A Simulation Model of the Financial Viability of Screening, Brief Intervention, and Referral to Treatment in the United States

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When evaluating a model, at least two broad standards are relevant. One is whether the model is consistent with the data. The other is whether the model is consistent with the "real world."

Kenneth A. Bollen, Structural Equations with Latent Variables

Acknowledgments

FUNDING

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- Numerous contributors from SAMHSA's Center for Substance Abuse Treatment

DATA

First cohort of State grantees

- California
- Cook Inlet Tribal Council in partnership with Southcentral Foundation (Alaska)
- Illinois
- New Mexico
- Pennsylvania
- Texas
- Washington

Background

- Research Question: for a Screening, Brief Intervention (SBI) and Referral to Treatment (SBIRT) program in the United States …
  - … under what organizational and client characteristics will revenue be greater than or equal cost?
- In the United States, SBIRT funding is largely a mix of government grants and service reimbursement (insurance claims)
  - Discretionary grants → last 1-5 years, establish and expand programs; Block grants → limited in size, scope
  - Service reimbursement → main source for ongoing funding

Background (cont'd)

- Data required on program revenue and program cost
- One large-scale study on SBIRT costs (ours)
  - Costs vary. Screening: $1.50 - $5.85. BI: $5.53 - $9.15. BT: $17.27 - $22.89. RT: $1.78 - $11.50
  - Variance in cost because of differences in staffing (e.g., doctor vs. behavioral health counselor) and setting (e.g., emergency department [ED] vs. outpatient clinic)
- No studies to date focus on financing and revenue for SBI/SBIRT in the United States

Data

- SAMHSA funded study of its grantees
  - Grants were limited time. Grantees encouraged to sustain
  - Several cohorts. We use data from cohort 1
    - 7 grantees, data from 2008-2010
  - Study collected data on cost, utilization, and funding
- Setting
  - Services provided in inpatient, outpatient, Emergency Department (ED)
  - SBIRT delivered by two staff types generalists (e.g. nurse practitioner) and specialists (e.g. behavioral health coach)

Data (cont'd)

- Model parameters from 5 sources

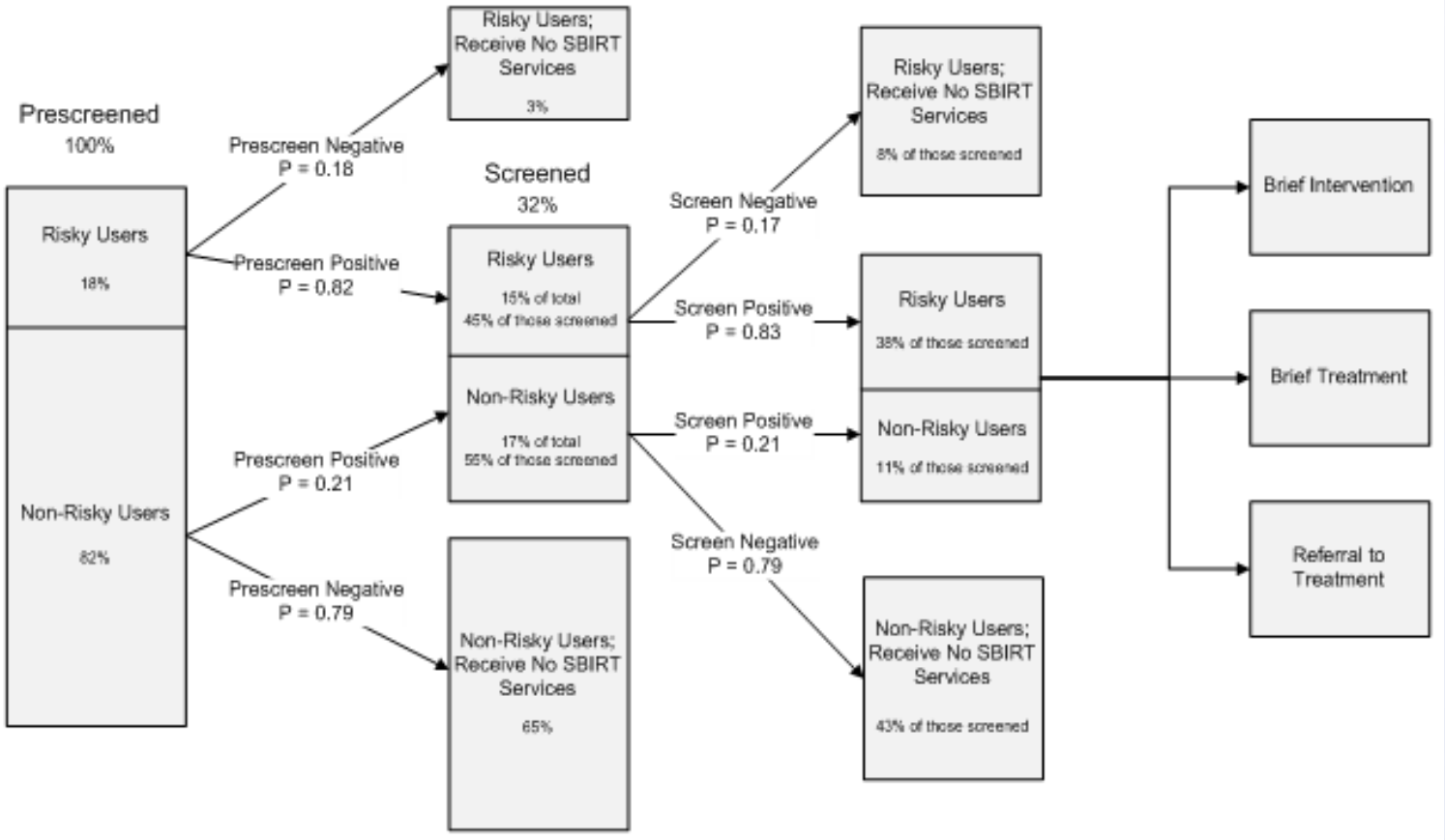
Parameter Type	Source
Cost of services	Primary data, from study
Number of services provided	Program data, from study
Prevalence of hazardous use & other population characteristics	Literature
Client and provider characteristics	Observation from study, and experience-driven assumption
Reimbursement rates	Published sources

