

# Healthcare Workers and PPE: *Lessons from SARS*

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# Conditions required for PPE to protect health care workers

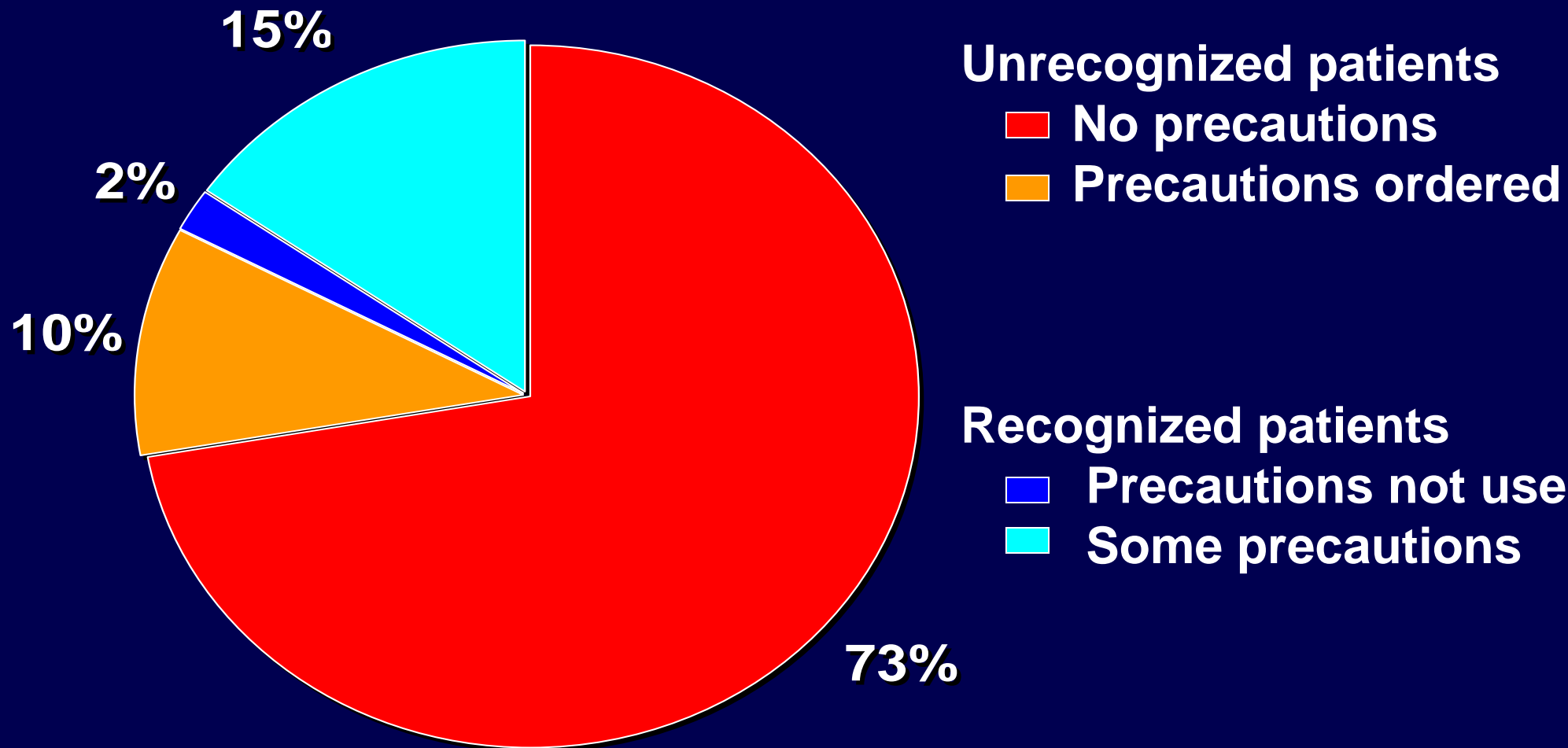
- At-risk patients must be recognized as such

**UNRECOGNIZED AS SARS: 2.2 infections/ patient day**

**RECOGNIZED: 0.0034 infections/ patient day**

- Healthcare workers must choose to wear PPE
- PPE must be appropriate and functional

