Long Term Drivers of Future Mortality – A Podcast Series - Chapter 7 – Medical Advances

Mortality and Longevity

Podcast Transcript

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Medical Advances, Future Mortality, Personalized Medicine, Genetic Profiling, Telomere Biology, CRISPR, Medical Technology, Telemedicine, Remote Surgery, Tissue Engineering, Electronic Health Records, Health Inequality, Public Trust, Innovation Adoption, Policy Impact.

SPEAKERS

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TRANSCRIPT

KARA CLARK 00:05

Welcome to another episode of The Research Insights Podcast. I'm Kara Clark, Senior Practice Research Actuary at the Society of Actuaries Research Institute.

This is part of our special podcast series based on the paper Long-Term Drivers of Future Mortality, by Yair Babad and Al Klein for the 2023 Living to 100 Symposium.

Today we're diving into chapter 7, which focuses on medical advances and their role in shaping future mortality. Joining me, as always are Al Klein, one of the papers authors and Principal Consulting Actuary at Milliman - welcome Al!

AL KLEIN 00:44

Thanks Kara, and welcome to everyone from near and far!

KARA CLARK 00:47

And Eric Pickett, Actuary and Chief Content Officer at Club Vita. Welcome back, Eric!

ERIK PICKETT 00:54

Hello, Hello! As always, it's great to be here!

AL KLEIN 00:54

Thanks, Kara. Medical advances have always played a pivotal role in extending life expectancy and improving health outcomes. But projecting their future impact is complex - requiring actuaries to assess not only new breakthroughs themselves, but also the pace and outreach of their implementation.

ERIK PICKETT 01:15

Absolutely and Chapter 7offers a structured look at developments across several domains: from the foundational progress of the 20th century to cutting-edge innovations in genetics, technology and digital health. And it also raises a critical point - not all promising ideas translate into real-world improvements.

AL KLEIN 1:34

So, in this episode, we'll walk through some of those key developments, explore what's coming next and reflect on what it all means for modeling future mortality.

ERIK PICKETT 01:44

So, when thinking about how medical advances could affect future mortality rates, it's worth considering how far we've actually come. The 20th century saw some amazing medical developments:

- Vaccinations for diseases such as polio, measles, rubella, diphtheria and tetanus,
- The development of antibiotics,
- Surgical innovations, including angioplasty, endoscopy, kidney dialysis, medical implants and organ transplants,
- And public health improvements in sanitation, hygiene and environmental health.

All these areas and more fundamentally changed longevity expectations over the previous century.

AL KLEIN 02:24

Right, and it's easy to forget just how transformational some of these were. The eradication of smallpox, the introduction of insulin and polio vaccine all made previously fatal conditions either curable or manageable. And all of these discoveries led to overall mortality improvements over the years.

ERIK PICKETT 02:46

And, while the pace of these breakthroughs was remarkable, it was also highly uneven - by geography, by wealth, and by political will. And that's something we still grapple with today.

Ultimately, though, if mortality improvements are to keep pace with those seen over the 20th century, we'll need some new medical advances of this kind of scale.

AL KLEIN 03:07

Now let's turn to genetics and biomedicine, which are reshaping the landscape of medicine in the 21st Century. With the mapping of the human genome, we've entered the era of *personalized medicine* - where treatment can be tailored to an individual's unique genetic makeup. While not there yet, personalized medicine, incorporating AI, which we'll talk about later, have the potential to possibly exceed the 20th century gains!

ERIK PICKETT 03:33

This is especially promising for cancer treatment. Oncologists are increasingly using genetic profiling to match patients with targeted therapies, dramatically improving outcomes for some cancers. We're seeing progress with immunotherapies and precision drugs that exploit specific genetic vulnerabilities in tumor cells.

AL KLEIN 03:52

Another emerging area is telomere biology. Telomeres are the protective caps on our chromosomes that shorten as we age. There's growing interest in whether preserving telomere length could delay aging and age-related diseases. While the science is early-stage, it's another dimension actuaries may want to monitor for long-term impacts on morbidity and mortality.

ERIK PICKETT 04:16

And gene editing tools like CRISPR also hold promise. They could one day be used to correct inherited conditions at the source.

As with all biomedical innovations though, it's important to know that there could be some ethical and regulatory considerations. And that implementation and access will ultimately be key to their real-world impact.

Moving on then, let's consider advances in medical technology - robotic surgery, wearable devices, diagnostic imaging and AI-assisted diagnostics. These tools are making medicine more precise and potentially more preventative.

