Systems Thinking and Synergy

Mary Tobin, ACRES

Martin Kohn, MedPredixAI, LLC and Wake Forest

System Overload

Functioning System at Work

Safety: An Example of Why We Need a Global System for Clinical Research and Healthcare

Statistics on Air Transport Safety With a Global System

System based on 10,500 Universally Applied Standards and Recommended Practices**

# of Airline Passengers (2014)*	**3.3 billion**
# of Accidents (2014)**	402
# of Passenger Deaths (2014)*	**761**

* IATA **"***Strong Demand for Air Travel Rises in 2014***"**
** ICAO correspondence

Statistics on Drug Safety when Clinical Research and Healthcare are Conducted Without a Global System

Non-System resting on Non-integrated, Inconsistently Applied ICH Guidance, Best Practices and GCPs

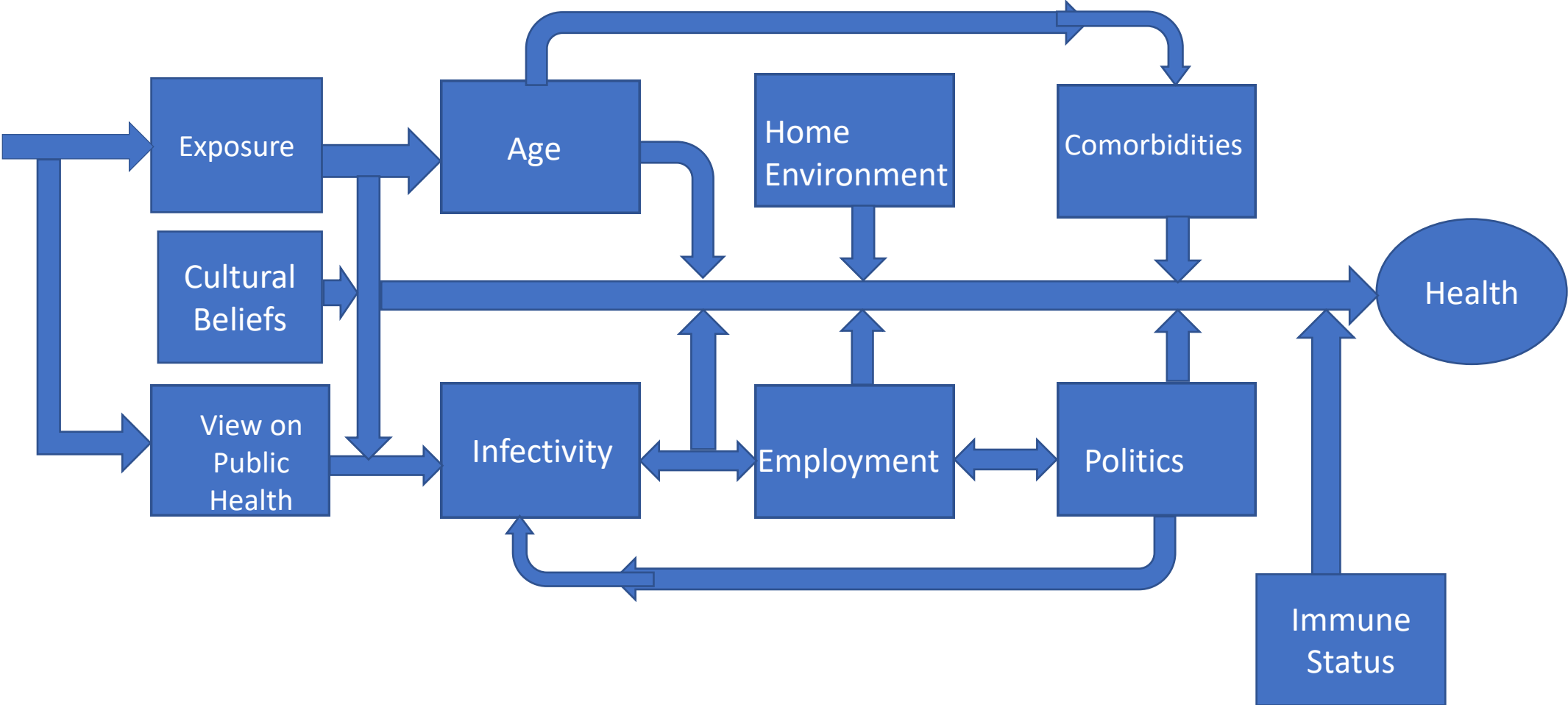|	
# of Prescriptions Written (USA2014)*	**4.0 Billion**
# of Serious Adverse Events(USA2014)****	807,270
# of Resulting Patient Deaths (USA-2014)**	**123,927**

*** *Estimates are USA represents 50% of prescriptions written*
****FDA FAERS Reporting by Patient Outcomes by Year*

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Healthcare is a Complex System

- Simple – easy to manage with existing methods

- Complicated – difficult, but amenable to rules and procedures
    - *Outcome of randomized control trial*
    - *Safety procedures – contact tracing, checklists*

- Complex –
    - *very difficult, too many unknowns, unpredictable interactions*
        - Lack of response to preferred treatment
        - Fix one thing, another breaks (anti-stall feature of 737MAX)
    - *Possible solution*
        - Empirical observation to quantify components of your model
        - AI to identify patterns for study and inference
        - Progressively include more data types to approach personalization

Health System Map

System Thinking and Personalized Decisions

■ Personalized healthcare decisions – study the influence of all components of your system model on the outcome

- – *Better manage patients with multiple chronic diseases*
  - ■ Most guidelines are disease oriented
  - ■ No controlled studies for treating patients with multiple problems
- – *Define longer term outcomes – healthier patient in 5 years*
- – *Decision support is, in part, prediction*
  - ■ Who will benefit from this intervention, who will have an adverse response
  - ■ Who will have a beneficial immune response to Covid19, who will have a cytokine storm

To Be Continued ….. In 2021

ACRES Synergy II Conference

Continuing the Discussion on the Application of Systems Approaches To Health Care and Clinical Research

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