelligence in health and medicine to do things like diagnose disease and recommend treatments, they are more concerned that health care providers will ...



Note: Respondents who did not give an answer are not shown.

Source: Survey conducted Dec. 12-18, 2022.

PEW RESEARCH CENTER

Figure 7 Consumer Concerns about AI in Healthcare

(Source: Pew Research Center)

[&]quot;60% of Americans Would Be Uncomfortable With Provider Relying on Al in Their Own Health Care"

WHAT IS THE FUTURE OF AI IN SENIOR LIVING AND CARE?

The capability is enhanced but the terminology disappears. Within a few years, AI will no longer be described as a separate category of technology. Why? Its characteristics of machine learning, customized vocabulary, and conversational responses will be expected and provided by all software used by people who depend on computers and data (see **Figure 8**).

Documentation scribing for care plan creation and updates will be standard. With training of a task-specific model, one transcribed set of notes can be converted as needed into multiple documents, saving substantial time and repetition. Dictation AI tools can be applied to all documentation tasks, such as fitness assessments, staff coaching, or patient/resident visits.

"In the documentation space, we are focused on training AI models – limiting what they do, enabling them to respond appropriately. For example, telling the user, "I am trained on Texas Assisted Living regulations, ask me about that." – Fritz Brumder, **WiseOx**

Staff education will be continuous with chatbots. Chatbots <u>have already been deployed for several years</u> in senior living organizations as a sales interface for prospects. But in the future, as is beginning to happen, their use will be broadened to day-to-day operations, making suggestions or guiding as appropriate. For example, a recently hired staff member can get a short refresher on a task before providing specific care to a resident. Soon a new generation of chatbots powered by LLMs which access internal documentation/articles will be capable of answering staff questions based on those articles.

"Instead of keeping education episodic, it becomes continuous. A new employee could later ask a chatbot in an earbud or in the room 'How do I do this?' for a reminder. Having key information so accessible could improve the quality and consistency of care." – Michael Skaff, Vayyar Care

App user interfaces will be replaced with conversational query and suggestions. User interfaces are tied to applications today, but in the future, when the data has been extracted and organized, it will be increasingly feasible to use natural language via talking or typing a question about a resident, getting insights and recommendations to consider. Once application data has been converted into repositories that include freeform notes, senior living companies will train staff on how to do these queries.

"The most significant result will be our ability to offer AI micro services that support a range of resident and team member experiences organically." – Peter Kress, **ActsLife.org**

AI tools will be used to coordinate multiple aspects of care. Today, the care continuum of older adults is filled with gaps between providers and processes. AI tools, if properly applied, can provide access to multiple structured and unstructured data sources that paint a picture for

caregivers, professionals and family. These tools will help assess the care to be provided based on a person's health status, offering automated check-ins and recommendations for next steps, much the way many web queries today are accompanied by chatbot suggestions.

"At Lifespace, we view AI as an integral part of our organizational fabric, enhancing everything from resident and team member experience to operational efficiency." – Srini Alagarsamy, Swapna Tavtum, **Lifespace Communities**

In-room voice-enabled responses will be personalized and helpful. Some communities have thousands of Amazon's Alexa devices in every room, as many as 5000 across one large senior living company. In <u>the near future</u>, Amazon has promised an upgrade (not free) for Alexa, powered by Anthropic's Claude, enabling voice conversations between residents and staff, which could substantially improve the user experience.

"I believe that voice + generative AI have the potential to invite the older adult audience in. There will be specific verticals – dementia, MCI, mobility. That is what Amazon got wrong with Alexa – something for everybody, nothing to everybody." – Ivan Wicksteed, Iameve.ai

Prediction will be expected – a smoke detector for your health. Instead of requiring users to query patient and resident history looking for indicators, predictive analysis will be refined over time. The result will actually be predictive. Simple suggestions – Mrs. Smith has fallen, perhaps she needs some evaluation and possible physical therapy – will be replaced by correlation between multiple aspects of Mrs. Smith's life – from weight, diet, exercise, bone density, and notes-based observations from staff and visiting physicians.

"Senior communities typically conduct manual fall risk assessments upon entry and every six months, leaving critical blind spots. Our AI Fall Prediction Engine harnesses the wealth of data entered into EHRs to perform continuous, daily fall risk assessments, helping to minimize hospitalizations." – David Moss, Care Daily

From	То
Analytics	Prediction
Clerical task work	AI-completed clerical tasks
Assigning scarce resources	Optimizing workflows
EHR and sensors	Health insights
Periodic training	Continuous chatbot refresh
Simple voice interaction	Voice-enabled conversation
Commands and requests	Conversation and
_	suggestions

Figure 8 Senior Living and Care organizations use of AI tools within five years

People will still be essential and job satisfaction will likely improve. Many in the industry worry about AI replacing roles for people with robots and other forms of automation. But the most useful AI tools will not eliminate the need for people who care for those in senior living and nursing homes. Instead, innovators are working on ensuring that these tools are applied in ways that improve care and enable caregivers to focus on their residents. Healthcare providers will not have to go back to the office and spend hours recreating data entry from notes. Instead, they will be able to focus on the health and wellness status of the individuals in their care.

"Consider this health example – a provider had many videos inside of a regular checkup of an older patient. The AI analyzed what the doctor missed, encompassing multiple visits, including the position of the patient who may have increasingly slumped over time. Senior living and care could also benefit from AI analysis of changes in stance, posture and gait of residents over time." - Ginna Baik, AOL/Yahoo

2024 Articles about AI in Senior Living, Nursing Homes

ChatGPT and Beyond: How Artificial Intelligence is Shaping the Future of Nursing Home **Operations**

The Role of AI in Enhancing Retirement Living and Healthcare

HealthTech Q&A: How AI and Automation Can Transform Processes for Senior Care Providers

McKnights: AI Could Open Doors to Advances in Care, Operations in Senior Living

EyeWatch Live: The Future of Senior Living: Top AI Innovations to Watch

Top Technology Trends for Senior Living Facilities in 2024

NIH PubMed: Application of artificial intelligence in active assisted living for aging population in real-world setting with commercial devices - A scoping review

Nursing Home Leaders Aim to Harness AI, Data to Beat Staffing, Payment Challenges in 2024

Nursing Homes Can Apply AI to Everyday Operations – But First, Involve the Nurses

Organizations That Provided Insights for Report

ActsLife.org Peter Kress
AOL-Yahoo Ginna Baik
Arrow Senior Living Matt Meyers
Avendelle Senior Living Veronica Carr
Care Daily David Moss

Caspar.ai Ashutosh Saxena **CNAOnline** John Reinhart Cypress Living Joe Velderman **Electronic Caregiver Group** Mark Francis HumanGood Nick Lindberg Iameve.ai Ivan Wicksteed Inspiren Michael Wang LifeLoop **Dylan Conley**

LifeSpace Communities Swapna Tavtum, Srini Alagarsamy

MemoMate Rafael Rubens

Nazareth Homes Tracy Fluhr, Mary Haynes

Presbyterian Homes & Services

RiverSpring Living

Senior Living Foresight

Solara Senior Living

UMC (fmrly United Methodist Com)

Vayyar Care

Kory Nadeau

David Finkelstein

Steve Moran

Adam Kaplan

Travis Gleinig

Wichael Skaff

WiseOx Fritz Brumder ZNest Bennett Kim