



STANFORD
SCHOOL OF MEDICINE

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THE ROLE OF ACUTE HEALTH SHOCKS IN THE EVOLUTION OF PERMANENT DISABILITY

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Motivation

- While changed employee incentives and improved population health have resulted in longer work-life, disability claims are also rising at all ages
- It is possible the rise in claims represent a perverse response to the same incentives, combined with impact of the macro-economy but less clear are the roles of health and job characteristics
- Health can be conceptualized as a chronic life trajectory interrupted with “shocks”= hospitalizations or periods of STD
- Questions we are addressing are: 1) whether these shocks in and of themselves, accelerate the process and 2) whether there is evidence to support interventions around prevention of hospitalization, post-shock incentives or rehabilitation
- A sub-question is whether employees doing (physically) different types of jobs may respond differently

Background

- Dutch evidence that acute shocks are important but unable to test hypothesis that the “shocks” are merely surrogates for declining health
- Few datasets available in which specific job and individual level baseline health are observed, and relevant economic outcomes are available in administrative form
- In US problem is compounded by diverse private incentives

Workplace Safety & Environment

- Injury experience
- Hygienus workplace samples
- Job Demand Survey
- Production/Quantity & Quality by month
- Community Health Indices (Census/BRFSS)
- Employee Engagement Survey

Financial

- Payroll (hours)
- W-2's
- 401K and Pension
- Housing Values
- Links to SSA-household earnings, life-work and disability

