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COVID-19 – MEDICAL DIRECTOR CHALLENGES

Navigating a Pandemic: The Unique Role of the Medical Director

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The sudden emergence of the COVID-19 pandemic in early 2020 presented a unique challenge for medical directors of life insurance companies. Company leadership required quick answers about many issues, but two in particular: 1) the magnitude of the pandemic's impact on the insured lives portfolio and 2) the underwriting of new applicants during a pandemic. This article will describe the experiences of a global team of reinsurance medical directors during a pandemic. It may also serve to provide guidance for medical directors facing a similar challenge in the future.

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TIMELINE: EARLY DAYS OF THE PANDEMIC

A cluster of cases of pneumonia of unknown etiology was reported in Wuhan, China, in December 2019. On January 7, a new coronavirus, initially named "2019-nCoV" and subsequently "SARS-CoV-2," was identified as the causative pathogen. While most cases were concentrated in Wuhan and Hubei province, by the end of January all Chinese provinces had reported cases. Thailand reported the first case outside China on January 13, followed by Japan and South Korea on January 14. Cases were subsequently reported in multiple countries, including the USA (January 20), Canada (January 25) and Germany (January 27). While many of the original cases in China could be traced to exposure in Wuhan, person-to-person transmission was confirmed in the third week of January. The World Health Organization (WHO) declared a Public Health Emergency of International Concern (PHEIC) on January 30, 2020, at which point cases of SARS-CoV-2 had been reported in 18 countries outside China. On February 11, the WHO announced the name "COVID-19" to describe the clinical illness caused by SARS-CoV-2. On March 11, the WHO declared a pandemic. Facing rapidly escalating numbers of cases with clear person-to-person transmission, most countries implemented strict social confinement measures in early to mid-March. At date of writing (December 2020), more than 70 million cases of COVID-19 have been diagnosed with 1.6 million deaths, making it the most severe pandemic since the 1918 Spanish influenza pandemic, which is estimated to have infected 500 million people and caused 50 million deaths.[1]

GENESIS OF GLOBAL MEDICAL PANDEMIC GROUP

In the first week of January 2020, Munich Re's medical director in Beijing began to provide information about the Wuhan outbreak. At the outset, his report was a simple tally of the number of cases of an unexplained respiratory illness requiring hospital care. Over the subsequent days patient characteristics began to emerge, including basic demographics, disease severity categories, number of ICU admissions and numbers of discharges. In the second and third weeks of January, as SARS-CoV-2 was identified as the culprit pathogen and a reverse transcriptase, polymerase chain reaction-based diagnostic test (RT-PCR) was deployed, the daily reports from Beijing became more detailed, providing preliminary insights into transmission routes and disease trajectories. On January 21, the WHO began to publish its daily situation reports.[2]

In late January, members of the Munich Re Global Medical group, an established group of physicians collaborating on international research, began informal exchanges, whose objective was to become familiar with the evolution of the situation in Wuhan and, most importantly, to estimate the likelihood of spread to other countries. As COVID-19 spread to South East Asia and then to Europe and North America, the informal exchanges developed into the creation of a Global Medical Pandemic Group with 5 physician members, based in Munich (AS, SW), Singapore (AA), Chicago (GG), Minneapolis (BH) and Montreal (TM). Additional medical input was provided by colleagues in China, Australia and Spain. Research and technical support were provided in Munich (YW). All group members were seasoned medical directors with a cumulative 100 years of experience in risk assessment and the development of underwriting guidelines. Clinical backgrounds included family medicine, rheumatology, obstetrics and gynecology, internal medicine and clinical epidemiology.

