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# The 2019 Long-Term Care Medical Symposium

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## Views From Experts Outside of the LTC Industry

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## Views From Experts Outside of the LTC Industry

### Introduction

The 2019 Long-Term Care (LTC) Medical Symposium was a one-day conference that extracted the thinking of leading experts on historical and future trends that will influence LTC insurance (LTCI) claim expectations. The symposium focused on the ideas from experts outside of the LTCI industry for the explicit purpose of gathering fresh perspectives on the issues that LTCI companies face, such as expected timing of new claims onset, length of claim, life expectancy and cost of care. The 2019 symposium built on and complemented the first annual symposium held in 2018. The focus in 2019 was on aging of the brain and how technology will impact the future of LTC caregiving.

The symposium is not intended to quantify historical or future trends or to be prescriptive or specific about long-term care actuarial assumptions. Rather, the symposium aims to provide the long-term care actuary with environmental context for considering morbidity and other macro factors that may impact LTC experience in the long term.

The agenda for the 2019 symposium included the role of technology, the evolution of care delivery, trends in cognitive impairment and Alzheimer's, and medical advances impacting LTC. The symposium was professionally facilitated to allow dialogue on topics outside of the explicit agenda. A handful of LTCI industry participants helped guide the discussion to ensure that the content remained relevant to the primary audiences.

In 2018, the LTC Medical Symposium was the first event of its kind: It covered a lot of ground for a one-day event, gathering foundational information. In 2019, the approach changed in two ways. First, the symposium dug deeper on certain topics and built on the foundation it established in 2018. For example, there were discussions on the quickly evolving landscape of activity in the tech space that could change how care is delivered. It also delved into how technology can detect a decline in health and hopefully intervene in such a way that insureds may remain independent longer. Second, and more important, the symposium entered into the conversation of what has changed, which is to take a look at the dynamic and evolving landscape of long-term care. Moving forward, the hope is that this type of discussion will be very useful to actuaries in understanding how the environment in LTC changes over time and to get a sense for the pace of this change.

*Introduction by Shawna Meyer, FSA, MAAA, and Robert Eaton, FSA, MAAA*

## Specific technological advances: What devices exist today to help the elderly, and what are the devices of the future?

Today, the technological advances are accelerating with internet of things (IoT) devices proliferating in our daily lives. The emerging challenge is how to harness capability of heterogeneous IoT devices and wrap that with the delightful coherent experience that delivers real outcome for the people. For the elderly population, abstracting the technological complexity with human-centered design is critical for adaption and continuous usage needed to change their behavior for better. Leading practices are found in European and Asian Organisation for Economic Co-operation and Development OECD countries who are aging ahead of the U.S. and provide socialized health care[1].

In Germany, nonprofit organizations partner with technology providers to outfit elders' homes with IoT sensors (e.g., water, door and heat sensors), and use data analytics to detect abnormal events and respond to abnormal events. In South Korea, the apartments, where much of the population resides, are built with the latest IoT sensors and giga-bit internet access. With an IoT technological foundation already in place nationally, it is much easier to create and provide innovative elderly aging-at-home services.

One issue with this in the U.S. is scalability. There are only around 600 trained professionals in the U.S. to adequately care for and analyze aging populations[2]. The issue lies in the inability to reach the aging population with useful technology. To deliver this information in a digital format, we must familiarize the aging adults with technology such as laptops and smartphones. Essentially, we need to make this technology easily accessible for our elders.

Regarding future trends, there is a big difference between pharmaceutical and biotechnology trends compared to digital trends. People believe that digital technology will be as quickly innovative as pharmaceutical and biotechnology, but recently this has not been the case. It is difficult to replace a human treating the illnesses of the aging population. There are technologies that exist to help bridge the gap between human and robotic assistance, but they have yet to arrive in the market. Some of these technologies include in-home rehabilitation assistance or exoskeletons that can make formerly immobile people more mobile. Both are examples of technology that can have a huge impact.

Like other technological advances, there still lies some problems with these innovations. One problem is that the last 10% of innovation is more difficult than the previous 90%. Although you can generate an idea and formulate most of the solution, the fine details are the hardest to figure out and add to the final product. There is also a risk tolerance in innovating new technology. There are vanity metrics, which are measures that don't mean much and could deliver false positives. There is bad quality of evidence, since the industry has not matured; the evidence also has not matured and may not be as valuable. Also, these changes are not going to happen on the first day of development or implementation but rather after numerous attempts of improving the product until it makes a useful impact. Finally, decreasing human contact is a huge problem, and although some people believe that robots can solve medical problems for the elderly population, others believe that it can make preexisting problems worse.

The U.S. has an increasingly aging population, so there is a growing demand for long-term care (LTC) products and advances in the long-term care insurance (LTCI) industry. New things will naturally happen in the environment surrounding the older population. Time and information are required to detect these sorts of events, and personal information may have data that some consider private. Clients may feel uncomfortable sharing this personal information with their LTC insurer. How do LTC insurers navigate this tough issue of potential privacy invasion?

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[1] This report is intended to be read as a transcript of the conversation among the 2019 LTC Medical Symposium panelists. There are many statements in this report that could be supported by citations and references. To facilitate the dialogue during the symposium, the moderators did not require that panelists provide references in each instance.

Some LTCI companies and even policyholders care about one particular area of elderly care, such as fall prevention. In reality, most people need help with multiple activities of daily living (ADLs), such as toileting and bathing, very popular items among the dementia population. If you are focusing on just fall prevention, even if you've taken some steps to prevent it using the data you've collected and utilized, what happens to people who struggle with toileting and bathing? There's an additional missing layer of analytics in this technological space that needs time to be seen. However, if there are advances in technology and digital health that are shown to increase longevity, there may be an impact on mortality graphs. The data companies who analyze this information don't need to know every individual's personal health information to figure this out. They don't need to know who has dementia in the U.S., because it is a liability for the technology company.

Breakthrough opportunities will be found by targeting LTC policyholder to live healthier and happier before they start the claim (think loss control). Statistically, once an LTC policyholder starts needing ADL, most do not recover, and LTCI claims stop only with death. So, major financial benefits (e.g., reduction in reserve) can be achieved by keep them healthier when they are younger, thereby delaying the ADL support need and reducing claims duration. A major technology enabler for pre-claim population is related to wellness targeted at the 40–65 age group. How to be healthy is deceptively simple—active lifestyle, regular moderate exercise, don't smoke, moderate drinking, regular check-up—Just like what mom told us. The real challenge is to get people started on the wellness activities and have them continue. This requires a mix of digital technology and human touch toward constant and sustained engagement with the policyholders.

