Occupational Safety in Hospital Nursing: Organizational Contexts

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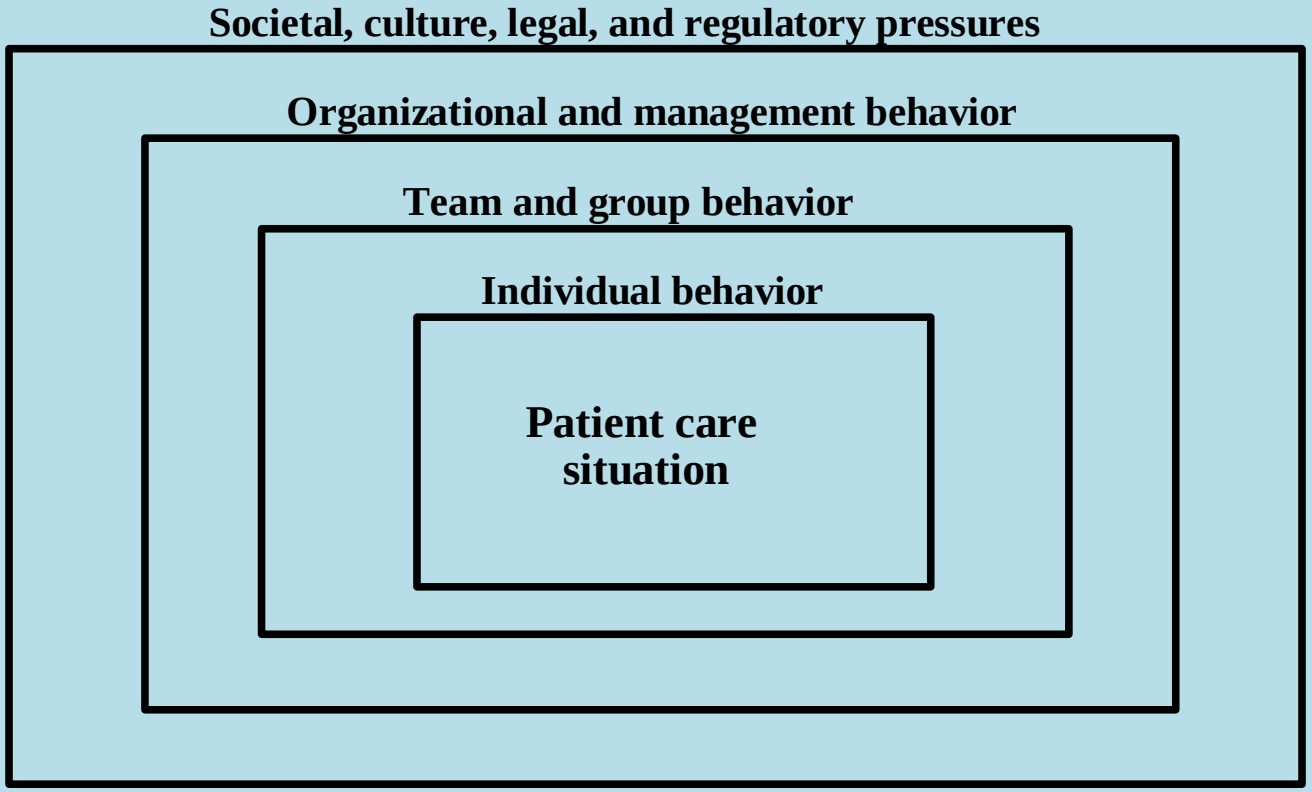
Outline

- Thinking about nursing work in organizational context
- Percutaneous injuries with used sharps: Lessons learned
- Other outcomes in organizational context: nurse job experiences and patient outcomes
- Next steps

A Systems Perspective on Safety in Health Care



Note : Adapted and redrawn from Moray (1994), p. 70.