MODUS OPERANDI

Our modus operandi was semi-structured at the outset, primarily consisting of email exchanges about the situation in Wuhan, as reported by our staff in China and recorded in the daily WHO bulletins. We simultaneously

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created collaborations with the many other internal groups studying the pandemic, to better appreciate the different content expertise areas of each. These exchanges allowed us to refine the contribution and role of the Global Medical Pandemic Group and to confirm our key deliverables. The declaration of travel advisories by different countries in February raised a series of underwriting questions for which a global response was required and constituted the first group exercise. We adopted a more structured working methodology in early March when the quantity of COVID-19 literature increased abruptly, and the number and variety of questions increased. Weekly and at times bi-weekly virtual meetings became the norm. During these calls we reviewed the evolution of the pandemic in various countries (useful websites appended below) and the mitigation approaches that were adopted. We reviewed key papers from the previous week, some in depth, to draw accurate conclusions. We divided our literature monitoring efforts into 3 streams: 1) epidemiology, 2) disease complications and 3) treatments/vaccine development. Streams were assigned to group members based on individual expertise. However, as each country required broad local medical expertise, it was imperative that all members remain abreast of the entire pandemic spectrum. Thus, literature perusal was not segmented. Rather, as members discovered relevant publications, these were channeled to the point person responsible for the area. Publications that were judged to be particularly important in any area were further circulated to all for comment and usually discussed at our weekly or bi-weekly meetings. Conclusions of the group were communicated informally and formally to chief underwriters and other relevant groups.

The volume of COVID-19 publications posed a unique problem. In early May, it was estimated that 23,000 articles had been published since January. It was also estimated that 4000 articles were being published weekly at that point.[3] This clearly surpassed the ability of a small group to remain abreast of all developments, other than at a high level. Preprints, whose number exploded during the early months of 2020, were the favoured route of many researchers to disseminate information rapidly. Preprints posed the dual challenge of being both numerous and of lacking peer review. Further, in recognition of the scale and urgency of the pandemic, nearly all COVID-19 publications were made available without subscription or charge. The result was a barrage of information arriving from many countries, describing local clinical experience. Added to this was an avalanche of writing from expert groups ranging from virologists, immunologists, basic scientists, vaccinologists and public health experts, to modelers, medical historians and futurologists. While much of this input was invaluable, there was a surfeit of uncritical writing. Not surprisingly, popular media, always looking for a sensational headline, were often guilty of opportunistic and inaccurate reporting. In this quest, preprints provided the ideal fodder. Such reporting inevitably generated queries that were channeled to the medical group for clarification and opinion.

In this research monitoring effort, we collaborated with the team responsible for Predictive Analytics who, in addition to perusing the COVID-19 literature, were also investigating mortality claims data to better understand the pandemic's impact on an insured population. Elevated body mass index (BMI) was a particular focus of the analytics group, as early studies suggested that elevated BMI was associated with increases in both mortality and morbidity. Careful ongoing collaborative scrutiny of the literature helped to ultimately refine this observation, confirming the association of higher ranges of BMI with both mortality and morbidity. In discussing the medical relevance of confounding variables, the Global Pandemic Group was able to contribute to both the analyses and conclusions of the analytics group.

Although our group had broad medical expertise, tracking a pandemic was a

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first for all of us. In addition to learning about a brand-new medical condition, we had to become quickly familiar with topics such as SARS-CoV-2 incubation periods, transmission routes, asymptomatic and presymptomatic infections, immunity following infection, case fatality rate (CFR), infection fatality rate (IFR), R0, Rt, spike protein and the concept of viral waves, to name but a few.

A further challenge was the speed with which knowledge was changing. This ranged from the sequence of the viral spike protein, to the behavior of SARS-CoV-2 to the utility of mask-wearing to the progress of vaccine trials. At the outset, in an effort to keep up to date, we attempted to develop a database of important publications. We quickly realized that updated information on virtually any aspect of the pandemic was readily accessible on different websites and that an in-house database would, therefore, be redundant.

KEY QUESTIONS

Amongst the many questions that COVID-19 was generating in the months of January and February, two questions were of particular interest to life insurers:

1. What will be the impact of the pandemic on the in-force portfolio?
2. Should the underwriting of new applicants be modified?

What will be the impact on the in-force portfolio?

This first question was initially the more important as a pandemic with exceptionally large mortality could potentially render insurers insolvent, making the second question irrelevant. On the other hand, if mortality losses were within pandemic preparation scenarios both questions were material.

Early data from China suggested that most symptomatic COVID-19 cases developed mild or moderate symptoms. In about 15% of cases, the disease was severe and the overall case fatality ratio (CFR) — the number of deaths divided by the number of confirmed cases — was estimated at about 5%. The number of deaths would then depend on the number of individuals contracting the SARS-CoV-2 virus, or the denominator in the CFR calculation. The Wuhan experience provided a preliminary estimate of the denominator and thus permitted an early estimate of general population mortality.