There is an abundance of technology, but the real question is: How much of it is currently working in the elderly space? Are these technologies preventing disease from happening or preventing people from becoming claimants? If you look at the 40s, 50s and 60s age groups, you see a lot of people who wear devices such as Fitbits and Apple Watches, but you don't see a lot of engagement from people, and they don't fully utilize these devices. When people approach the 70s and 80s age range, you see even less engagement and less effect. Then we find other ways to monitor the elderly, such as putting technology in their homes that they don't need to engage with.

However, there are issues with this technology. Predictive modeling used to improve or monitor this technology suffers from a lack of data, and sometimes nobody knows what to do with the data that is already gathered. Placing technology in the homes of the elderly and monitoring them all day means nothing if you don't know what to do with the data. Sometimes improper evaluation of this data leads to false positives, which may not prevent claims. Also, if you monitor a fall as it happens, you haven't prevented anything, only monitored the fall itself and executed a call for an ambulance retroactively. Once the technology and data have time to mature and people learn how to utilize this data, preventative measures will be taken. For now, this is all at an immature stage of development. There are phone services for the elderly, such as Great Call, which are adopted specifically for the elderly population, which can help for retroactive assistance with falls.

Another question on privacy is how to balance individual privacy. There are opportunities to take information about what happened during an event, what you can respond to, and what the future may look like. For example, if a policyholder has already had one fall, the probability of the individual falling again is higher. However, by using prior data collection to design interventions, instead of treating the fall, this person now has the same fall risk as anyone else. You consider the person's previous claim and react accordingly to prevent future instances. There are opportunities to expand on this as well and integrate it into practice.

The difference in the dementia space comes down to engagement (big issue) and behavioral change programs. Most people are not joining dementia programs on their own and are not given a chance to engage in the program. In the cognitive space there are no drugs, and lifestyle intervention is the only thing we can do to help people. There is a natural opening for the user to join programs like this when you talk to them, work with them and help them understand the need of being in one of these programs, especially if they have a personal connection to a family

member, friend, loved one who has experienced cognitive impairment. It is important not to ignore the client's fear, because fear is a very real and natural part of this disease development.

When developing the LTC policyholder engagement strategy, there are two levels—individual and portfolio. At the individual level, the focus is on keeping them on a continuous prolonged wellness journey with personalized activities, encouragements and new programs. At the portfolio level (i.e., entire LTC block), the focus should be on identifying high-risk segments, developing an engagement strategy for each segment and identifying optimum wellness programs for the population. A healthier portfolio means a healthier business, and the healthier portfolio will have a better claim impact on the bottom line.

In LTCI, the underwriting happened about 20–25 years ago. Over time, morbidity builds, but there is loss of engagement. Driving blind in some ways is the actual risk and liability. It is important to understand the claims experience side, especially from an actuarial perspective, since it can be very different between carriers. There are mandates around reserving and looking at claims experience. The liability risk differs significantly, even with morbidity. For example, in a population where diabetes is six times the norm, you don't really look at this risk in a homogeneous way but as a heterogeneous mix.

One often overlooked aspect to LTC is the emotional process of giving care to an elder loved one. The policyholder aggregate and portfolio approach can be looked at differently. Look at the person as a whole rather than the person as a policyholder. Family members who take care of their loved ones are also at a significant amount of risk. Social needs of family members who took care of the policyholder had almost 0% interaction with the policyholder. Engagement with the elder population, the use of technology, and the wholistic person approach and engaging family members are gaining a lot of light in LTC.

Changing behavior is very important. Engagement is not just about one person. It takes participation from the policyholder, family members, caretakers, and other stakeholders. All of these people need to be taken into account when developing engagement strategies. It is very important to strategize around both the individual and portfolio levels.

Again, thinking about the caregiver and care recipient, there are predictive models on what you want and what you need at a specific time of the day or week. When you ask caregivers what they would like in their caregiving journey, the typical answer is respite home care or adult daycare services; however, this is only treating a symptom, not the problem. You need to identify the family members' different needs and use behavioral intervention to prevent them from burning out while taking care of their loved ones. This has nothing to do with the policyholder specifically, but using the whole person approach again, this can increase the quality of care for the caregiver and the care recipient.

What's unique about the aging space is that it is very different for the relatively younger 40- to 60-year-old population. They can make health care decisions for themselves, whereas their older counterparts may not. It is important not just understanding the caregiver but what services the caregiving is providing on a day-to-day basis for that patient. Good understanding of the core needs for that person and supporting the individual with the right resources at the right time is the key to success.

One important thing to reassure family members that their elder loved ones are being taken care of from far away is to find easy ways to remotely monitor them. There are ways to easily measure blood pressure, noise activity in the home and pressure sensors, but that really isn't going to do anybody much good. There are concerns and fears driving the issue that elders need to constantly be monitored, and people pay large sums of money to help combats these concerns. When there is a way to improve condition, we use predictive modeling. These models are great, but there they also have limitations. Companies take on financial risk by utilizing these predictive models, and if the risk doesn't pay off, they lose money. These models are supposed to help with early detection and lead to fewer claims.

Digital technology can also help family members cope with their concerns for their elder loved ones. For example, a suite of mobile apps can work together to help connect the elders, caregiver and family members. The app for elders is designed to be easy to read and can assist with medications and other scheduled tasks. The caregiver app helps them record what they're doing and what activity is going on with the elder. The family member app gets information from the elder and the caregiver so they can help track what's going on. This information also allows family members to know what's happening when they aren't physically around their loved ones, and they are better educated when they make in-person visits.

It's good to follow through with people after you have identified them as a risk. Once there is data to support that someone is at risk, you are more likely to know when to intervene and start providing care. There is value in predictive analytics, which hopefully can lead to change and more effective intervention in the future. Lots of people opted into an Apple heart study where they looked at irregular heartbeats and fed that clinical data to researchers. Once we leverage this technology, such as Apple's heart study, we can be more comfortable with the care that is given to our elder population.