# HCW – source of infection



# Problems

- If you ask HCWs to use inconvenient preventive practice when they think it is unnecessary
  - **THEY WON'T DO IT**
- Barrier precautions are associated with highly significant rates of **PATIENT** adverse effects
  - *Half as many HCW visits, 33% less contact time, increased rates of depression, anxiety, anger,*
  - 12% risk of preventable adverse events per one week admission

# Objective

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To assess adherence to barrier precautions among staff who cared for critically ill SARS patients during the Toronto SARS outbreak

# Methods

- **Design** –Retrospective cohort analysis
- **Cohort** – HCWs providing care for SARS patients immediately (<24h) before and during intubation during the Toronto outbreak (March-June, 2003)
- **Cohort identification** - HCWs identified from charts, staffing assignment forms, managers, and colleagues
- **Data collection** - Face-to-face interview using structured questionnaire, with chart available

# Methods

## Outcome measures

- Outcome:
  - Consistent adherence to PPE
    - eye protection, mask, gloves, and gown
    - “always wore”
- Secondary: Removal practices

# PPE removal

- Safest
  - Gloves removed first
  - Consistent hand disinfection BEFORE hands touch face
  - Hand disinfection as terminal event
- Some risk
  - Gloves removed first
  - Hand disinfection at least once
- At risk
  - Gloves NOT removed first
  - No hand disinfection described

# Methods

## Predictor variables

- Patient-related:
  - Patient's diagnosis, Severity of illness (APACHE II score), Precautions ordered
- HCW-related:
  - Age, gender, occupation
  - Hospital, type of ward (SARS unit, ICU, ED, other)
  - Time spent in patient's room
  - Number of room entries
  - Involvement in patient care activities (N=34)
  - Infection control training

# Results

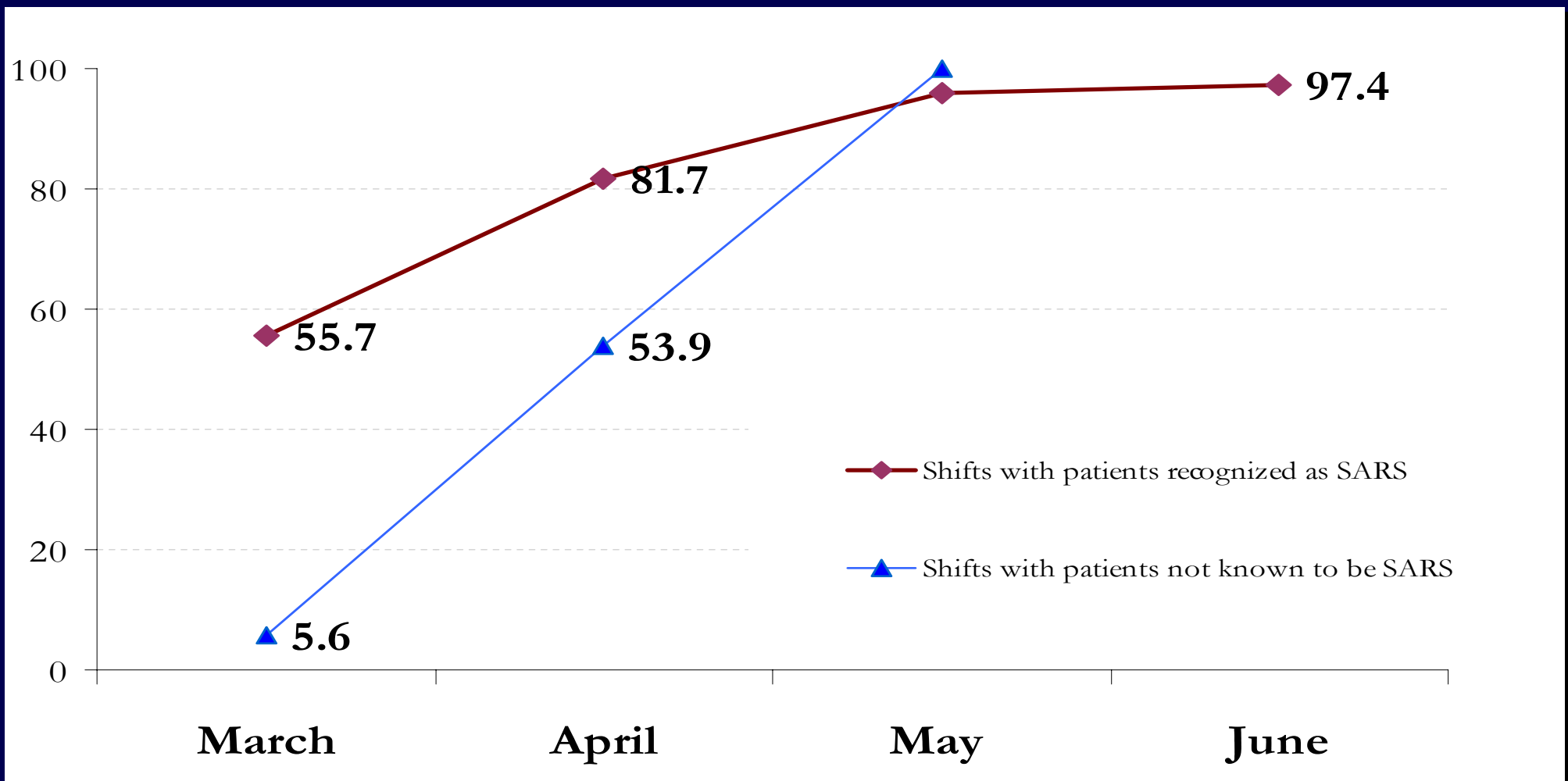
- 56 patients intubated
- 15 hospitals (4 teaching, 11 community)
- diagnosis at time of care
  - 49 SARS
  - 3 pneumonia (during outbreak)
  - 1 contact + airborne
  - 1 MRSA (gown, glove, mask)
  - 2 pneumonia (prior to outbreak recognition)