However, this estimate was highly dependent on the likelihood that the Chinese experience would be replicated in other countries. The confinement measures adopted in China were extensive, strictly observed and appeared to be effective. Would other countries adopt similar approaches and would they be equally effective? Or would better understanding of SARS-CoV-2 characteristics such as transmission route and incubation period curtail spread in other countries? Or indeed, might antivirals or other treatment modalities be effective and thus limit mortality? Given the uncertainty around many of these questions, initial assessments of general population mortality covered wide ranges.

While the assessment of mortality in the general population was of key interest, the estimate of impact on an insured lives portfolio also depended on the demographics of individuals contracting COVID-19 and, more importantly, those succumbing to the illness. Early reports from China had provided a preliminary assessment of the mortality risk factors: most deaths had occurred in older individuals and in individuals with chronic illnesses. Deaths in younger individuals and those in good health appeared to be uncommon. Based on these reports, subsequently validated by European reports, most insurers had completed an early estimate of the expected portfolio impact. And while the impact varied depending on portfolio characteristics, for most insurers the impact was deemed to be manageable and within the contingency limits that had been established for rare events such as a pandemic.

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The CFR as a measure of the pandemic's severity was continually debated. The WHO noted that in the early stages of the pandemic countries had reported CFRs ranging from 0.1% to 25%.[4] As the pandemic evolved, it became evident that many SARS-CoV-2 infections were asymptomatic or pre-symptomatic, perhaps as many as 40% for the former. The CFR was not capturing such individuals in its denominator. Data from serologic surveys provided infection fatality ratios (IFRs) — the number of deaths divided by the total number of infections, including asymptomatic — of 0.5-1%.[5] Measurement of IFR added substantially to our overall understanding of the pandemic's severity.

As COVID-19 mortality increased, its impact on all-cause mortality became an additional focus of attention. Questions arose such as: had deaths due to other causes declined due to confinement or other unknown factors? Or, had reduced access to healthcare during confinement resulted in worsening mortality due to other conditions? Or put differently, had "excess deaths" occurred during the pandemic months? Comparisons to historical death rates provided contrasting results. In some countries the impact appeared to be small; in others, as many as 10%-50% more deaths were observed.[6] Many of these were probably COVID-19 related deaths that were not correctly attributed. However, excess deaths could also be explained by reduced healthcare, whether due to diminished access, fear of visiting a hospital setting, neglect, or other social and economic reasons. At the time of writing, the true COVID-19 related death count is still being debated.

Should the underwriting of new applicants be modified?

The initial underwriting concern was the risk of contracting COVID-19 during travel to China and as the pandemic evolved, travel to other countries. Many insurers opted to impose travel exclusions to address this risk. These exclusions typically reflected travel advisories issued by national authorities such as the US Centers for Disease Control and Health Canada. Similarly, applicants returning from travel to affected areas were often required to provide evidence of good health, usually following a delay period corresponding to COVID-19 incubation periods.

As the pandemic unfolded the underwriting focus shifted to the question of whether current underwriting guidelines were adequately capturing COVID-19 risk. Healthcare workers had suffered higher rates of infection than other population groups likely reflecting their extreme front-line working conditions, including a shortage of personal protective equipment (PPE). Inevitably, this raised the difficult question of whether healthcare workers should be charged more for life insurance – perhaps justifiable from a pure risk perspective, but a morally charged option during a pandemic.

Early reports from China and subsequent reports from Europe had noted that most deaths occurred at older ages and in individuals with co-morbid illnesses such as diabetes, obesity, and cardiovascular diseases. While this was key information, it became imperative to quantify the impact of each on prognosis and to assess whether this impact was adequately addressed in current underwriting manuals. The medical group spent considerable time evaluating the additional quantum of risk that each of these factors added to baseline COVID-19 risk. As additional data was published, including good cohort studies that used multivariate analysis to estimate relative risks, a better handle on the mortality risk factors, and the degree of their impact, became clearer. At this point a better assessment of the accuracy of current underwriting guidelines could be made.