Some companies have the goal of creating big datasets, but you cannot create a data set but when you have no data on aging. There is a lot of reliance on electronic health records, and we need to find how to use the data from the family, the caregiver, the home setting or any other factors. There needs to be a way to figure out how to collect this data to generate some value. One day there will be a larger collection of data, so these data analysts have a better understanding of how to help care recipients; however, this is an extremely costly process.

Many companies say data is gold, but data is only as good as the quality of the data source. Electronic medical records data challenged by clinics is flawed. The claims data is also flawed, and there needs to be another level that cleanses this data to sensor what may be clinical criteria. Finally, there is a lot of noise in all this data in medical science, and those who can find the signal in all this noise will be able to more adequately use this data.

There are a lot of issues around privacy in insurance. Medical and insurance companies have access to all sorts of information but aren't allowed to use it. By law, these companies are not allowed to ask for some specific personal information, but there are instances where clients willingly give this personal data without being asked. Since LTCI is typically sold to people who are at least in their 60s, people may just give all the records they have, regardless of whether the insurance or medical company asked for it. However, since the companies are now utilizing all this data, there isn't much work done on understanding the customer, rather just understanding the data the customer provides.

One thing that LTC insurers can improve is learning more about their policyholders before they hit their first claim. Currently, LTC insurers knowledge about pre-claim policyholders are limited to name, age and address. Furthermore, policyholder engagement is kept to a minimum, typically premium payment notices. One way to change this is to look at outside data to determine typical health care behavior, for example, which socioeconomic segment they belong to and what the health care behavior of that segment is (e.g., frequency of doctor visits). Taking this data into account, the companies can already know more about their policyholders before they submit a claim, and they have a better idea of what their policyholder's health looks like. This allows for a different approach of engagement, because it is very likely that their policyholder is exhibiting similar behavior as the typical health care research data suggests.

When auditing the caregiver side regarding the data they collect and store, caregivers have all the medical records they need including morbidity and mortality of any preexisting conditions that a client may have, such as cancer. Having the specific data at the right time is essential when trying to figure out the characteristics of insured clients. If claimants give more data than what is asked of them, it is difficult to decide what to do with this information. The whole-person approach model is the main focus in the LTCI space, and any data can be extremely helpful. For example, fall prevention is likely only a small amount of claims experience, but bathing or toileting are areas that

need to be looked at more. Having a data partner is helping the insureds, and it is essential to keep people healthy as well as using the data we have on them to better help them.

Perhaps when collecting medical records, LTCI companies should synthesize all the information they can so they can learn more about the claimants at the time they submit a claim. That way, this information can be used in an underwriting situation. If you want to get a prediction on future claims, you can use other data to predict these things several years down the line. Data between zero and three years before a claim is very useful in developing models for that stage. When you collect this data, you need to collect it in such a way that will overcome issues of privacy. More data may be good for modeling, but it may not be the case in all regards.

When coming up with stratification and coming up with the information in these datasets, many companies utilize data from an annual 50–80 question survey sent to thousands of people worldwide. For the past 30 years or so, this has been the source for their general LTC behavioral data. However, this is only what the companies need, but they may get records that they don't ask for. One major question is whether it is good medical practice to use information that they don't ask for, such as genetic testing. Maybe this data can be put into a database where it isn't currently used but could be used for predictive modeling later. Datasets may already have that information, but it may also not even be a key piece in predictive models. Genes make a difference in dementia only about 10% of the time, whereas comorbidities and lifestyles are true predictors.

You want to avoid bias when creating predictive models. Make sure you do predictive modeling on data from a source where you are comfortable with how it was collected. Failure to avoid these biases may cause more harm than good in predictions. Companies who do this general lifestyle analysis such as IBM have a methodology on how they collect data on 80,000 lives. There are multiple predictors here, including claim duration, mortality trend, fall prevention and so forth, but no data set captures all these things. There is claim data, service of claims, what happens before claims and experience data, and all these data pieces capture different aspects of a claimant. The challenge is to figure out how to use the right combination of this data and use them to make predictions, despite there not being one ideal dataset.

There are other ways to get this data too, and you don't have to be boxed into data that already exists. By engaging the policyholder, we can gather data through their own personal experience, such as asking them how they feel on a day-to-day basis. This allows companies to look for more insightful data on the policyholder. This will generate more insight than ever before, and more data can be created in the future as well.

Another question is how to predict things over the next 10 to 20 years, not just within the next three years. We need to consider what the world is going to look like in the future and potentially adjust models and customer care accordingly. Insurance companies are typically not the best at customer engagement. They are great at predicting things such as what bills or claims will come up or analyzing history of cash flows or risk of overdraft. This does add engagement and value to the customers. Everyone is interested in wellness and living longer and healthier. You can collect data from Fitbit's step counter, for example, where you can track whether people are healthier based on how many steps they walk in a full day or whether they reach a certain step quota throughout the day. Then you can compare the healthier people who are walking more to the insured person who is walking less and make assumptions and adjustments based on that data.

It is very important to get this engagement data, but you have to be delicate with the subject. The LTC market has customers whom they may not have contacted for more than 10 years, but if they suddenly ask for some engagement data, it's going to raise some concerns for policyholders. However, this is revolutionary, because before now, these types of data were never able to be collected for things like cognitive testing. For example, you can track eye movement through devices such as an embedded phone camera. Through innovations and technology, we can generate brand new insights that weren't able to be created before.

There may be some programs that have faster results than others. There are programs that track caregiver hours and ensure that people are receiving care accurately. When dealing with big data, the longer-term things such as wellness behavior and the impact of that on cognitive development is difficult to predict 18 months in advance. It's an expensive program to administer, but the cost-benefit analysis is not yet complete, and this may prove to be beneficial. A 1% change in claims is huge for any insurer, and they have to figure out whether this program is beneficial to them. Each company has to think about this challenge and whether it is worth the resources to develop and utilize this big data.

Caregiver training is another benefit that is underutilized in the LTC industry. How do we introduce technology to help further this topic? Over the past 20 years, typical caregiver training was often done by administering a class, but now we can train them in other ways thanks to technological advances.