# Results

- 795 HCWs (90% of 879 eligible) enrolled
  - 46% (368) nurses
  - 14% (113) respiratory therapists
  - 14% (113) physicians
  - 10% (82) X-ray technologists
  - 16% (125) Other (eg. paramedic, physiotherapists)
- Most HCWs cared for 1 patient (range 1-8)
  - 164 (20%) cared for more than one patient
- 5146 patient care activities/procedures assessed

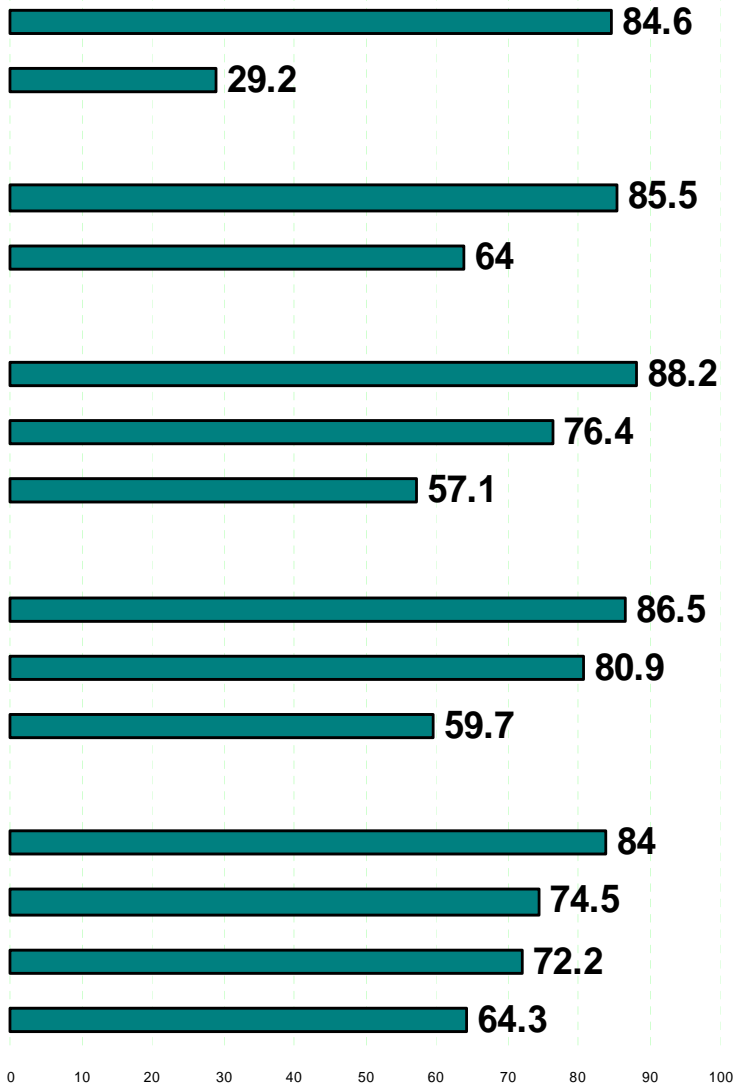