Stanford-Yale Alcoa Data Vault



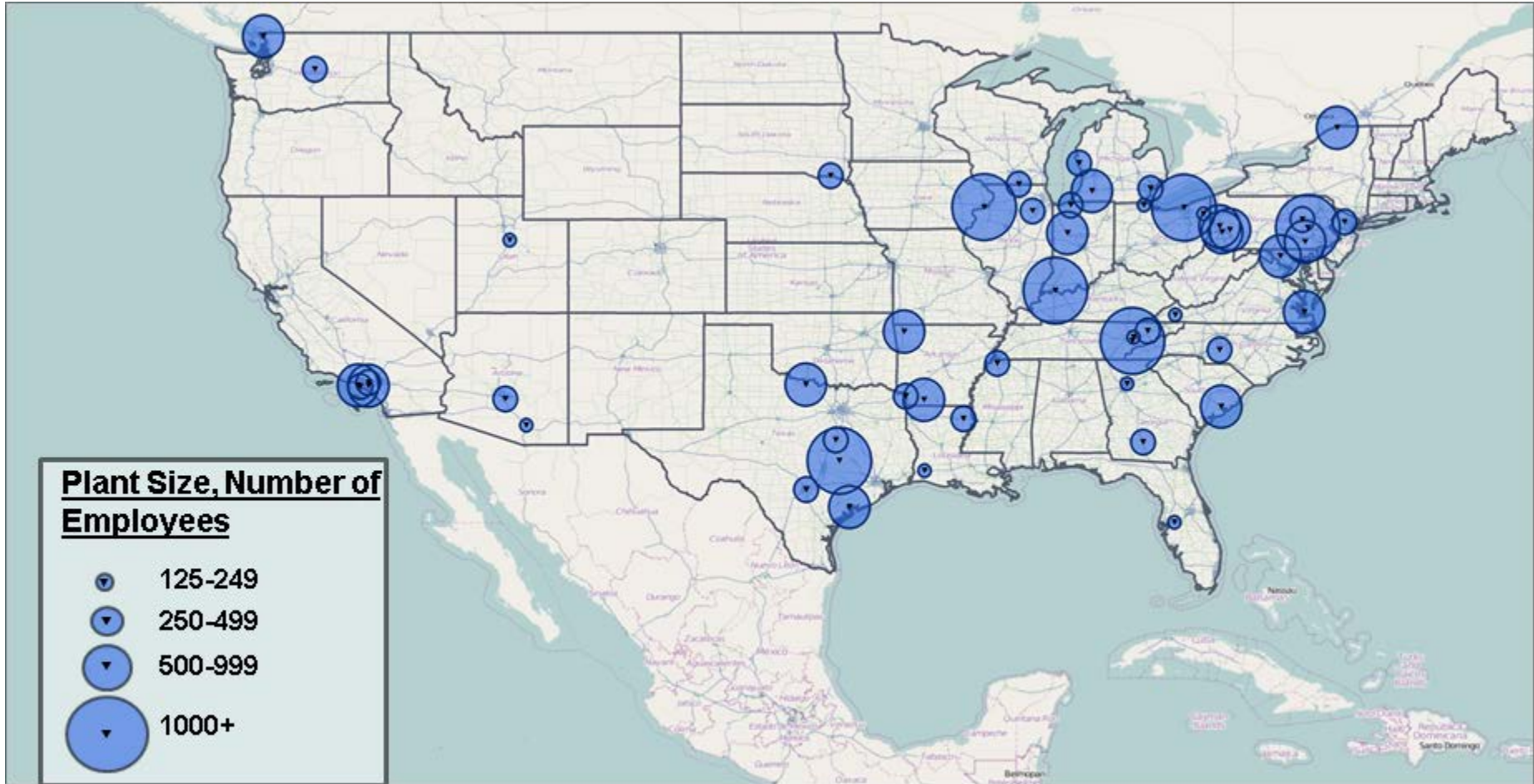
Health

- OHM: Cardiovascular data, PFTS, Audiometry, and Workplace Medical Surveillance Files
- Medical Claims Files
- EAP (roll-up by plant)
- Disability claims
- Injury Management System
- Medicare Claims linked to work-life claims
- Death - NDI
- Health Risk Scores

Demographic Data

- SSN – Childhood Locale
- Geocoded addresses
- Human Resources
- Dependent Information

Location of large Alcoa plants



Characteristics of typical cohorts

Cohort Characteristics (N=9,622)					
401K outcomes		Gender		Risk Scores	
Participated	87.37%	Male	82.28%	0-1	64.59%
Contributions (Median)	\$6,030	Ethnicity		1-2	25.99%
Withdrew	19.22%	White	82.38%	2-3	6.44%
Took Loan	14.82%	Black	8.33%	3-4	2.01%
Contributed to Stock Funds	62.84%	Hispanic	6.33%	4-6	0.98%
				Chronic conditions	
Contributed to Bond Funds	24.47%	Asian	2.17%	COPD/Asthma	3.37%
Contributed to Money Market Funds	58.41%	Other	0.79%	Depression	3.43%
		Employee Type		Diabetes	6.10%
		Hourly	76.57%		
		Annual Pay (Median)	\$53,312	Hypertension	20.02%
				IHD	3.14%

Data Issues

- No measure of work-status, income post-Alcoa
- No measure of spouse working status
- No measure of household income
- No measure of SSDI claiming
- In the era of increased privacy concerns, availability of linkable observational data are generally under threat, including ongoing Alcoa data

Four Studies

- Descriptive analysis of outcome among employees with acute shocks to establish determinants of RTW trajectory
- Case control study comparing matched subjects with equivalent baseline jobs and health to isolate role of the acute shock
- Multi-state model assessing determinants of transitions from active work to STD, LTD and out of workforce across the work-course
- Unsupervised (model and assumption free) assessment of predictors of LTD

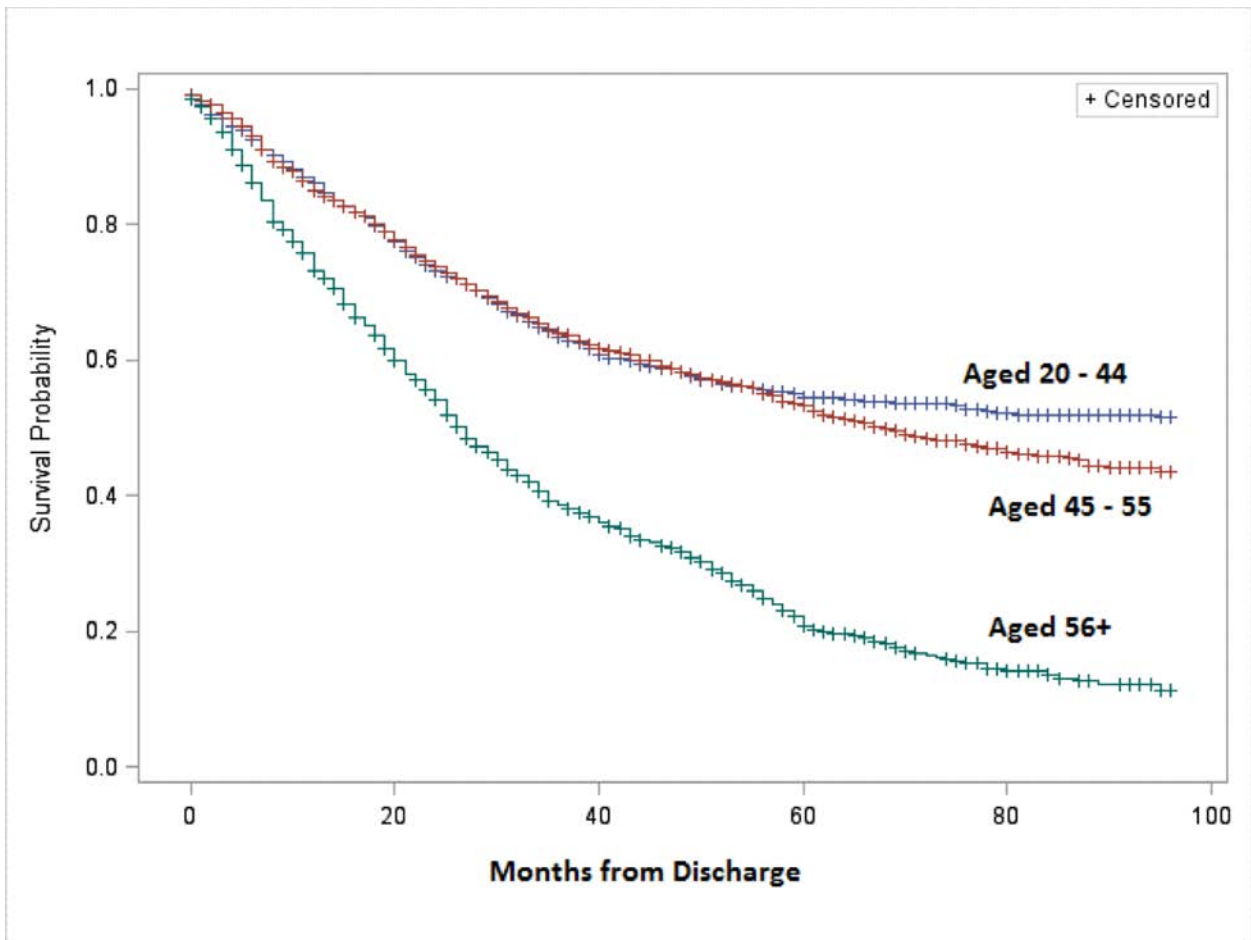
Study 1. Return to work after acute hospitalization.