When creating new technological advances, the industry needs to be more aware of prior tests and failures. Industry players are completely unaware of things that have already been tested and failed, including a lot of five- and 10-year horizons, and other various tests have unfortunately failed. If people factor these things in, they would not start from scratch to create progress. Start with things that are proven to work, and once enough money is saved up, science will hopefully be more advanced, and more beneficial wellness programs can be implemented and make an impact.

The main driver of dementia is fitness and lifestyle. A lot of data and trials have shown that exercise is the No. 1 thing that helps the most with maintaining a healthy lifestyle. Thirty to 35 minutes of exercise three times a week is optimal. One of the key factors is for actuaries and technology companies to collaborate and come up with ways to offer these wellness solutions. However, designing those wellness solutions is difficult, because it's difficult to determine what the best measure is for everyone, whether it is exercise, blood pressure control or better caregiver support.

To improve overall health, there needs to be lifestyle modifications, healthier living and help with some cognitive issues. The science is still young in this space, and while we have a lot of information up front, there are other driving factors that can help generate this longitudinal data. It will take some innovation and motivation to see how to bring these things together. To do this, clinical trials need to be designed, and we need to ensure there are no biases. Actuaries and potential outside sources could be interested in these findings.

## How is technology impacting care delivery?

Partnering with the Japanese on the life insurance side can be an educational opportunity for the U.S. They have the highest rates of dementia in the world right now, and they have started to develop insurance products solely focused on Alzheimer's or dementia. These policies may also include riders to life insurance policies. This is slightly different from how the U.S. LTC industry operates, not using cognitive assessment at the time of underwriting to more greatly benefit policyholders. It can be difficult to set up pilots to move into this market if you notice cognitive function does not change after six months or even a year. However, most pilots that can't look nearly as far into the future can also be effective. However, incorporating new technology to assess cognition and improve lifestyle is a low-risk, high-reward mechanism to start to move the needle on cognitive health.

In the Medicare space, there is a wealth of information for guidelines, best practices and protocols. The Centers for Medicare and Medicaid Services (CMS) and the Alzheimer's Association have standards of care that the insured have access to through their health insurers. Although there is evidence that Medicare and Medicaid may have a role in LTC claims, there needs to be return on investment evidence to adopt any new technologies.

There are different phases that a caretaker goes through during each stage of the caretaking journey. Regardless of the health care provider, the emotional, behavioral and psychosocial risks for caretakers are universal. This was able to be proven, and the caretakers were able to receive better assistance in several categories including heart failure, chronic obstructive pulmonary disease, pneumonia and urinary tract infections. There has also been a reduction in 30-day readmissions and reduction of the length of stay. There is plenty of evidence to prove these benefits, including a government report, but this is still not being taken seriously. There needs to be a way to get this information across to LTC insurers so they can utilize it.

If you're going to implement something new, you're not going to have evidence supporting it right away. There are differences between sources, quantity of evidence and how that evidence is applied to specific populations. For example, you cannot compare Medicaid to the LTCI population, because you are comparing a government-funded program to a private product. It is beneficial when an actuary wants something more closely related to its private program than Medicare or Medicaid to make comparisons. We must be careful when we compare evidence or analysis between programs like this. We need to think about what the evidence truly means and whether it can be applied in other areas.

LTCI is unique, with similarities to disability insurance and life insurance, but the benefit triggers of ADLs and cognitive impairment also make it similar to a health insurance product. Innovative companies think about population health management. Medicare readmits or length of stay are important because the more readmits someone has, the more likely the individual is to end up in long-term care. There is also an acceleration of claim incidence. Looking at this Medicare health data, health management programs are out to redesign claims, and these are going to be key moving forward.

Population health management is important to take from health care insurance. This is how you manage a block of people or an individual to achieve certain goals. For example, a person who is constantly readmitted for something like heart failure may become a claimant but may also die. As cynical or sad as this may be, you must factor this in as well. This is called the "rising risk population," which translates very well to LTCI, and a lot can be learned from this population.

Some LTC carriers are interested in this data and in population health management. This could be a cause for a rate increase assumption. The regulators could prove this, and this could add value to the policyholder for future rate increases. However, despite this interest, some carriers are still skeptical. Some carriers may even find it challenging to implement this in their policies. Carriers need to determine how much these policies cost to implement per customer. There is added risk here, which puts added risk on the actuaries.

We want to know how technology impacts care delivery. We already see this in a couple of ways, and we have data to determine how to react to care delivery. What technologies are doing the interaction? Are there specific devices employed in assisted living facilities or skilled nursing facilities? There are a lot of advancements in home health care and how technology is interactive with home health recipients.

There already exist companies who deployed tablets in senior people's homes; these are used for telemedicine with either a nurse, physician or family members. There is also the ability to sensor different aspects within the home, such as detection of whether lights are on or off, the ability to listen to sound in the home, or other various sensors. There is a mixed reaction from the elderly population regarding these tablets and monitoring tools. This may make them feel safer but doesn't create a solution for loneliness. One solution is a home hospital, where elders can get post-acute care after something bad happens, making sure they get better and are improving.

One thing to highlight that is new in this decade is telemedicine, particularly because it provides access to care from facilities. When you integrate this telemedicine at a specific time when a resident gets agitated, you can alert the physician on call and the physician go through their protocol so that the situation can be handled on-site. In this scenario, this may prevent an emergency room visit, and the patient may not need an extra step to receive care. This could have a huge impact in LTCI in forecasting, morbidity and mortality models.

Additional care that exists includes smart lightbulbs placed in homes and senior facilities that can monitor and predict clinical events or injuries for the seniors. One example is Trualta, which uses an evidence-based training platform to help family givers with different cognitive or chronic training. The evidence to support this and the success are impressive, and the technology is scalable. IBM robots also provide multipurpose elder care assistance. MERA can scan vital signs and recognize language so elders can interact with them.

One of the key issues regarding these technologies is distribution modeling and how to forecast those models for an entire distribution. We don't know how prevalent these technologies are going to be and how they are going to be distributed. Are they going to be widely available or only available to more wealthy individuals who can afford it? The implications for Medicaid and the LTCI forecast could be very different and vary by socioeconomic status. These changes that occur from these technologies are going to change what people are dying from and when. Currently people are living much longer, so it directly affects data that companies may use. This data is potentially used for forecasting. If the data is not changing even after the new technology is released, maybe the technology doesn't have an impact after all.