Characteristics of Health Care

- Many elements predictable or standardizable, but unpredictability also a constant
- Most services have multiple components, each with the chance of error
- Delivery systems very complex (many people and units/entities involved)
- People and entities often tend to have their own priorities (not always those of patients, clients or communities)
- Often services delivered in large numbers and/or under time or cost constraints (or both)

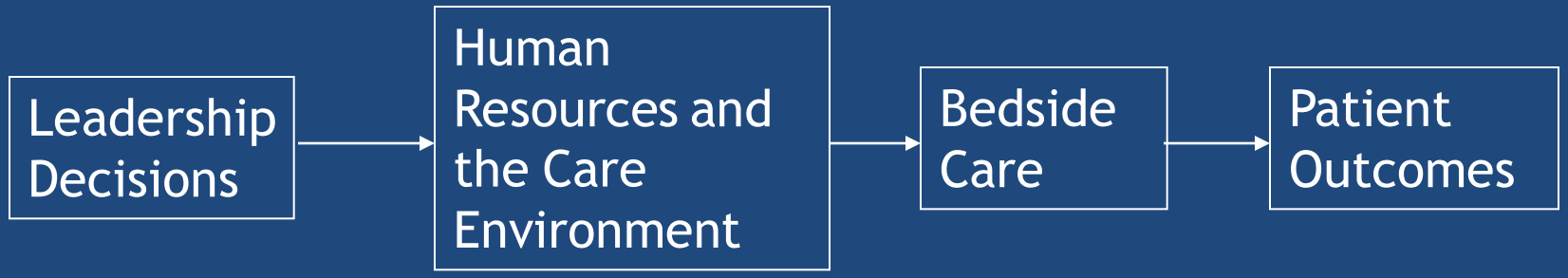
Nursing Work

- Services are delivered in large volume by several layers/types of workers
- Complicated history—not a discipline used to negotiating from a position of power
- An uncomfortable (unresolved) balance between knowledge work and command/control models
  - Articulation of the nature of the work has never been easy
- A number of specific mental and physical health risks: musculoskeletal injuries, biological/chemical exposures, sleep disturbances etc. as well as verbal/physical abuse

Characteristics of Nursing Practice on Today's Acute Care Units

- Rising patient acuity (intensity of care) on hospital units over past decades: high thresholds for admission, high thresholds for discharge
  - The work of admissions and discharges: "Churn" or patient turnover
- Constant interruptions
- Overstimulation/sensory overload
- Heavy documentation burden
- Often limited formal staff development initiatives
- Increasing initiatives related to safety and quality (initiative overload?)

A Simplified Conceptual Framework



Human resources = Staffing levels and qualifications of nursing staff
Care environment = Support of nurses from managers, availability of resources for care (including inservice education, quality improvement, relationships with physicians, etc.

Quick and Dirty Introduction to Nursing Organizational Variables

- Staffing=coverage (ratio) and qualifications (staff mix) parameters
- Practice Environments=All the other factors influence nurses' practice above and beyond staffing parameters:
  - Administrator support for nursing practice
  - Staff development/quality improvement
  - Interdisciplinary practice
  - Profile/respect for nursing in the organization

How Do We Measure Organizational Variables

- Secondary (administrative) data sources
- Surveys
  - Aggregation (averaging) of answers to questions about staffing levels, working conditions
  - Example: Nursing Work Index—Revised (49 items related to various aspects of work environments for hospital nurses scored on 4-point Likert type scales) , various subscales

Unpacking A Health Care Safety Issue: Needlesticks

Background

- Percutaneous injuries with used sharps:
  - risks of hepatitis B, C, and HIV transmission (Risks of transmission from known carrier roughly 300/1000, 30/1000, 3/1000)
  - 600,000 sharps injuries per year in U.S. health workers (1996 data; University of Virginia's Exposure Prevention Information Network (EPINet), 2000)
- Was a major occupational health concern in late 1980s/early 1990s through late part of decade: some research suggested that 50%+ of hospital nurses were injuring themselves annually
- 2 major "solutions"
  - Staff education about recapping, universal precautions
  - Implementation of needleless/self-resheathing systems

Why study percutaneous injuries with used sharps (needlesticks)?

