Superbugs vs. Outsourced Cleaners: Employment Arrangements and the Spread of Healthcare-Associated Infections

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Summary in a Single Slide

- **Dual Phenomena**
  - Healthcare-associated infections are prevalent, injurious, costly—and preventable.
  - The workers best-positioned to halt the spread of HAIs are often outsourced.

- **Findings**
  - The intensity with which a hospital outsources housekeeping (or EVS) is positively associated with its incidence of C. diff.

- **Implications**
  - The results suggest to healthcare administrators and policy works to look beyond clinical, technical, and micro features when considering patient safety.
  - Implication that deficiencies in worker voice are partially to blame for the infection epidemic.
Practical Motivation: Attack of the Superbugs

- Hospital-acquired infections (HAIs)
- Healthcare-associated infections (HAis)
- Nosocomial infections
- "Superbugs" – infection caused by antibiotic-resistant bacteria whose development is favored by a hospital environment, such as one acquired by a patient during a hospital visit.

CLEANING UP: Why Hospitals Fail at Preventing Infections and What You Can Do About It

- Methicillin-resistant Staphylococcus aureus (MRSA)
- Vancomycin-resistant Enterococcus (VRE)
- Clostridium difficile (C. diff)

- 1 in 25 hospital patients has ≥ 1 HAI (Magill et al. 2014).
- 75,000 deaths/year during their hospitalizations (Magill et al. 2014).
- Estimated $33.8 billion direct medical costs to U.S. hospitals (Scott 2009).

- Broad consensus as to proximal cause...

Hospitals are not kept clean enough.
Theoretical Motivation: Outsourcing Hospital Cleaners

- Lack of long-term employment expectations
  - less citizenship behavior (Starrer and Masterson 2002)
  - less likely to seek performance feedback (Ashford et al. 2003)
  - less likely to be object of training investments (Schein 1999)
  - less organizational commitment (Auger et al. 2011)
  - more likely to be treated and to perceive themselves as organizational outsiders (Kunda et al. 2002)
    - excluded from communication and coordination structures (Gersick 2009)

- "Flexible" or "low road" work arrangements ≠ voice- or discretion-enhancing practices
  - Workers more likely to choose the absence of voice opportunities (Freeman and Medoff 1984; Hirshman 1971)

- Flexible staffing arrangements for high-skilled members of the care team erode patient outcomes (Alien et al. 2003)

- Zubiri (2013) shows outsourced cleaners were
  - overworked and understaffed
  - undertrained
  - under-supervised and poorly monitored

From a Theory to a Hypothesis

Theory

\[ \uparrow \text{EVS outsourcing} \rightarrow \uparrow \text{HAIs} \]

- Outsourcing reduces or hinders
  - EVS worker attachment and commitment
  - hospital control over EVS work and workers
  - training and human capital investments
  - communication and coordination

Hypothesis

\[ \uparrow \text{purchased EVS services total EVS direct costs} \rightarrow \uparrow \text{C. diff. cases} \]
**Dependent Variable: C. Diff. Cases**

**What You Need to Know:**

*Clostridium difficile* (aka *C. diff.)*...

- Of all superbugs, the most likely to thrive in unclean hospitals.
- Lingers on sheets, floors, toilets, and other surfaces.
- Flourishes in dryness.
- Thrives in alcohol-based hand sanitizers.
- But...quivers and dies in the face of proper cleaning.
- Symptoms?

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**Dependent Variable: C. Diff. Cases**

Reported Cases of *Clostridium Difficile* (C. Diff.)

![Bar chart showing number of "hospital-onset" cases of C. diff. in 2012.](chart.png)

- **Mean (μ)**: 27.5
- **Standard Deviation (σ)**: 32.9

Source: California Department of Public Health

Note: Sample encompasses 8,667 total cases; reported across *n* = 237 hospitals. Source: California Department of Public Health.
**Independent Variables**

- EVS purchased services as a share of EVS total direct expenses
- EVS total direct expenses
- Case mix index
- Total beds
- For-profit
- Urban
- Academic
- Readmissions post-heart attack
- Patient satisfaction

**Empirical Strategy (in 3 Bites)**

1. **Split sample difference-in-means**
   - Treat C. *diff.* as binary.
   - Examine outsourcing measure in C. *diff*-positive vs. C. *diff*-free hospitals.