Some people are still unsure of this impact, but they suspect it's going to be better for short-term claims, which works out better for the LTCI industry. Distribution of these services and technologies is extremely important, and factors such as age, wealth and geographic location should be considered. For each demographic, make assumptions for when that population is expected to start its benefits. Expensive medications are also going to cause a huge hit to the LTCI industry. For example, most cancer treatments aren't dedicated to curing cancer; it's about how to live longer with the cancer. These cancer drugs are extremely expensive already, and since they are helping people with cancer live longer, this results in an extended claim duration for the LTC insurer. This can carry over to other conditions, such as diabetes or Alzheimer's, and the impact will likely be seen within the next 15 years.

One key driver with this advanced technology and medicine is how to finance it. For example, Medicare is saying it will pay for it, but what about the private sector? We have yet to see how it will be financed in that industry. There are three additional points to be made here. First, when anyone is struck by disability, we need to bring them something new, even if it's not targeted at the ageing population. Second, there is a social driver that will support aging and help people who are exhibiting signs of dementia but are still living independently. On the technological side, there is a virtual reality program to experience when living with someone with dementia. This may continue to drive a social call for better support for those experiencing dementia symptoms but who are not to the point where they need 24-hour care. Third, one of the issues with increased roles and access of technology is the role of ageism

in getting an accurate diagnosis. Unfortunately, there is a trend among a few disease areas where patients have complained about having a condition caused exclusively by their age and symptoms attributed to them just being old. There are management steps that can help or slow the condition they are living with.

At the end of the day, some of this technology is developed for someone who doesn't need care and can perform certain tasks on their own but can't do things such as drive or cook without some supervision. Their smartphone isn't going to help them clothe themselves or bathe them, but it assists with managing early stages of elder care. eLivelihood financial management platform allows the aging individual to utilize their bank account but under the eye of a loved one. This is one example with freedom and flexibility but keeping the ability to be monitored. There is a periodic table of technology supported ageing[3] that needs to be integrated to be successful.

[3] IBM. The Periodic Table of Technology-Supported Ageing. https://ibm.ent.box.com/s/giqm6ii95f85h4bil2ovphvq7wq33g77 (accessed February 17, 2020).

## Trends in Dementia and Alzheimer's

In terms of what's happening in the space for current diagnosis and intervention, we need to keep in mind several aspects including neurosite testing, what framework to use, and how to assess patients asking for a medical perspective before a definitive diagnosis of Alzheimer's or dementia. The lack of medical education for these diseases while caretakers are in school is maybe a total of two hours out of their four years of studies. Research has shown that physician's primary care only offers cognitive assessment 16% of the time. Some physicians thought process is "What's the point? There's no cure," but in reality, there is a lot you can do to help someone with cognitive impairment. You can rule out diseases like depression. There are a dozen different things to do before you can deem someone is cognitively impaired.

Currently, it is relatively rare to go ahead and make a formal diagnosis or undergo pre-clinical screening, if the screening happens at all. People now use tools for cerebral spinal fluid biomarkers, MRIs for structural changes in brain atrophy, as well as evidence of cerebral vascular disease. These tools are primarily used for clinical studies to test drugs. These things can be seen 10 years before clinical evidence of the disease. Moving forward, it is exceptionally important to intervene before symptoms arise. These reversible factors can explain up to 30% of the presentation of dementia, such as diabetes, hypertension, obesity, decreased physical activity, depression, smoking or decreased years of education. These modifiable risk factors that account for a large chunk of initial presentation of Alzheimer's Disease can certainly delay it, which can have a big impact across the population.

Healthy lifestyles will delay the onset of Alzheimer's Disease. Alzheimer's is kind of a three-legged stool of a problem, dealing with improper amyloid protein, issues around tao, and beta amyloid or vascular disease. Interventions go to each of these three legs of the stool. The previously mentioned modifiable factors may have very little impact on an individual with premature Alzheimer's disease. However, for the average sporadic person with Alzheimer's, they could have a bigger impact, up to eight times more chance of developing.

There are 15 different types of dementia, and Alzheimer's is prevalent in about 30% of the cases, meaning a combination that could also include vascular. What's important to highlight is that with mixed types of dementia, they require different type of work and blood tests. From an actuarial perspective, there have been dozens of medical articles that specify that depending on the type of dementia, your utilization is going to be different.

Another point is the biomarkers space. There are a variety of types, blood, cerebrospinal fluid, optical biomarkers and retinal biomarkers. It is still undecided which biomarkers make sense and depend on what type of dementia you have. We look at dementia to try to get a framework on what type of dementia may happen before the next series of tests, clinical trials, initial drugs or data. There are emerging drugs that address the symptoms of dementia, which are FDA approved, but we have yet to see how that will impact morbidity improvement. These drugs are launched and designed to manage a symptom of dementia. In theory, if you're able to manage a symptom, could you manage the dementia itself?

Reducing agitation is one thing, but are these things truly having an impact if elders continue to require constant observation? One example is a woman who is agitated in the evening and requires substantial supervision. After speaking with a doctor, there is a new drug that she can take to handle hallucinations better. However, insurance policy language is ambiguous. Certain terms and wordings are up to claim teams to interpret, and there is a discrepancy between the medical records and the claim teams, such as claims that would be approved by CMS. The insurance company is becoming the health entity without knowing it in certain ways. Nobody wants their elder loved ones to have cognitive impairment or depression, but they must address these issues if they want to administer treatment.

One major issue is the underreporting of cognitive impairment in deaths. If you take the time to read the details in these death reports, you don't find any information about cognitive impairment. We don't talk about this, mostly

because it's so problematic. Alzheimer's may increase in one year but decrease in the next, but this never ends up being recorded on death certificates.

One report that came out earlier this year shows that death reports lump together certain conditions that we know are Alzheimer's, dementia or other brain disorders. The media also greatly affects these numbers. If a big story about Alzheimer's comes out, a few months later you will see a huge spike of this mentioned in death certificates. If we put all these different diseases together under the umbrella of dementia, it would be the third leading cause of death in the U.S. The number of dementia-related deaths, which includes Alzheimer's disease, unspecified dementia, vascular dementia and other degenerative nervous system diseases was at 261,914 people in 2017. Our aging population is one of the causes here. Thirty years ago, if someone had a stroke, heart attack or cancer, the individual likely died. However, today you can survive heart disease, strokes and cancer and live long enough to develop Alzheimer's. Obviously, you will die from something, but it's a matter of competing risks, and if you don't die from one thing, you're will die from something else.