- Epidemiological significance as an occupational health issue for nurses (bloodborne pathogen transmission)
- For someone interested in safety … less prone to certain some problems in measuring adverse outcomes ("sensitive" events, reporting issues)
  - involve the nurse herself/himself
  - readily identified, memorable
- A potential proxy for a wider range of safety issues in hospitals?

Needlestick Papers

Clarke, S.P., Sloane, D.M., & Aiken, L.H. (2002). The effects of hospital staffing and organizational climate on needlestick injuries to nurses. American Journal of Public Health, 92, 1115-1119.

Clarke, S.P., Rockett, J., Sloane, D.M., & Aiken, L.H. (2002). Organizational climate, staffing, and safety equipment as predictors of needlestick injuries and near-misses in hospital nurses. American Journal of Infection Control, 30, 207-216.

Clarke, S.P. (2007). Hospital work environments, nurse characteristics and sharps injuries. American Journal of Infection Control.

Clarke, S.P., Schubert, M., Koerner, T. (2007). Sharps injuries to hospital nurses in four countries. Infection Control and Hospital Epidemiology.

Proportion (%) of Healthcare Workers Exposed to Bloodborne Pathogens via Sharps Injuries Annually, By World Region

	HCV	HBV	HIV
Africa I	5.4	21	5.4
Africa II	5.6	22	19
USA/Canada	.3	.09	.1
Central and South America I	3.7	4	1.5
Central and South America II	5.9	5	2.5
Middle East I	2.4	5.9	.02
Middle East II	23	18	.3
Western Europe	.3	.7	.2
Eastern Europe I	1.7	5	.02
Eastern Europe II	2.2	3.5	.3
Southeast Asia I	5.8	17	1.2
Southeast Asia II	4.1	7.8	1.6
Pacific I	2.0	1.5	.03
Pacific II	4.0	14.3	.16