Data (cont'd)

Parameter	Estimate (approximate value)
Prescreen : screen	3:1
Screen : BI	3 – 4
Length of pre-screen	0.9 min
Length of screen	4 – 14 min
Length of BI	12 – 22 min
Generalist service delivery availability	20%
Specialist service delivery availability	80%
Proportion patients covered by insurance	50% (67% of which is public insurance)

Analysis

- Linear programming: construct an algorithm and solve it algebraically



Analysis (cont'd)

- Key features of the model
  - Program incurs costs of generalists only when they are performing SBIRT activities, whereas it incurs costs of specialists regardless
  - Either generalists or specialists may deliver screening and the first BI, and only specialists may deliver follow-up BI, BT, and RT
- Output describes by setting
  - How many screens & staff needed so that revenue = cost
  - For each combination of staff, maximum program surplus
- Sensitivity analysis
  - Varied % patients insured & quasi-fixed administrative costs

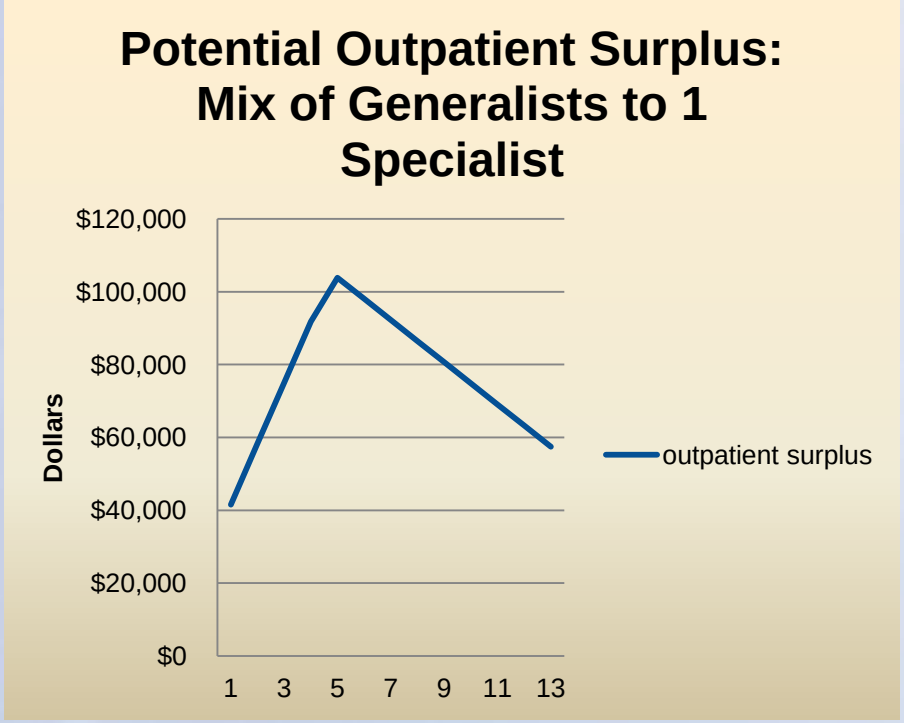
Results

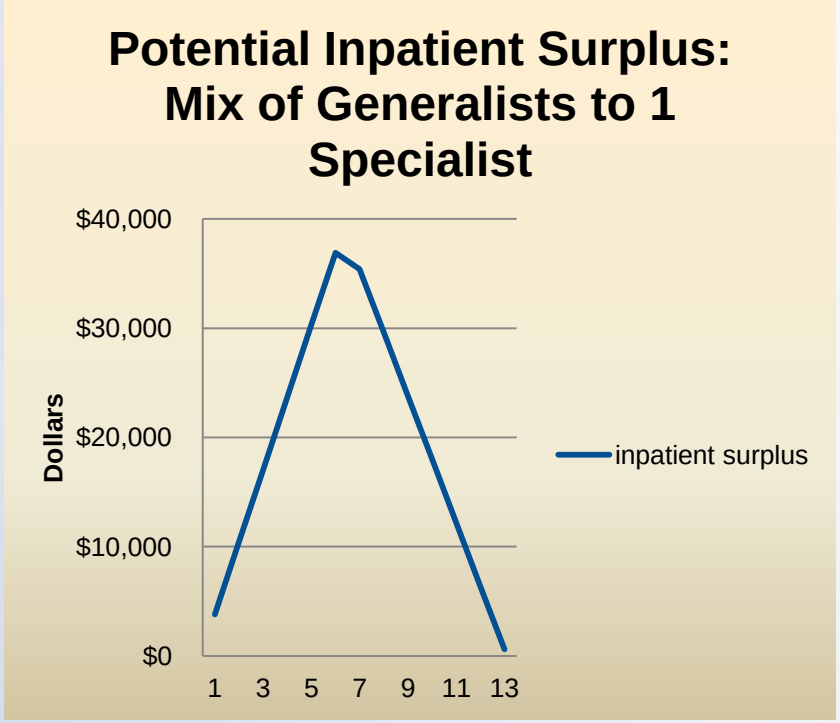
- Number of annual screens so that revenue = cost
  - Variety of staffing mixes can be sustained
    - E.g. Range of the minimum number of screens per year for a program with one specialist: 2,852 (inpatient) to 3,156 (ED)
  - Exceptions are staffing mixes with a large proportion of generalists (e.g., a mix of 13 generalists and 1 specialist gives negative surplus)
- Maximizing surplus
  - Varies across the three settings, with highest potential surplus in the outpatient setting
    - Outpatient highest because in that setting, the estimated time to complete patient screens was lowest

Results (cont'd)