In addition to answering the questions mentioned above, various members of the Global Pandemic Group were also involved in more general discussions about the corporate pandemic response. These discussions varied depending on country and local circumstances.

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In North America, applications for insurance decreased precipitously following confinement, reflecting the multiple constraints on the application process ranging from restrictions on broker and paramedical staff mobility to reduced access to attending physician statements and fluid testing. The latter was accentuated by the decision of some insurance laboratories to close temporarily. Direct insurers came under pressure from brokers to keep business operating as normally as possible. This included requests to increase policy face amounts that could be issued without supplemental medical evidence. The imperative of the direct insurers was to remain responsive to applicant needs, particularly at a time of heightened importance of life insurance. In turn, direct insurers looked to reinsurers to support these initiatives. The imperative of the reinsurer was to support their direct client companies to the greatest extent possible while providing expert assessment of the risk involved in each initiative.

A multidisciplinary group of underwriting and medical directors, pricing and risk management experts and executive leaders met daily to evaluate these requests and to consider a series of risk mitigation approaches. Time was of the essence in these discussions, reflecting the extreme pressure that direct insurers were facing and their need for quick answers. Not surprisingly, given the substantial uncertainty about the evolution of the pandemic, a wide range of options was considered. Relatively minor initiatives included the addition of underwriting questions to address travel risk or recovery from COVID-19 infection. More substantive interventions that were considered included pricing adjustments, reduction of facultative insurance offers and increases in the acceptable face amount eligible for less comprehensive underwriting. Temporary suspension of premium payments was also considered.

A number of these proposals were quickly rejected. Almost universally, medical evidence requirements were relaxed for larger face amount policies to recognize the prevalent logistic challenges. The final changes adopted by direct insurers likely reflected their unique market pressures in addition to results of these discussions.

What will be the impact on disability and critical illness insurance?

While the initial focus of interest was mortality, the medical group also assessed the likely impact of COVID-19 on both disability and critical illness portfolios. In the early months of the pandemic, COVID-19 morbidity was poorly understood. Although cardiac, hematologic, vascular and renal complications were reported in severely ill patients, it was unclear whether these would resolve or cause long-term disabilities. Neuropsychiatric complications were also reported but the degree to which these were COVID-19 specific, rather than complications of admission to a critical care setting were unclear. Nevertheless, the early data suggested that amongst the 5% of individuals admitted to critical care units a relatively small percentage would develop physical and mental sequelae. The early assessment was thus that the overall impact on disability and critical illness would be modest. As follow-up studies of COVID-19 survivors were published, including those of mild and moderate COVID-19 infection and as the social and economic impacts became evident, the potential for a more pronounced impact on disability emerged. Comparisons with the morbidity impact from SARS, where longer-term follow-up data is available, provided a source of reference. However, COVID-19 has many unique clinical features: the hyperinflammatory immune response and multisystem involvement are amongst these. Thus, reliance on the experience of SARS or other viral illnesses to predict long-term morbidity seemed injudicious. Like the calculation of the mortality impact, the total number of COVID-19 infections in the insured portfolio would also be a major determinant of any long-term impact on both disability and critical illness

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portfolios. At time of writing, "Long COVID" has become the term to describe the protracted symptoms among COVID-19 survivors.[7] This construct is about to undergo validation via prospective cohort studies.

OTHER TOPICS WE COVERED

Multiple different questions were posed to the medical group, too numerous to list. Amongst these:

Advice to Human Resources: In February and early March, the medical group advised the Human Resources department on issues such as transmission routes, incubation periods, COVID-19 symptoms, and risk mitigation strategies. This advice helped to develop on-line information for employees on topics such as reducing social contact and handwashing. As work from home became the norm, attention turned to developing a safe "return to office" set of instructions, that incorporated advice from public health authorities and expert groups.

Mode of transmission: The mode of transmission of SARS-CoV-2 created substantial debate in January 2020 and indeed, at time of writing, it remains incompletely understood. Early cases were linked to an open seafood market in Wuhan. However, person-to-person spread was confirmed in late January, but the precise mechanism was unclear. An early study demonstrated that the virus could survive for days on different surfaces. Subsequent studies identified virus in ocular secretions, blood, stool and semen adding the possibility of multiple different routes of transmission. Ultimately, respiratory transmission through close-range contact was considered the culprit route for most infections. The medical group also examined the role of "superspreader" events and the importance of vertical transmission.