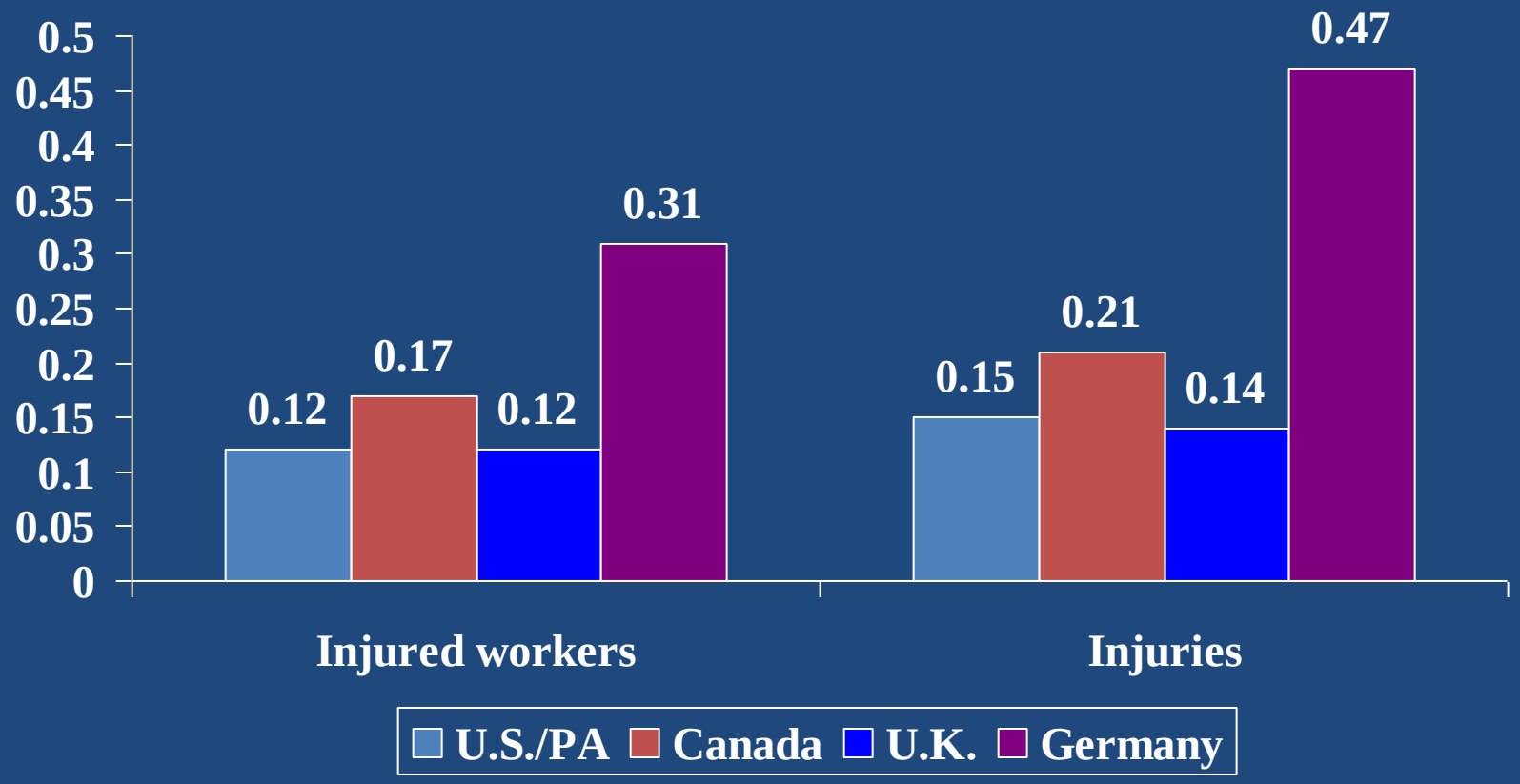
WHO, 2003

Estimated Proportion (%) of Bloodborne Pathogen Infections Attributable to Sharps Injuries, By World Region

	HCV	HBV	HIV
Africa I	45	46	4.5
Africa II	45	47	5
USA/Canada	8	1	.5
Central and South America I	55	83	11
Central and South America II	52	65	7
Middle East I	35	35	.6
Middle East II	66	64	6.2
Western Europe	25	8	1.4
Eastern Europe I	34	32	7
Eastern Europe II	38	4	1.2
Southeast Asia I	51	40	9.8
Southeast Asia II	52	42	7.9
Pacific I	27	5	3.1
Pacific II	41	36	3.7

WHO, 2003

Sharps Injury Rates for Medical-Surgical Nurses Across 4 Countries (per FTE/year)



% of Nurses Reporting IV Insertions and Routine Blood Draws on Last Shift Worked by Country*

