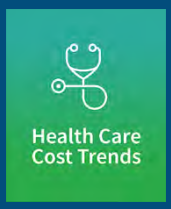
SOA Research INSTITUTE

A Summary of the 2022 Wall Street Journal Future of Health



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On September 14, 2022, *The Wall Street Journal* hosted its 'Future of Health' event, which was a virtual event featuring three sessions on some emerging cutting-edge topics that could impact the future healthcare environment as well as health care actuaries.

The Future of Health event consisted of three independent sessions that each lasted twenty-five minutes. The sessions consisted of two one-on-one interview and one interview of a panel of two. The topics covered included:

- Session 1: Finding a Cure for HIV
- Session 2: A New Frontier in Female Fertility and Aging
- Session 3: What's Next for Moderna?

Each session featured a twenty-five-minute interview run by Wall Street Journal Staff and one to two panelists. The sessions focused on some interesting topics that are somewhat outside of the mainstream of traditional healthcare topics but are worth monitoring. Each session consisted of a 15-to-20-minute interview followed by a series of questions from the audience.

Included below is a summary of the different sessions offered, with a focus on those relevant for actuaries. With each summary, the Institute has provided insights on actuarial implications on this information.

Session 1: Finding a Cure for HIV

The first session of the "Future of Health" event featured the President of the International AIDS society discussing some potential groundbreaking developments in Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) research.

Currently, there are about 38 million individuals in the world infected with HIV and roughly 75% of them are on antiretrovirals. Antiretrovirals are a class of drugs designed to reduce viral load in HIV infected individuals to levels that don't endanger their immune system.

There are some potential cures for HIV currently being used, but they only apply in rare situations. One such cure is using Bone Marrow or Stem Cell Transplants. These treatments can cure HIV, but only if the donor has resistance to HIV. However, these courses of treatment are very expensive and are generally only given when cancer is present. These options do not represent realistic broadly available cures for HIV.

HIV has a high cost to society, with worldwide treatments costs coming out to between $25 Billion and $30 Billion per year. Because of this, there is a lot of incentive to find a cure. However, the probability of a "home run" cure is low due to the fact that HIV integrates with infected individuals' DNA, which makes it very hard to get rid of. Significant investment and collaboration are needed to find a cure for HIV. This is a difficult task, but worthwhile given the costs of the disease and the societal impact.

The current cures that are being sought are complicated and researchers are looking for a lasting solution.

The speaker described three different methodologies which are all currently represented in clinical trials. They include the following:

- Preventing Infection
- Attacking the virus
- Purging HIV from the individual

Of these three approaches, purging the person of HIV is the least likely to succeed because it's difficult to track down all the infected cells.

Making Anti-HIV antibodies seems to have the most promise. This has been tried but people have not stopped antiretroviral treatment yet after that approach since HIV appears to be dodging many of those antibodies.

Making cells resistant is another option that has some promise. This involves removing cells, infusing them with a treatment and then reintroducing them into the body.

M-RNA vaccines are also being considered. This offers a great chance for delivery, but that concept is not as far along as the other previously mentioned ones.

Lastly, gene therapy is another option which has become viable due to rapid advances in delivery over that past 3-5 years. This approach is likely to come in the next decade.

Of all of the methodologies mentioned above, Immunotherapy will likely arrive first. This involves taking a series of pills and possibly injections. Animal studies have shown effectiveness, but it is unclear if this approach can work for everyone, or how effective it will be. If the goal is to ultimately eliminate the virus, immunotherapy does not accomplish this. It is good for a short-term approach, but a better methodology is needed for the longer term. The most likely outcome is remission, rather than a cure.

The panelist also emphasized the benefits of early diagnosis as well as testing of viral loads to measure how well treatments are working. This would be the case for both current and future treatments.

Finally, stigmas associated with the disease can lead to suboptimal outcomes as current and likely future HIV treatments will work better when detected earlier. Home based antibody testing can help get quicker diagnosis while also removing some of the stigma.

ACTUARIAL IMPLICATIONS

Like many other drugs under development, a cure for HIV could potentially have a significant cost outcome on the commercial and government health systems in the United States and other countries. After experiencing large cost increases with the development of Hepatitis cures, Actuaries need to closely monitor the progress of HIV cures. Due to the large extent of impacted populations, there could be a similarly large cohort that could be eligible for these new treatments.

Additionally, actuaries would need to consider the relative cost and effectiveness of current treatments as compared to where future ones might land. Current treatments cost in the range of $1,800 - $4,500 per month[1] which can add up. However, the cost of cures might easily be significantly more, and these costs would be borne up front rather than being spread over a lifetime. Unless a new cure eliminates the need for future treatments and comes at a relatively affordable cost, it is less likely to get general uptake and approval in the payer's formulary.

Finally, if an HIV cure can significantly raise life expectancies of the infected populations, life, annuity, and pension actuaries need to take note.

Session 2: The Next Frontier in Female Fertility and Aging

The second session featured two individuals involved in research on female health issues. One panelist was a founder of a biotech company and the other was an investor in advances in female health technology.

As the title suggests, there were two main areas of focus in this session with some overlap between the two. The topic of fertility dealt with how to enhance the limited window of opportunity for childbirth as well as health issues related to the period around female menopause.

The issue of fertility is largely related to activity of the ovaries. Per the panelists, ovaries age five times faster than most other body organs. Ovarian aging is looked at under the context of the following conditions:

- Fertility – or the production and preservation of eggs
- Primary ovarian Insufficiency or early menopause

When dealing with infertility, the side effects are generally minimal because most of the treatments happen external to the body. However, some treatments take place within, such as hormonal injections, which can affect the patients. Overall, the best treatment for infertility due to ovarian decline appears to be the freezing of eggs,

On the other hand, conditions related to menopause are much more prevalent and they have a greater influence on women. Symptoms related to menopause, or upcoming menopause include:

- Hot flashes
- Genitourinary conditions, including incontinence
- Mood disturbances
- Loss of bone density and muscle density

The median age of menopause among women is 51.