There is a lot of discussion along prevalence and greater risk of dementia because of people surviving various diseases and beginning to live into their 80s and 90s. Back in the 1990s, about 45% of people above the age of 85 had dementia. However, the type of dementia that starts to present itself when people are in their 90s is going to have a shorter duration than the type of dementia present in people in their 70s or 80s. The age can have an impact on the duration of which people are starting to develop these diseases.

Classes of drugs are under investigation; they were interested in monoclonal antibody. This trial unfortunately failed. Recently, there has been some interesting work using ultrasound to open the blood brain barrier. People have learned a lot more about the pathogenesis of Alzheimer's, tao and beta amyloid, and people are coming around to the notion that beta amyloid may just be a plaque deposited or a reaction to this tao protein that's causing nerve tangles, which may have a relatively minor role. Somehow, it's combination with TP really enhances the inflammation that occurs, and the three-legged stool has a lot of interest in treating the inflammation. In in vitro studies, you don't see the inflammation because it really happens with the E4. This is key to drug development, because people are going to be targeting how to go after the inflammatory component. However, there may be consequences with getting rid of E4 altogether.

For people who have moderate to severe Alzheimer's disease, it will be very unlikely that there is a cure in the next 10 to 15 years. The key will be early intervention, and this will likely be the only way to keep it from ever occurring. What are you going to do with all the baby boomers that could go on to develop Alzheimer's disease? Although not yet known, it would be wonderful to intervene at the point where they won't need care. This won't be of much cost to society, and this will at least delay progression of the disease.

A cure for Alzheimer's is a possibility in the next 15 years, given the more recent development with biogen. Others are approaching it at an angle that's more symptom based. Different types of dementia have a different mortality, and it has caused more death than breast cancer and prostate cancer combined. If you deal with reimbursing people for a sinus infection, it is far less time-consuming and tedious than for someone who mentions dementia.

Most health care is fee for service, not about delivering value-based care. How can we improve the outcome for our patients, claimants and insureds? How do we optimize the patient and physician interaction? If you look at the Alzheimer's association facts and figures report, only 50% of patients are reported. Trickling down into claims, looking at medical records for evidence of cognitive impairment are nowhere to be found. In the rare case that it is found, it's like finding a needle in a haystack. The stigma of diagnosing dementia trickles back to medical school, where people aren't receiving enough education. The front line of our medical system is primary care doctors with two hours of education on how to handle this disease. We need to get the American Medical Association on board with this situation. There is a shortage across the board of neurologists, psychologists, and infrastructure. Even if there is a cure, it will be difficult to deliver due to the lack of resources.

From the view of our members, they look at dementia and Alzheimer's as experiencing cognitive impairment, but individuals could also have diabetes, which causes them not to manage their insulin. Having this cognitive impairment, whether in mild or severe stages, represents the rest of their health. Looking at the potential for treatments, we would caution anyone using the word "cure," because this implies reversing some of those issues. We're looking at treatments in stopping the progression rather than reversing them. In certain cases, we realistically have to look at catching mild dementia and stopping progression rather than getting individuals fully healthy again.

You aren't going to eliminate elderly care needs altogether. There will need to be some sort of drug pipeline report to our elder population. There are treatments that can stop the progression of dementia or significantly slow the process. On the positive side, in terms of creating a diagnosis, there are potential biomarkers in the development pipeline that may help. The challenge is getting people diagnosed early and accurately and getting the appropriate treatment. There is optimism that biomarkers are making advances. Maybe we will end up seeing progress as early as 2020 or 2021.

Even in a positive scenario where we have a vaccine for Alzheimer's in 15 years, the thing about infrastructure, or the lack thereof, is significant. For example, a vaccine for shingles took a while to adapt and get to reasonable levels. It would be difficult to see a vaccine for Alzheimer's moving quicker than that. Some people believe that, at best, these vaccines will only delay further onset of Alzheimer's by two to three years.

When you model this effect on the population, it's a huge difference. Modeling the scenario of a cure is one thing; modeling the delay is another. Again, everyone must die from something, and this is only delaying the inevitable. If you can delay Alzheimer's with a drug for two years, then people are going to live longer because of those drugs. That will impact people and society, but it won't have that much of an impact on claim burdens for an insurance carrier. There is a very clear distinction in the medical discussion to start doing more sophisticated things in modeling, because no additive or linear functions are going to work here.

General physicians may not have enough time and are not yet prepared to handle a cure for Alzheimer's. When it comes to people who come in for a diagnosis, there is a difference between a 65-year-old who just forgets their keys and someone who is actually having cognitive issues. For example, there could be a medication this person is using that is causing fuzzy brain. It is important for people to get access to guidelines.

One piece of research looked at all 50 states to look at the number of people with dementia and the number of neurologists in those states. Wyoming was the state with the biggest dementia population. There may be a correlation with that and claims in LTCI. We can screen a population and potentially identify those who may not immediately need intervention or a doctor, but this is more about streamlining so everyone is getting the right care at the right time. There is publicly available knowledge and a list of evaluations to check someone for dementia or severe cognitive impairment. There's a big gap in clinical care in this data, and there is also a high number of false positives. Going back to the relative risk in closed blocks, noticing the subtypes of dementia are different between carriers, and this is going to influence claim duration and mortality.

Some of this is age related and reflects bias and research. Looking at this interesting survivorship phenomenon, if you can get into your 90s without dementia, it opens the brain up to other rare forms of dementia such as frontal lobe dementia. The duration of these types of dementia is quite different once you start evaluating people in their 90s. As baby boomers start entering that arena, the numbers start to get important, but the duration will be most important in making predictions on impact.

There are drugs that can have an impact on the basic mechanism of aging, including dementia, cardiovascular disease, diabetes or strokes. These two drugs are Synalytics and Metphormin, which selectively weed out cells that are producing or secreting inflammatory substances and others that play an important role in aging. Using some of these drugs that selectively get rid of these senescent cells, it seems to have a positive impact and people get

better. There is another cheap drug called Metphormin that can play a role in aging and in Alzheimer's as well. We can expect both drugs to potentially start having an impact within the next 10 years.