	IV insertion	Routine blood draws
U.S./PA	61	36
Canada	55	20
Germany	--	31

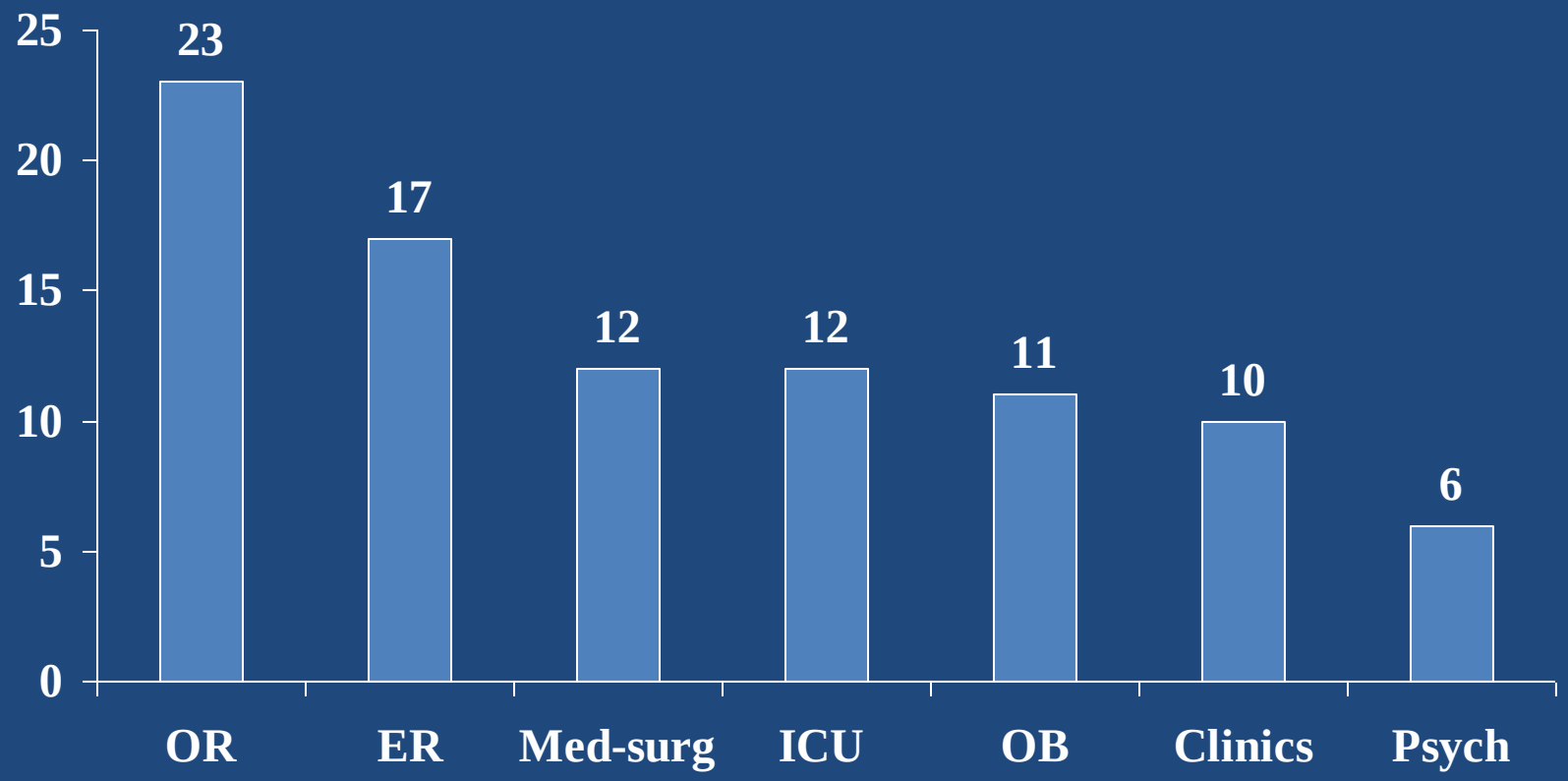
* not asked in UK sites

% of Nurses Reporting Use of Safety-Engineered Sharps by Country*

	Self-capping/ retractable needles	Needleless IV tubing
U.S./PA	40	78
Canada	14	54
Germany	6	8