2. **Logistic regression**
   - Treat C. *diff.* as binary.
   - Regress binary C. *diff.* measure on outsourcing and controls.

3. **Zero-inflated negative binomial regression (ZINB)**
   - Treat C. *diff.* cases as a count measure.
   - Regress C. *diff.* count on outsourcing and controls.
Results

Observed Mean Share of Housekeeping Expenses Exhausted by Purchased Services

\[ t = 3.32 \ (p < .001) \]

purchased services as a share of total direct expenses for housekeeping

Results

Estimated Logs of the Probability that a Hospital Reports One or More C. Diff. Cases

<table>
<thead>
<tr>
<th></th>
<th>Model #1</th>
<th>Model #2</th>
<th>Model #3</th>
<th>Model #4</th>
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</thead>
<tbody>
<tr>
<td>ln(EVS purchased services share)</td>
<td>.82***</td>
<td>.28***</td>
<td>.24***</td>
<td>(2.12)</td>
</tr>
<tr>
<td></td>
<td>(6.47)</td>
<td>(2.68)</td>
<td></td>
<td></td>
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<tr>
<td>ln(total EVS expenses)</td>
<td>1.64***</td>
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<td>1.24***</td>
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<tr>
<td></td>
<td>(5.51)</td>
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<td>(3.08)</td>
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<tr>
<td>ln(total beds)</td>
<td>1.65***</td>
<td></td>
<td>.88**</td>
<td></td>
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<tr>
<td></td>
<td>(4.74)</td>
<td></td>
<td>(2.09)</td>
<td></td>
</tr>
<tr>
<td>ln(case mix index)</td>
<td>.62**</td>
<td></td>
<td>1.92*</td>
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<tr>
<td></td>
<td>(2.37)</td>
<td></td>
<td>(1.77)</td>
<td></td>
</tr>
<tr>
<td>for-profit</td>
<td>1.32</td>
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<tr>
<td></td>
<td>(1.42)</td>
<td></td>
<td>(0.86)</td>
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<td>1.00</td>
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<td>(1.41)</td>
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<td>academic</td>
<td>-.22</td>
<td></td>
<td>.82</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.37)</td>
<td></td>
<td>(1.21)</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Coefficients (and t-statistics) from logistic regression. Key: **p<.10, ***p<.05, ****p<.01.
Results

Probability of One or More Cases of C. Diff. as a Function of the Share of Housekeeping Expenses Exhausted by Purchased Services

Estimated ZIP Count of the Number of C. Diff. Cases Reported by a Hospital
Results

Predicted Count of C. Diff. Cases as a Function of the Share of Housekeeping Expenditures Exhausted by Purchased Services

Some Challenges

- Is the problem outsourcing per se. or outsourcing done poorly?
- How generalizable are these results?
- How reliable is an “accounting” measure of outsourcing?
- How concerned are you that your evidence is tested on cross-sectional data?
- How can you infer the mechanisms by which outsourcing is driving infection rates?
Key Takeaway

Controlling for a hospital’s structural characteristics and patient case mix, the intensity with which a hospital outsources housekeeping (or EVS) is positively associated with its incidence of *C. diff.*

Ongoing Research

- in-depth case study
- large-sample statistical analysis

St. Joseph’s Hospital Health Center

Medicare.gov

AHRQ

Hospital Compare

HOSPITAL SAFETY SCORE

Bloomberg BNA

American Hospital Association
Implications for Policy & Practice

- Look beyond the clinical, the technical, and the micro.
- Mitigate outsourcing’s downsides.
  - Introduce structures and processes for evoking worker voice
- Might the NLRB’s “joint employer” decision actually be welfare-enhancing?
- Structure incentives to reward fewer HAIs rather than lower costs.
  - “They’re only cleaners...?”
  - Hospitals exemplify the classic cynic...

Thank You!

“[One] who knows the price of everything and the value of nothing.”