People are reaching this age range where their bodies aren't going to live after a certain amount of time. Baby boomers reaching their 90s would change the length of time with which they have Alzheimer's. In which ways do we expect this to change? Well, it depends on the disease. If people are taking good care of themselves, that's going to lead to an important delay of the onset of the disease and progression. However, we are still very worried about the huge burden of Alzheimer's that's around the corner with the baby boomer population. We will see a lot more people in their 90s and even 100s after the baby boom population disappears.

Looking at trends happening in medicine and society, how does obesity—for example—impact vascular burden? There is a ton of obesity in the population coming up to a claim, and how will this impact claims as a whole? Does an increase in people vaping cause more vascular disease? Diabetes goes hand in hand with obesity. The amount of kids who have obesity and diabetes is alarming, and how is that population going to age? Environmental factors such as pollution, aging and dementia are going to be impacted. Other factors that have an impact include living in a rural versus an urban setting, legalization of marijuana in many states, and the opioid epidemic in the U.S. We need to look at these larger macro issues that are in our society and see how that may trend into LTCI.

One potentially important thing is a cohort shift in education for differences in younger ages. These differences are potentially an offsetting factor given what we've seen in the past 20 years. Education is neuro protective; the more education you have over time and the more social engagement you have, then you have a reserve in your brain that can withstand some insults over time. Imaging may show someone may have tao, but clinically the individual seems normal. In terms of gender, women have three times the rate of dementia as men. When more women have more access to education, there will be an impact down the line of incidences of women with dementia, because there is currently a clear bias in our education system. There will always be cultural differences that differentiate dementia onset between demographic groups.

People are a little worried about the indication that education is neuro protective. Some companies that have marketed this have gotten into trouble by saying education can prevent Alzheimer's disease. While there may be some neurocognitive activity going on that may delay Alzheimer's, the true factor is that people with more years of education make better health decisions. For example, they are less inclined to smoke and more inclined to go to the doctor to get screened. All of this is very important.

## Medical advance for other chronic conditions impacting LTC

Dementia and Alzheimer's today have about a 10-year lifespan. The first two years are generally early development, the middle stage is about six years, and the last stage is about two years in length. Sometimes patients move in steps, their symptoms worsen or get better, and they see different clinicians. Is this still the profile we should look for in Alzheimer's and dementia patients? Also, what is the typical dementia patient going to look like 10 years from now, and are these diagnoses going to change the way this profile looks?

There are a lot of studies that look at the cost of care over a 10-year period. The biggest spike is typically the last year before death. However, early detection and early screening can help this period from turning into, say, eight years. If a senior got confused, fell down the stairs and broke her hip, she will be placed in the hospital. After some mental examination, physicians may find that she has been demented for a few years, and the diagnosis starts in the middle stage rather than early development. This means that after the diagnosis, the spike in medical costs will happen sooner. Earlier diagnosis in 2030, after new medical advances, may show the period of dementia lasting more than 10 years and potentially approaching 15 years. Compression on morbidity and mortality as people get older will lead to compression on the life expectancy.

Pharmaceutical companies are looking to develop treatment with further incidences of the condition. For biogenetic trials, the average age is about 70, but this age is trending downward. As we look at developing intervention that gets rolled out to the population, these will be targeted at earlier stages of progression.

There are ideas floating around that Alzheimer's is being caused by an infectious agent. There are a few different types of thinking regarding that idea. There is one belief that Alzheimer's is more of an issue with inflammation rather than an infectious agent. However, with Prion disease, this is a different form of dementia that's more like an infection. Another belief is that Alzheimer's is potentially neuroinfectious.

We are going to see improvements with age-related disease in general, including compression and morbidity. Getting rid of obesity and other similar trends will help aid those improvements. Hopefully the drugs will interfere, and we can suppress the amount of time of age-related illnesses affecting people before they die. Blood biomarkers, imaging, cerebral spinal fluid, optical genes and brain vessel ultrasounds are all innovations that are on the horizon.

There are blood thinners that can cure strokes, and interventional stroke care has recently been introduced. Taking a small catheter and pulling out the clot has a similar use to how it's utilized in cardiology. This may change how stroke incidents are received in 10 years. A lot of drugs and irregular heartbeats cause blood to coagulate and clump together. Traditional treatment for this is Coumadin. There has been a variety of new methodology for strokes, and as a result, there has been a decrease in incidence.

One new aspect of caregiving is the number of older adults who are also caregivers. We are seeing people in their 60s and 70s caring for their parents who are 80, 90 or upwards of 100 years old, which can cause additional stress and increase onset of chronic diseases for the caregivers. This is a new phenomenon as the population is living longer.

Some people and companies are marketing and distributing nadmedics with the idea that it helps a person's aging despite some thinking this advancement is premature. Cardiovascular disease and strokes have been declining, primarily as a result of better screening and treatment of hypertension. That being said, we are still doing a terrible job of screening and treating hypertension in minority populations, especially the African American population. If we simply do a better job of screening this demographic, the disparity between ethnic groups will disappear. There has been major headway in terms of cancer medicines and treatments; however, these are very expensive and not available to a large portion of the population. As we get rid of smoking, there will be a huge decline in chronic obstructive pulmonary disease and pulmonary cancer.

With vaping, there is not yet evidence of long-term impact. People are getting huge doses of nicotine, so they get addicted very quickly. There may be cancer risk, but the studies have not proved that yet. However, it is logical to believe that the risk is higher for those who are vaping. In the majority of hypertension LTC claims, the person has hypertension as one of multiple diagnoses. If this could be caught earlier and treated better, this could solve some problems. It would also be interesting to understand how inflammation relates to different diagnoses and to see how different factors evolve as a result of inflammation and how they can impact claims.

We are hoping hypertension claims can be immediately accompanied by treatment. Hypertension used to be defined as having blood pressure greater than 130, but now it is having blood pressure above 120. We are doing more omix, a whole range of biomarkers, metabolomics and microbiomics bacteria in the gut, and this can tell us about different inflammatory substances to help combat inflammation. There are more nonspecific markers, but all these markers are for inflammation accelerate age-related diseases. One powerful thing that is just now getting researched is the metabolites in people's blood stemming from bacteria in the gut. There are genetic signatures and longevity signatures associated with diagnosis from blood. This can potentially lead to a blood test that can tip whether a patient has Alzheimer's.

