Analysis on the Risk of Ebola

and

An approach to Modeling the Potential Impact

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March 27, 2015
International Actuarial Association
Analysis on the Risk of Ebola

About the IAA

- Worldwide association of professional actuarial associations
  - 67 Full Member Associations
  - 29 Associate Member Associations
  - Representing 60,000+ actuaries in 108+ countries
- 7 special interest Sections for individuals
- 750+ volunteer actuaries
- Constituted in Switzerland based in Canada with 11 staff
- Exists to encourage the development of a global profession. Acknowledged as technically competent and professionally reliable. To ensure the public interest is served.
IAA Vision

The actuarial profession is:

- Recognized worldwide as a major player in the decision-making process within the financial services industry in the area of social protection and in the management of risk
- Contributing to the well-being of society as a whole.
IAA Mission

- To represent the actuarial profession and promote its role, reputation and recognition in the international domain
- To promote professionalism, develop education standards and encourage research, with the active involvement of its member associations and Sections, in order to address changing needs
Health Committee

- Represents the IAA in discussions at the international level on matters relating to health systems, with a particular focus on actuarial aspects.

- Raises the profile of health actuaries in policy debates and research on health systems.

- Supports, through IAA Member Associations, actuaries working in the health systems field, both private and public.
Analysis on the Risk of Ebola

- Paper developed by South African Company
- 2,600,000 lives covered in South Africa
- Ebola is a virus - severe, often fatal to humans
- First discovered in 1976 in Africa
- Latest outbreak first noted one year ago this month
- Primarily Guinea then to Liberia and Sierra Leone
- Most recent figures show over 24,000 reported cases with nearly 10,000 deaths
Most significant modelling aspects

- High probability of death over a relatively short period of time – on average 21 days from exposure

- Low transmission

- One directional path suggests a multi-state model fed by assumptions on transitional probabilities and mortality rates based on available data and information
Analysis on the Risk of Ebola

- Transmission Characteristics
- Highest in very poor, underdeveloped countries
- In latest African outbreak
  - Lack of basic health infrastructure
  - Burial rituals
  - Fear and mistrust of government officials in part due to recent and almost constant civil unrest
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Control through Intervention

- Advice on travel restrictions to affected countries
- Travel restrictions for foreigners from affected countries
- Local financial support to affected countries
- Assistance setting up testing laboratories in affected areas
- Setting up isolation facilities
- Training of laboratory staff in affected countries
- Supporting volunteer programs for healthcare workers to support affected countries.
Further Internal Controls by Individual Countries

Further screening for any suspicious cases based on specific clinical risk criteria with passage into next country managed by government

All public health facilities and private(?) hospital facilities tasked to appoint designated areas for impacted patients

Each suspected, probable and confirmed case would be reportable to government authorities
Role of private sector

- Collaborate with governments for the national preparedness and response plan
- Provide financial support
- Possible role for insurers to play in this
Impact on a Health Insurer

The lower transmission probabilities of an Ebola type epidemic is typically easier to contain, and typically has a less significant population mortality impact than an epidemic with lower mortality rates and higher transmission probabilities, such as a full-blown avian flu epidemic.

Thus, life insurers are more likely to be impacted to a greater degree than health insurers especially if public health facilities are more likely to be used for care.
Even if the actuary makes extreme assumptions about herd immunity (the development of immunity as the disease passes through the ‘herd’), and large influxes of Ebola positive people into a country, the modeling will typically not indicate an extreme population impact.

For actuaries working in countries where there are good national preparations for Ebola, as mentioned above, the results of the multi-state model would typically indicate that the risk to an insurer is fairly limited.
In general, for any health insurer offering a form of medical expense insurance, there are two mitigating factors even in the case of a widespread epidemic:

- There would typically be limited private hospital capacity to isolate patients so governments step up to do so.
- Hospital admission rates will most likely decrease dramatically, because everyone who can, will postpone any form of elective surgery as no-one would want to be in hospital due to the perceived risk of contracting Ebola.
- In addition, the short symptomatic period and limited techniques for treatment limits health care expenditures.
This can be represented by the following diagram:

The fundamental structure of this epidemic model is that movement occurs only in one direction.
Implicit Assumptions

- Death can only happen due to Ebola
- All persons infected will show symptoms of the virus
- No reinfection occurs if person recovers
- Once recovery occurs the person can not infect others
- Patients are only infectious once symptomatic
- These effectively contain many simplifying assumptions
- All models assumed 2,600,000 potential patients
3 initial infections and 90% of patients are hospitalized after incubation.

There will be 7 infections in total with a mortality rate of 47%.
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Analysis on the Risk of Ebola

- Low - 3 initial infections and 90% of patients are hospitalized after incubation.
- There will be 7 infections in total with a mortality rate of 47%.
Analysis on the Risk of Ebola

- 10 initial infections and 80% of patients are hospitalized after incubation.
- There will be 108 infections in total with a mortality rate of 55%.
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Analysis on the Risk of Ebola

30 initial infections and 50% of patients are hospitalized after incubation first 8 weeks, then 75% for next 8 weeks and then 90% after that.

There will be 4,900 infections in total with a mortality rate of 57%. Most like West Africa in 2014.
Analysis on the Risk of Ebola

- 30 initial infections and 50% of patients are hospitalized after incubation first 8 weeks, then 75% for next 8 weeks and then 90% after that.

- There will be 4,900 infections in total with a mortality rate of 57%. Most like West Africa in 2014.
30 initial infections and 50% of patients are hospitalized after incubation first 8 weeks, then 75% for next 8 weeks and then 90% after that.

There will be 4,900 infections in total with a mortality rate of 57%. Most like West Africa in 2014.
30 initial infections and 50% of patients are hospitalized after incubation throughout with a limitation of hospital beds introduced at 3,000 beds.

Everyone will be infected with a mortality rate of 79%. Extremely unlikely.
## Analysis on the Risk of Ebola

### Very High Model - Cumulative Mortality and Infections

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Key findings of Ebola study

- Low transmission coupled with high probability of infection
- Boarder control is critical for controlling the disease
- Health insurers have limited exposure particularly in well-developed countries like the United States
  - In addition, to the extent that care is provided through public facilities the financial impact on the insurers is limited
  - The very short infectious period and limited treatment ability limits the ultimate cost
Questions