Aims

- Determine the likelihood of returning to full time work after acute hospitalization and identify factors which predict return to work.
- Determine the trajectories of future work after return and their determinants for workers at different career stages

Summary of findings re RTW

- 11.4% of patients failed to return to work within 180 days
- Age, sex, occupation, income, length of stay, hospital readmission within 30 days, and union status all were important predictors of RTW
- Those with medical admissions returned to work sooner than patients with surgical admissions
- Admissions classified as musculoskeletal, neoplasm, and injury were all associated with delayed return to work



Conclusion

- For both the 45-55 and >55 age group, as the local unemployment rate increased so did the odds of ending employment after being discharged from the hospital

Study 2. Long-term economic outcome of employees experiencing acute health shock.

Aim

- Comparing the work/income trajectory of matched subjects to isolate the impact on outcome of acute health shock holding baseline health state fixed (replicate of Dutch study)

Summary of initial findings

- Employees who were hospitalized had a lower annual rate of pay increases than employees who were not hospitalized
- On average about \$500 less of an increase per year compared to employees who were not hospitalized.

Study 3. Multi-state model of transitions from work to STD, LTD and out of the workforce.

Aims

- Model average time spent in various states of work and disability across a working life span.
- Characterize common trajectories between work and disability in this working cohort.
- Identify differences in trajectories across a number of socio-demographic and health states.
- Develop a model to assess the determinants of adverse outcome at each stage of the work trajectory.

Characterizing common trajectories of work and disability

- What are the most common trajectories of work and disability? How, if at all, do demographics differ across the individuals in these different trajectories?
- Sequence analysis using “K-grams” with Jacquard distance measures.
- 68.8% (N=11,111) of the sample stays continuously employed (and/or leave Alcoa for other reasons) through sample period.

While the majority of workers remain in healthy work, the probabilities of transitioning to disability are non-negligible

	Regular Work	Short Term Disability	Long Term Disability	Worker's Compensation	On Leave
Regular Work	99.5450%	8.6572%	0.3076%	2.4215%	2.7153%
Short Term Disability	0.2308%	89.9785%	0.0198%	0.1181%	0.1450%
Long Term Disability	0.0002%	0.0896%	99.0077%	0.0443%	0.0585%
Worker's Compensation	0.0049%	0.0065%	0.0000%	96.9433%	0.0280%
Leave	0.0399%	0.9401%	0.4366%	0.1921%	96.8001%
Out of Alcoa	0.1793%	0.3281%	0.2282%	0.2807%	0.2531%

Episodes of STD are sometimes temporary in nature...



(16.38%)

...and sometimes far more complex



(10.79%)

Trajectories from LTD typically follow more straight-forward pathways



(4.01%)

Next steps

- Understand specific health conditions associated with episodes of disability and to what extent they differ across trajectories.
- Calculate time components to length of stay in disability and/work.
- Develop a model to assess the determinants of adverse outcome at each stage of the work trajectory.

Study 4. Predictors of LTD/ premature workforce exit

Aim

- Using an unsupervised, assumption-free model to explore possible unsuspected contributors to early disability generally, and after acute shocks in particular