# Results

## Adherence with PPE over time



# Results: Multivariable analysis

## % adherence



## PATIENT RECOGNIZED AS SARS

Recognized	2.5, P=.002
Not Recognized	1

## PATIENT'S APACHE II score

Less than 20	1
More than 20	0.4, P<.0001

## HOSPITAL LOCATION

SARS Unit	4.0, P=.0006
ICU	4.3, P=.0001
Other ward	1

## INFECTION CONTROL TRAINING

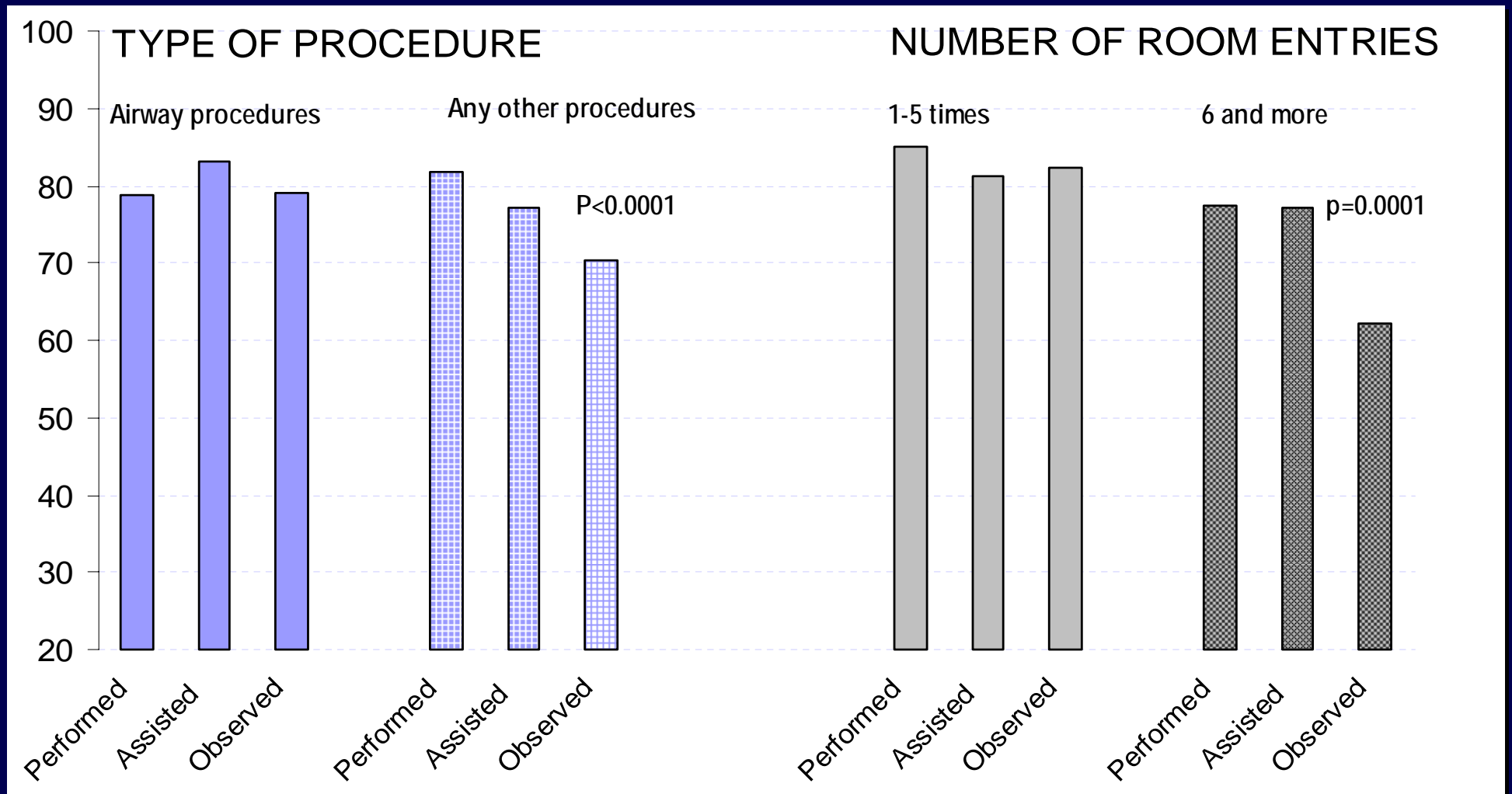
In person	2.7, P<.0001
Written Instructions only	1.7, P=.05
None	1

