Title Slide: COMPUTER SIMULATION MODELS AND MULTILEVEL CANCER CONTROL INTERVENTIONS

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Slide 2: Computer Simulation (CS)

- Our paper focuses on CS as a useful tool for developing and evaluating multilevel cancer interventions
- CS = computer-based representations using mathematics, rules, and logic to portray cancer and the dynamic multifaceted influences of cancer processes over the lifetime of the organism or system

Slide 3: Varieties of Simulations

Models vary on four attributes
1. Stochastic or deterministic?
2. Steady-state or dynamic?
3. Continuous or discrete?
4. Local or distributed?

Slide 4: Simulation Targets

- Policy options, choices, and resource allocations
- Provider organization strategies
- At-risk populations as aggregates
- Individual risk within populations
- Events

- Beneath the skin (biological levels)
- Multilevel interactions

Slide 5: Why Simulate?

Practical Reason

- Allows numerical or "virtual" experiments when real ones are not feasible
- Can bridge "above the skin" (social-ecological variables) and "below the skin" (biological variables) influences
- Way to combine multiple data sources and time periods to create realistic estimates to inform policy making as well as individual patient choice

Theory/Discovery Reasons

- Heuristic tool to generate "what-if" scenarios, hypotheses, and theories about mechanisms
- Help identify most powerful "leverage points" to improve system outcomes
- Identify gaps most likely to alter intervention decisions or to estimate the value of obtaining better information

Slide 6: Cancer Control Simulations

Not new; CISNET has led many advances
But most current models deal only with 1-2 vs. 3 or more levels
We profile four cancer models and suggest how they can be expanded to multilevel:
1. Tobacco control (SimSmoke)
2. Colorectal cancer screening (MISCAN-colon)
3. Cervical cancer screening (Goldie)
4. Breast cancer racial disparities (Mandelblatt)

Slide 7: Challenges 1: Methods

- Much of the data needed to measure causal relationships for complex multilevel modeling do not exist or are fragmented
- Limited understanding of how to integrate data and measure interactions between patients-providers-policies and then validate results
- More efficient computational algorithms and distributed computer networks
- Substantial learning curve here for the modeler

Slide 8: Challenges 2: Structural

- Requires multi-disciplinary teams
- Shortage of training programs specific to cancer, other health conditions
- Lack of grant review and funding infrastructure specific to modeling disciplines
- Some promising developments from NIH Office of Behavioral & Social Science Research

Slide 9: Challenges 3: Communication

- Need for common language across diverse disciplines for describing and shaping multilevel simulation modeling
- Need to create a 'learning community', such as CISNET, for multilevel modeling that can push the envelope of convention and orthodoxy in cancer research

Slide 10: Discussion Question

How can we get target audiences to trust multilevel model results and
to use them in personal decision-making, clinical practice, and the support of cancer control interventions?

Slide 11: Discussion Question

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