* not asked in UK sites

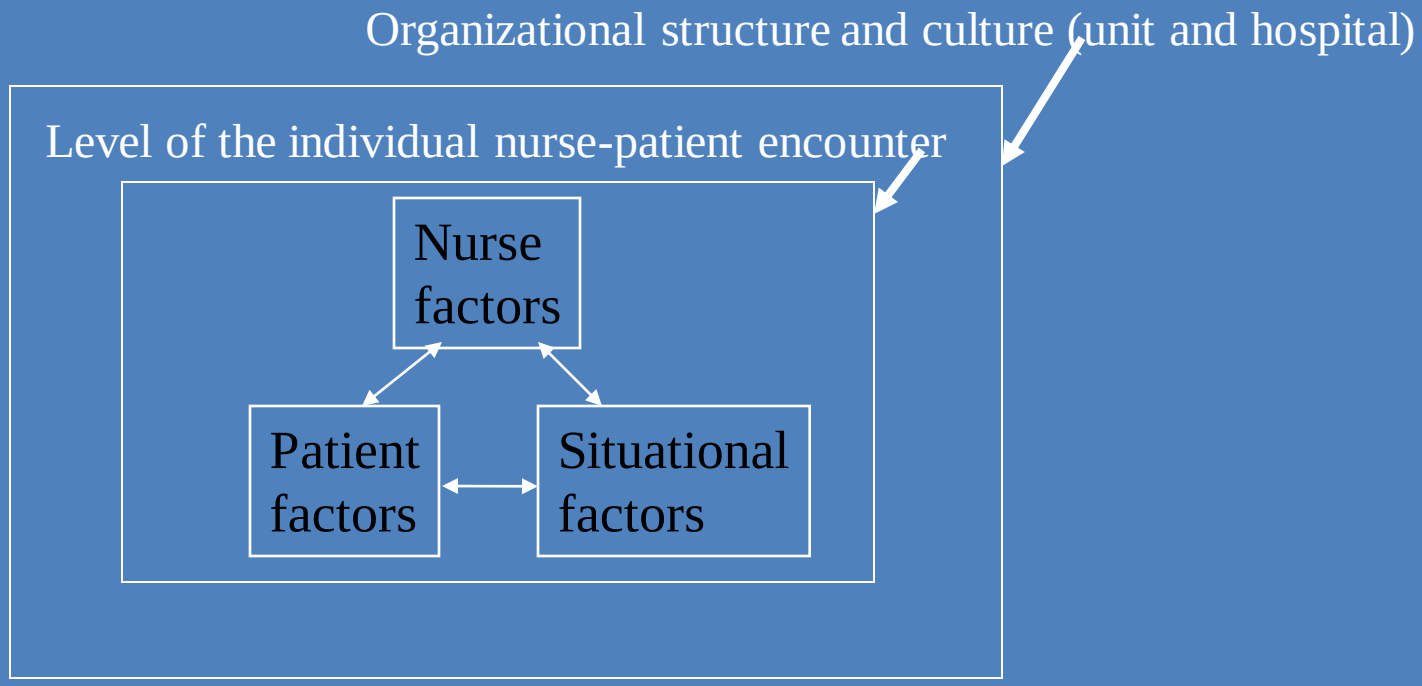
% of North American Staff Nurses with at Least 1 Sharps Injury in Past Year for Selected Specialties (N=27,774)



Overall Findings from International Comparisons

- By 1998-99, U.S. has much lower injury rates than
  - Development, marketing, and state and federal regulations
- Evidence for effectiveness of engineering controls?

Occupational Exposures to Bloodborne Pathogens: The Larger Context



Premise:
Injuries more likely under unfavourable organizational conditions

Unit Characteristics and Risks of Injuries/Near-Misses for 1 Month Periods for Medical-Surgical Nurses from 40 Units in 1991 (Odds Ratios with 95% CIs)

	Retrospectively-reported needlesticks (N=789)	Prospectively-reported needlesticks (N=962)	Prospectively-reported near-misses (N=962)
Low RN:ADC ratio	**3.03 (1.22, 7.51)**	**2.06 (1.00, 4.25)**	**1.95 (1.02, 3.73)**
Low resource availability	**2.69 (1.08, 6.70)**	1.73 (.82, 3.66)	**2.04 (1.08, 3.88)**
Low support from nurse manager	**2.84 (1.14, 7.08)**	1.56 (.70, 3.49)	**1.89 (1.06, 3.40)**
High emotional exhaustion	2.54 (.90, 7.26)	**2.08 (1.03, 4.19)**	1.57 (.80, 3.10)

Source: Clarke et al. *AJPH*. 2002; 92(7): 1115-9.