## NUMBER OF TIMES ENTERED A ROOM

1 -2 times	1
3-5 times	0.6, P=.03
6-10 times	0.5, P=.03
> 10 times	0.3, P=.0007

# Results

## Adherence by type of procedure



# Results

## Removal practices

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- Safest – 15%
- Some risk – 62%
- At risk – 22%

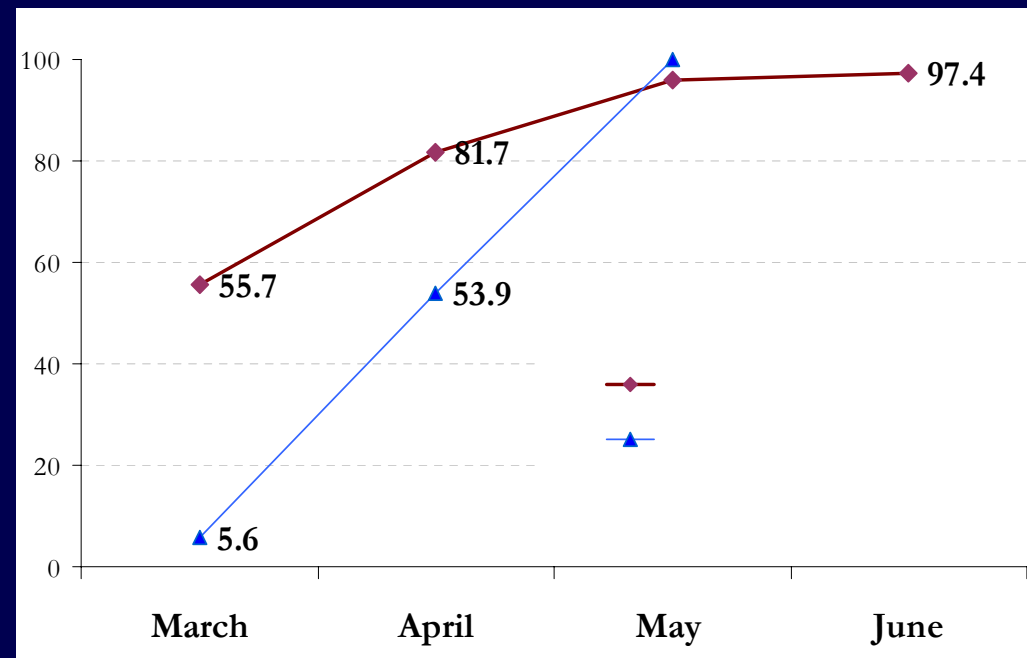
# Results

## Factors associated with safe removal

	OR (95% CI) Multivariate GEE Model	
Nurses vs. other job category	2.0 (1.3 - 3.2 )	P=.002
Teaching vs. Community hospital	7.6 (4.8 - 11.9)	P<.0001
SARS Unit	3.4 (1.3 - 9.3)	P=.02
ICU	1.9 (0.7 - 5.0)	P=.22
Other	1 (ref)	

# Conclusions - I

- 6 weeks into the SARS outbreak, HCWs were still not making sufficiently conservative decisions about using PPE



## Conclusions - II

- Decreased adherence with increased APACHE score suggests that HCWs may make decisions based on patient safety despite risk to themselves
- This cohort did not make PPE decisions based on the procedure they were about to undertake

## Conclusions - III

- Education is critical
  - In person training > written materials > none
  - SARS units > other hospital areas
  - Teaching hospitals vs community for PPE removal
- Despite education, most HCWs did not clearly understand self-contamination with PPE removal

# Research questions

- Why was education so important during SARS outbreak, when other research suggests that knowledge is not a particularly important factor in HCW PPE adherence?
- How to worker and patient safety interact?  
How do we balance priorities if they conflict?
- Is a continued focus on procedure-driven PPE feasible?

# Acknowledgements

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