AL KELIN 04:50

We're also seeing a rise in at-home health monitoring. Devices that measure blood pressure, oxygen levels, heart rate variability, sleep habits and more. And better screening tools too. All of these could shift the model from reactive care to proactive management.

ERIK PICKETT 05:09

And telemedicine has grown rapidly as well, especially since the pandemic. It provides remote consultations, expanding access to care - particularly for those in rural or underserved areas. And it's often more efficient for both providers and patients. Doctors can also study some issues, such as skin lesions with cell phone cameras in real time.

AL KLEIN 05:31

Remote surgery is another fascinating development. With high-speed connections and robotic platforms, surgeons can now operate on patients across long distances: we're talking about thousands of miles, and potentially across

different countries. While still in its early stages, this has the potential to revolutionize care delivery in isolated or low-resource settings and allows a limited number of specialists to serve many more patients.

ERIK PICKET 05:58

And don't forget tissue engineering and regenerative medicine as well. Fields focusing on growing tissues, organs, or using stem cells for repair. These could offer breakthroughs for organ replacement, wound healing and chronic conditions in the future. And this isn't just science fiction: it has already been done with a number of organs in practice.

AL KLIEN 06:19

For actuaries, all these developments raise important questions, how quickly will they scale? Who will have access, and how will they shape long term mortality and morbidity trends? The answer to this will likely vary based on availability, accessibility and actual usage.

Which brings us to electronic health records - or EHRs. The promise here is streamlined, coordinated care, powered by data-driven insights. Doctors can record notes electronically, vs. the handwritten notes in the past, share the notes more easily, track progress and use predictive analytics to flag risks.

ERIK PICKETT 06:57

But adoption has been uneven. Health Systems are not always using the most up-to-date technology, and many don't communicate between each other. There's also a sensitive balance to be struck between data privacy and sharing of information for better outcomes.

AL KLEIN 07:13

Still, improved data infrastructure could support early detection, chronic disease management .and better outcomes.

Next, it's important that we also acknowledge the barriers. First, innovation doesn't always lead to impact.

ERIK PICKETT 07:28

Exactly. High development costs, regulatory hurdles, slow adoption and health inequality all stand in the way of progress.

AL KLEIN 07:35

There's also uncertainty around public trust. New technology, especially genetic ones, can face skepticism or ethical concerns that slow uptake.

From what I have observed about technology in general, there are usually two distinct groups - the early adopters of all new technologies and those who prefer to wait and see how they might work out. Yes, there are some in the middle, but most people fall into one of these two groups. And if I had to guess, most actuaries would fall into the wait and see category. But this is also why we're trying to provide our listeners with this information: that is, so most are better able to anticipate what might happen and how to respond to it.

ERIK PICKETT 08:18

And even when treatments exist, they're not always equitably distributed. So, the mortality impact is tied as much to, or even more to implementation than invention.

Al, we're now coming to the end of our overview of this chapter, but before we wrap up, can you tell us how you and Yair summarize the impact of medical advances in your outlook?

AL KLEIN 08:38

Of course! As a reminder, Yair and I provided our view on the future for all of the main items covered in each chapter, as well as our overview of the chapter itself. Starting with our overall view, we thought medical advances would lead to reductions in future mortality rates.

We predicted modest reductions in mortality due to new medications, surgical techniques, adoption of holistic medicine, use of telemedicine, development of biomedicine and other technology, as well as the application of electronic health records.

For those who have been listening to our podcast, this chapter has the best outlooks for the future.

ERIK PICKETT 09:17

Thanks Al. So, to wrap up then:

- Medical innovation continues to be a vital driver of mortality improvement.
- There are many areas of emerging scientific research that could drive significant increases in longevity.
- The impact doesn't just depend on the scientific results, it also depends on access, scalability, acceptance and system integration.
- Actuaries will need to track both the pace of invention and the reality of implementation.

AL KLEIN 09:45

And always remember, mortality doesn't just follow the science. It follows policy, availability, and more importantly, actual behavior. These are the wild cards.

Kara, back to you to give us a preview of the next chapter topic and to close us out.

KARA CLARK 10:01

Thanks Al and Eric, and thanks again for tuning in to the Research Insights Podcast.

Join us next time for chapter 8, where we will be exploring technological advances as long term drivers of future mortality.

We'd love your feedback at Research-ML@soa.org. Until next time, I'm Kara Clark for the Society of Actuaries Research Institute.

ROSE NORTHON 10:30

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