Efficacy of pharmacologic treatments: The medical group assessed the multiple treatment options that characterized the early days of the pandemic. These included the use of antivirals, azithromycin, hydroxychloroquine, non-steroidal anti-inflammatory agents, interleukin inhibitors, interferon, anticoagulation, convalescent plasma and monoclonal antibodies.

Hydroxychloroquine commanded a lot of time and attention. Curiously, its use became a political issue in the United States and presaged a protracted squabble about many aspects of pandemic management, which pitted medical science against political expedience, a scenario that few would have anticipated.

Vaccine development: Following the publication of the SARS-CoV-2 genetic sequence on January 12, 2020, the race to produce a vaccine began. Many questions were posed to the medical group: How long would it take to develop? When might it be available? What level of efficacy could be expected? Would virus mutations make the vaccine less effective? What is herd immunity and could it be achieved without the vaccine? By necessity the medical group quickly became familiar with vaccine development, including different vaccine types and vaccine trial timelines. At the time of this writing, vaccine deployment was beginning in the United States, Canada, the United Kingdom, Singapore and elsewhere.

SUMMARY

The COVID-19 pandemic presented a unique challenge for the life insurance industry. A Global Pandemic Medical Group was created to answer key questions and to provide expertise on a large array of pandemic-related queries and issues. Once the concern about the impact of the pandemic on the in-force portfolio had been answered, the most pressing question became the pertinence of current underwriting approaches to individuals with risk factors for COVID-19 mortality. The extraordinary amount of medical research, most of it non-peer-reviewed, was a substantial challenge. Frequent group discussions lead to consensus analyses of key research articles, which were subsequently reflected in underwriting guidelines.

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Widespread population confinement posed major challenges to insurance policy sales, particularly for policies requiring face-to-face meetings, attending physician statements and fluid testing. The collaborative efforts of this global group provided expert opinions on the different strategies needed to palliate these challenges. Medical directors provide unique insights during pandemic situations, by virtue of their understanding of biologic mechanisms, disease trajectories and pharmacologic interventions. Their ability to analyze large volumes of medical research that is published without traditional scrutiny is a further, critical asset. These combine to provide an essential contribution to the insurer's ability to weather a pandemic.

APPENDIX

Useful Pandemic Online Resources

1. **Pandemic tracing websites:**
   - Worldometer, www.worldometers.info/coronavirus/coronavirus-cases
   - Johns Hopkins University, https://coronavirus.jhu.edu/map.html
   - Euromomo, www.euromomo.eu
   - IHME, https://COVID19.healthdata.org
   - Metabiota, www.epidemictracker.com
   - Sero Tracker, www.serotracker.com
   - The Atlantic: www.COVIDtracking.com/data/national
2. **Core medical journals:**
   (a) NEJM, www.nejm.org/coronavirus
   (b) JAMA, www.jamanetwork.com/collections/46099/coronavirus-COVID19
   (c) Lancet, www.thelancet.com/coronavirus
   (d) BMJ, www.bmj.com/coronavirus,
   (e) Science, www.sciencemag.org/collections/coronavirus
   (f) Nature, www.nature.com/articles/d41586-020-00502-w
3. **Websites of additional interest**
   - LitCOVID, www.ncbi.nlm.nih.gov/research/coronavirus
   - bioArxiv, https://connect.biorxiv.org/relate/content/181
   - WHO, https://www.who.int/emergencies/diseases/novel-coronavirus-2019/global-research-on-novel-coronavirus-2019-ncov
   - WHO, www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports
   - Human Mortality Database, www.mortality.org
   - Prevent Epidemics, www.preventepidemics.org
   - CDC (*MMWR*), www.cdc.gov/coronavirus/2019-ncov/index.html
   - Cochrane, www.cochrane.org/coronavirus-COVID-19-cochrane-resources-and-news
   - EvidenceAlerts, https://plus.mcmaster.ca/COVID-19/
4. **Twitter**
   - @COVID19Tracking
   - @CoronavirusExperts
   - @VirusScientists

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