Organizational Climate and Staffing and 1-Yr Needlestick and 1-Mo Near-Miss Risk (2287 Nurses, 22 Hospitals, 1998)

	Needlestick Risk (OR with 95% CI)	Near-Miss Risk (OR with 95% CI)
Lowest level of administrative support	**1.53 (1.05, 2.22)**	1.32 (.93, 1.86)
Highest hospital-level average day shift patient loads (worst staffing)	**1.52 (1.06, 2.20)**	**1.40 (1.01, 1.95)**
Lowest average staff experience	1.01 (.71, 1.43)	**1.78 (1.31, 2.42)**

Source: Clarke et al. *AJIC*. 2002; 30: 207-216.

Organizational Climate and Staffing and 1-Yr Needlestick Risk (11 516 Nurses, 188 Hospitals, 1999)

	Raw (OR with 95% CI)	Adjusted for nurse characteristics and hospital structure (OR with 95% CI)
High technology hospital	**1.53 (1.05, 2.22)**	**1.32 (.93, 1.86)**
Best/highest staffing level	1.04 (.90, 1.19)	.96 (.81, 1.14)
Best nurse work environments	**.69 (.56, .86)**	**.66 (.54, .81)**

Source: Clarke. *AJIC*. 2007; 35: 302-9.

The Findings

- Steep decline in sharps injury risk in medical-surgical nurses from 1991 (0.8 injuries/FTE/year) to 1999 (0.15 injuries/FTE/year) and beyond (coincident with U.S. state and federal regulations mandating use of safety engineered equipment)
- Staffing and work environment conditions (such as support from frontline managers) very strongly related to sharps injury risk in initial studies, less dramatic in later work (environment still important)
- Experience, clinical specialty important determinants of risk

Clarke, PI. Risk factors and incidence of sharps injuries to nurses. National Institute of Occupational Safety and Health, Centers for Disease Prevention and Control, R01-OH008996, 2007-2010. $669,000

CDC/NIOSH Study

- Incidence rates of sharps injuries and use of engineered devices in acute care hospital nurses replicated in a 3 state survey and expanded from prior work to include:
  - Specialty, children's hospitals
  - Nursing homes
  - Home health care
  - Practical nurses in NJ
  - Advanced practice nurses

  Anonymous surveys as a complement to other databases
- Organizational correlates of hospital nurse injury rates (practice environment, staffing, safety climate) in ~600 hospitals in CA, PA, NJ
- Another 150 hospitals in FL later added)

Nurse Job Outcomes Associated With Staffing and Practice/Work Environment

- Job satisfaction
  - Global match between expectations and perceived benefits/deficits of a particular position
- Burnout
  - Emotional exhaustion, plus depersonalization and a loss of sense of personal accomplishment in one's work
- Direction of causality?
- Monomethod, single source bias?

Back to the Larger Questions

Management Decisions in Clinical Care

- Staff coverage
- Other staffing-related factors
- Care delivery model (distribution of work and responsibility/accountability structure)
- Practice environment (conditions and supports)

Factors Driving Management Decisions

- Financial constraints
- Organizational/managerial vision
- Regulatory forces
- Local traditions
- Local labour market forces
- Others???