Oscar Wilde
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Theoretical Motivation: Nonstandard Employment Arrangements for “Peripheral” Workers

- Some workers too important to be left unprotected from market forces (Thompson 1967).
- “Core competence” orientation shifts core-peripheral distinction from descriptive to prescriptive.
- Employers make a strategic choice based on flexibility needs and feasibility (David Blake and Uzzi 1992; Kale and Pettigrew 2000).
- Advent of “HR Architecture” concept for categorizing employers’ orientation(s) to their workforce (Lepak and Siret 1999, 2002).
- Along comes the “Fissured Workplace” (Wel 2014).
Robustness Check I: “How reliable is an ‘accounting’ measure of outsourcing?”

Hospitals that rely exclusively on outside workers to staff and manage the entire EVS function

\[ 0.85 < \frac{\text{Purchased EVS services}}{\text{Total EVS direct costs}} > 0.97 \]

Hospitals that rely mainly or exclusively on their own employees to staff and manage the entire EVS function

\[ 0.01 < \frac{\text{Purchased EVS services}}{\text{Total EVS direct costs}} > 0.22 \]

Christina Frye, PhD candidate
University of Illinois at Urbana-Champaign

Robustness Check II: “How can you rely on cross-sectional data and still sleep at night?”

<table>
<thead>
<tr>
<th>Term</th>
<th>Model #1</th>
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<th>Model #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>In(.security purchased services share)</td>
<td>0.04 (0.03)</td>
<td>0.04 (0.03)</td>
<td>0.09 (0.70)</td>
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<tr>
<td>In(.total security expenses)</td>
<td></td>
<td></td>
<td>1.06** (2.14)</td>
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<tr>
<td>In(.EVS purchased services share)</td>
<td>0.34** (2.12)</td>
<td>0.30* (1.79)</td>
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</tr>
<tr>
<td>In(.total EVS expenses)</td>
<td>1.24*** (3.08)</td>
<td>1.13* (1.90)</td>
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</tr>
<tr>
<td>In(.total beds)</td>
<td>0.88** (2.09)</td>
<td>0.86 (1.50)</td>
<td>1.18** (2.44)</td>
</tr>
<tr>
<td>In(.case mix index)</td>
<td>1.92* (1.77)</td>
<td>0.81 (0.54)</td>
<td>-0.19 (0.14)</td>
</tr>
<tr>
<td>forprofit</td>
<td>0.55 (0.88)</td>
<td>1.73* (1.72)</td>
<td>1.60 (1.62)</td>
</tr>
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<td>academic</td>
<td>-0.82 (1.21)</td>
<td>-0.27 (0.28)</td>
<td>-0.31 (0.34)</td>
</tr>
</tbody>
</table>

Estimated Logits of the Probability that a Hospital Reports One or More C. Diff. Cases

Note: Coefficients (and t-statistics) from logistic regressions. Key: *p<.10, **p<.05, ***p<.01.
Robustness Check II: “How can you rely on cross-sectional data and still sleep at night?”

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<tr>
<td></td>
<td>Inf.</td>
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<td>ln(security purchased services share)</td>
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<td>-1.05**</td>
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<tr>
<td></td>
<td>(-1.98)</td>
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<tr>
<td>ln(total security expenses)</td>
<td>.05**</td>
<td>.05**</td>
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<td></td>
<td>(1.98)</td>
<td>(1.88)</td>
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<tr>
<td>ln(EVS purchased services share)</td>
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<td>(-1.75)</td>
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<td>ln(total EVS expenses)</td>
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<td>(6.43)</td>
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<tr>
<td>ln(total beds)</td>
<td>.36***</td>
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<td>(3.46)</td>
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<td>ln(case mix index)</td>
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<td>(5.54)</td>
<td>(5.30)</td>
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</tbody>
</table>

Notes: Coefficients (and p-values) from ZIB regressions. All models include controls for urban vs. rural, for-profit status, and academic status.  
* p<.10, ** p<.05, *** p<.01

Implications for Research

- Challenges the central thesis of core-periphery/HR architecture/externalization frameworks
- Occasions a critique of these literatures
  - Account for differences in...
    - Labor market power.
    - Social interdependence of work.
  - Ask how many inessential jobs still exist.
  - Consider the possibility of reverse causality.
  - Clarify researchers’ orientation as positive or normative.