Increased focus on aging that can severely impact quality of life includes vision loss, bladder control or hearing loss. These all have an impact on the population but aren't considered untreatable but rather moderately manageable. By increasing attention to those issues, we can focus on those conditions and treat them. Another major point is focusing on a caretaker who also has LTC insurance on themselves, such as when the caretaker is a spouse. There are studies on the impact of caregiving for elders on the caregiver's health and can impact their own need for a claim.

Resources for access to home-based services are hugely in demand. Systems are not always available for home-based care at varying degrees as much as people would like though. Often there are barriers to at-home care services that can lead to caregivers making other care type decisions. For some, when they buy a home, they look for a stereotypical two-story single-family home and want to live there for as long as possible. It would be more plausible to build homes in our communities to adapt as people age. For example, we could improve furniture to have coffee tables that adjust in height or kitchen countertops that do the same thing. There are ways to adapt in our society to make the home an easier place in which to age.

Psychosocial help to the caregivers is still neglected in the LTC industry. There have been consumer focus groups across the nation to figure out what products are missing from the industry. There are some organizations that, in the first quarter of 2020, are launching a caregiver insurance service, which covers out-of-pocket expenses and lost wages from time spent caregiving. The Family Medical Leave Act provides benefits to the caregivers themselves as well. After a long time in the industry of having no support for caregivers, people are finally addressing this issue.

LTC products have gotten too expensive. The middle class is typically the demographic who needs this care, but many of them cannot afford it. We must find a way to make LTC insurance affordable again. Digital technology and data will certainly be part of the solution. For example, auto accidents frequency continues its decline with better car technology (e.g., telematics). Given LTC's major social impact, there is a great incentive to find a way to make LTC insurance affordable again.

Most policyholders have nutrition or fitness benefits that they aren't engaging in. For any chronic disease, there needs to be an early monitoring tool that shows the point when the patient's health changes in a more quantitative way. Second, it doesn't seem that people truly know what is in their LTC policies. There's a level of knowledge from a claimant standpoint, but individuals don't truly know what's available to them. There is not a lot of incentive to utilize, let alone add, to these policies.

It's also important to know how people plan to use their LTC benefits in conjunction with other benefits they may have, such as increased supplemental benefits through Medicare Advantage. Changes to Medicare Advantage, such as the new special supplemental benefits for the chronically ill, and any future changes to Medicare, may affect LTC needs for beneficiaries who may also have access to LTCI. As the issue becomes more pressing, states are creating new models to provide LTC benefits, and we should see an increase in this over the next 10 years.

There is a navigator service, where we can see elders staying at home for as long as possible instead of moving into more expensive settings. There is also a frailty index that we can use to evaluate people. We need to decide how to assign and determine the services they can receive, because this will delay them from going into a long-term care setting. There is a huge trend in these products becoming services now, and LTC is on the verge of this as well. We just need to figure out how to turn these products into services that people can benefit from on a daily basis.

As climate change continues to happen, we need to ask how this will affect LTC in terms of disaster-related incidences and the ability to continue long-term support after something like a fire or flood. As those natural disasters continue to increase in frequency and severity, it will have a great impact.

Circling back to differences between demographic groups in diagnosis of diseases, there is also likely to be a difference between the number of African Americans and other nationalities with dementia diagnoses. There is also

a discrepancy regarding the male and female population as well. There are programs in places such as Phoenix where researchers work with African American and Latino communities in the area and utilize their programs to help with these discrepancies.

One of the things from the Medicare side is the administrative burden in LTC for proprietors, families and policymakers. Also, for an area that a lot of people deal with, people still don't know enough about long-term care even after experiencing it and dealing with family members receiving care. Value-based health care and the ability to access more providers could change claim incidence and the duration of these claims.

Some data agencies produce data that is used exclusively by actuaries, and this is considered quality data. If the data improves on the producer end, the data released to the actuaries improves, which in turn improves forecasting. The goal for this data is to create a correctly completed death certificate. Data agencies have been working for a long time with medical examiners to create courses online that will improve the data that the agencies receive. This is done because physicians in this country aren't trained in death certificates, and they usually learn this from their colleagues.

As the middle class shrinks, we need to add another component to value-based care in the ability to finance LTC policies. We may not be processing as many claims or even be able to sell the product if the middle class cannot afford it. The baby boomer population is making these concerns far greater than they have ever been. There are far too few nursing home beds available, and resources are stretched too far. Eventually services will be so stretched that care will be almost impossible. This could greatly incentivize the system, so we can take care of people before they get sick. Climate change is a huge factor too, and it's going to stress everyone out in terms of accelerated aging.

Another notable thing is the growing age of people using technology. The 65 and older segment is showing the highest growth in digital technology adaption and, and this gives us a better view of how the senior population behaves. We can create preventive care and support by studying these technological advances.

The U.S. is experiencing changing demographics and increased diversity as the baby boomers age and minority populations grow. These diverse populations have different experiences with caregiving. There will be a need for government programs to respond to this, whether it is changes to Medicare or Medicaid. There will also likely be an increase in value-based care as a result.

Because of machine learning techniques, we will see advancement of technology solutions and more availability of larger data sets. This will influence the reactive nature of the LTCI world, and we will in turn shift to a preventative model. There is an environmental change in the underprivileged LTC world where some states enacted the LTC insurance trust, effective in 2025. There are also thoughts that CMS and state LTC will be intersecting at some point in the future. Demographic change and enormous growth of inequity are not going to impact the industry environment or needs. The inequalities are political changes through state programs or modifications to Medicare and Medicaid. Enormous inequity is going to be a huge social problem.

This sort of change was initially launched in Japan. Everything went exactly as the country had hoped, except that 60% of its population is seniors. Adoption of technology is critically important, but if people can't access it, then it makes no difference what technology is available. The ability to make this technology available becomes the most prominent factor. The shift toward preventative medicine is important as well. It's still a new field, and people are still learning to adopt and adjust. This will change the dynamic of how people are aging and staying healthier.

# Appendix: Biographies of Participants

### EXTERNAL EXPERTS (ALPHABETICAL BY LAST NAME)

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