Kane et al. (2007) Nursing staffing and quality of patient care. Available at http://www.ahrq.gov

- 94 studies examining associations of nurse-to-patient ratios and hours per patient day on patient outcomes in hospital practice from the United States and Canada, 1990-2006
- Formal meta-analysis (calculation of pooled effect sizes across studies and subpopulations) incorporating evaluation of methodological quality

Clarke & Donaldson (2008)

Summary of the Staffing-Outcomes Literature

- Across a variety of study designs and clinical populations:
  - **low levels of registered nurse staffing** typically associated with **increased rates of poor patient outcomes** in inpatient care (particularly surgical inpatient care)
- Patterns of results suggesting staffing impact not always found

The Explanations …

- #1 Variations in quality and quantity of care under different staffing scenarios
  - Common sense, and reflects nurses' experiences, but little research behind this (yet)
- #2 Associations of outcomes and of staffing with patient and hospital characteristics not accounted for

Practice/Care Environment

- Strongest evidence is for associations with factors related to retention of nurses (job satisfaction, burnout, intention to leave)
- *Limited* data demonstrating the link between environments, actual care delivered, and patient outcomes despite intuitive nature of relationships
  - Tourangeau et al. (2007); Aiken et al. (2008); Friese et al. (2008)
  - Limitations of measures and data sources on both independent (environment) and dependent (process, outcomes) sides

Nursing Surpluses/Shortages: The Cycle

- Equilibrium: Outflow of nurses (temporary and permanent) compensated for by new graduates entering field

Then

- Economic downturns—reduced reimbursements/tighter budgets—layoffs, hiring freezes—decreased nursing school enrollments

Then

- Shortages arise—wages rise—word of opportunities spreads

Then

- Nursing school enrolments rebound and equilibrium returns

Health Workforce Turbulence in North America

- The 1990s saw a precipitous drop in nursing school enrollments and graduations (part of long-standing cyclical pattern)
- Around 2000, alarm bells sounded reports of and nursing school enrollments begin picking up

The Story in North America

- Post 9/11 financial turbulence and extensive publicity around shortage drove up enrollments
- Now economic conditions have delayed retirements and softened demand for new graduates
- From late 2008 onward, a significant portion of new graduates have been having trouble finding work in major North American cities.

However …

- Experts are convinced that national shortages of registered nurses are a certainty
  - Perhaps up to 30% of workforce in Canada and the U.S. by 2020
- How should we react?

Responsibilities of Policy Actors

- Including governments, professional associations etc.
  - Steering systems for preparation/education of health care workers (and other factors influencing supply)
  - Managing financing levels/structures and organization within the system to support care/outcomes desired
  - Reviewing the place of regulation of workers/institutions in achieving system goals

Responsibilities of Practice Setting Leaders Inside and Outside Nursing

- Making necessary investments in staffing and organizational supports for care
- Evaluating and communicating needs in terms of volume/types/preparation of health care needs to other levels and sectors
- Selecting and supporting leaders to send clear messages, shape practice, and evaluate performance of system/impacts of changes

Responsibilities of Researchers

- Generating evidence about:
  - Impacts of managerial and policy decisions on patient outcomes, workforce stability and system outcomes
  - Best direct and indirect methods for establishing benchmarks for staffing and organization

Occupational Health Considerations (1)

- Long-term nurse shortage on the horizon has been (temporarily) stabilized—but expected to deepen
  - Healthy, high-functioning workforce and avoidance of voluntary turnover/departures from nursing work will become a priority again

Occupational Health Considerations (2)

- Aging workforce considerations
  - Mean age of a registered nurse in Canada/US is high 40's and will likely remain high
  - Implications for work design
- Stresses related to job availability/stability
  - Casualization of the nurse workforce in Ontario the 1990s produced many problems; traces remain
  - Current underemployment of new graduates

Occupational Health Considerations (3)

- Stresses related to high system demands/tensions, high client expectations (front line human service work in complex organizations)
- Stresses related to system change/reorganizations
- Intersections between work health and patient safety likely to come under increasing scrutiny (human factors at work)

Future Directions

- Focus on patients (care and outcomes) rather than “soft” nurse-reported measures alone
- How is care delivered under different conditions/how can patient/worker safety be maintained when one or more parameters is suboptimal
- Impact of changes in design of systems of care on patient and system outcomes