The keys to treating menopause and its related conditions include the following:

- Managing abrupt shifts in women to help ease other symptoms
- Providing medicines to help manage the transition
    - Targeting the abrupt phase can help to mitigate side effects
    - Building on existing medicines is key
    - Hormone replacement Skin patches are an option

[1] https://www.webmd.com/hiv-aids/hiv-treatment-cost

    - Breast cancer is a potential side effect for prolonged us of menopause transition medicines
- Exploration of long-term therapies
- Stopping menopause is not realistic
- Addressing primary ovarian insufficiency offers the best opportunity to succeed

In addition to the approaches mentioned above, there are also some potential biotech opportunities in this area. These include:

- Tissue engineering
- Ovary transplants
- Medicines to slow ovarian aging
- Other biologic therapies

Challenges include many different cell types make ovaries more difficult to transplant or re-create. Growing babies outside of bodies is also very risky

Overall, there are many potential different approaches being examined to help women deal with infertility and menopause related symptoms.

ACTUARIAL IMPLICATIONS

Actuaries need to keep an eye on any developments in this area, as successful treatments and methodologies may result in significant uptake and cost increases. As women are delaying childbearing, costs in these areas, particularly related to fertility, may grow as more options continue to be explored.

New treatments tend to be costly and any developments in these areas can potentially have a pronounced effect on costs for women at or near the end of their childbearing years.

On the other hand, effective treatments for menopausal symptoms could potentially reduce overall costs for women entering that phase, especially with the large number of side effects associated with peri-menopausal women.

Session 3: What's Next for Moderna

This session featured an interview of the CEO of Moderna, the manufacturer of one of the two mRNA COVID-19 vaccines and the originator of the messenger RNA (mRNA) technology.

During the COVID-19 pandemic, Moderna, was one of several pharmaceuticals to develop a COVID-19 vaccine and one of two companies to develop a vaccine that uses mRNA technology.

The mRNA technology itself is a platform, or delivery system for medicines, including vaccines. In theory, the agent being put forth can be changed while still maintaining the mRNA platform. The development of this technology allowed for a more rapid development of the vaccine itself relative to previous vaccines, as well as the adaptation of different medicines to this delivery mechanism.

To that end, Moderna, was able to develop and put out to market an updated bi-valent vaccine which targets both the new BA.4 and BA.5 strains, as well as the original one. This became necessary as the protection against transmissibility from the original vaccine dropped significantly with the emergence of the omicron variants. The hope is that the new vaccines will help reduce transmission of the current variants in addition to protecting recipients from severe disease resulting in hospitalization or death.

Beyond that, Moderna is looking to target a new vaccine for the fall of 2023. This will be COVID only, not COVID plus flu. Moderna is working towards a combined COVID and flu vaccine by the fall of 2024 which would again be through the mRNA platform. They are also looking to create mRNA vaccines for Respiratory syncytial virus (RSV). Because of the efficacy of the mRNA platform, Moderna and others can quickly use this platform to introduce new vaccines.

The Moderna CEO also addressed the lawsuit that his company brought against Pfizer related to use of the mRNA technology. As the CEO put it, the intention was not to seek damages for use of the technology during the early part of the pandemic, especially considering the vaccine's use by numerous foreign governments. Instead, they wished to be compensated for the technology that they developed, going forward.

Other potential applications for mRNA include cancer vaccines. This involves using mRNA to teach the immune system the signature of the cancer cell. Teaching the immune system T-Cells to recognize and fight cancer amounts to immunotherapy. Keytruda is an example of a current immunotherapy drug. Moderna expects to do trials on mRNA immunotherapy with comparisons to other methodology in the hope that if some success is found, it can take over as a best practice.

This would also work best by stocking up on at home testing prior to the next COVID wave.

Home testing is also now able to integrate through available apps to be included in report data in order to supplement locations of where cases are surging in real time.

Finally, the large increase in demand for COVID testing has also impacted non-COVID testing, resulting in diminished diagnostic testing for non-COVID diseases leading to lower early diagnosis and ultimately more severe disease and death. The use of home testing will allow for more non-COVID testing capacity. In addition, with its more recent acceptance, home based testing has an opportunity to enhance detection and early treatment of non-COVID diseases.

ACTUARIAL IMPLICATIONS

COVID-19 testing has had an uneven impact on overall healthcare costs. While much of the testing occurred outside of the insurance system and were covered by federal relief funds, there are many tests done at provider locations that result in direct reimbursement from payers to providers. Overall, insurer costs are a function of the proportion of tests administered in a provider setting as well as the total number of cases. Cost impacts will be higher during outbreaks, especially when free testing at other locations is strained due to limited availability and slow response times.

Closing Summary

Overall, these sessions from the WSJ Health Forum provided actuaries with many insights into emerging healthcare topics and some key related actuarial considerations. They include the following:

- Changes in delivery of care such as greater use of technology can drive more efficient care but can also drive costs up in the short term. Examples of this include Telehealth and Hospital at Home.
- New entries into the provider market including retail pharmacies, and increased provider diversity can help ease access issues in underserved areas.

- COVID-19 related costs are likely to increase as more treatments are developed and government funding for testing and vaccination dries up.
- Provider burnout and mental health issues can lead to worse patient outcomes and higher costs if not addressed properly.
- Future climate disruptions can cause geographical shifts in healthcare costs including increases in vector borne diseases and other diseases driven by environmental changes.

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