- Adding specialists to a given number of generalists increases maximum program surplus
- Adding generalists to a given number of specialists at first increases maximum program surplus, but this peaks
  - E.g. inpatient: 5 generalists & 1 specialist more surplus than 6 generalists & 1 specialist
- Sensitivity analysis:
  - Varying the % of patients covered by insurance is key
  - The range of sustainable screens is quite small for inpatient and relatively large for outpatient

Results (cont'd)





Conclusions

- A large variety of configurations of generalists and specialists could be used to run a viable SBIRT program in both outpatient and ED
- Meeting patient flow targets may be problematic for the inpatient setting
- Solutions?
  - Increase patient flow. Conduct universal screening with no prescreening?
  - Use an on-call staff system. If a hospital has SBIRT in an ED or outpatient setting, practitioners based in these settings may be able to cover any low flow inpatient setting

Limitations and Next Steps

- Deterministic model
  - No estimating variance
  - Many simplifying assumptions
  - Not validated or calibrated
  - Data limitations – restricted to within-sample inference
- Next steps
  - Currently developing discrete event simulation model
    - Similar to—but not the same as—Markov model
  - Includes more real world features
    - Window for patient interaction that is inconsistent and limited
    - Engaged patients may return at a later time for additional services
    - Practitioners may balance SBIRT service delivery and other responsibilities
    - Missed service opportunities and slack in staff time
    - Variation from estimation error

More Information

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