Respirator Tolerance

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WILL RESPIRATORS BE EFFECTIVE?

- DEVICE MUST EFFECTIVELY SUPPLY CLEAN ENOUGH AIR
- DEVICE MUST BE USED WHEN AND WHERE NEEDED

QUESTIONS:

- CAN WORK CONTINUE IF WIDESPREAD USE IS NEEDED?
- CAN PERSONS WITH MILD RESPIRATORY DISEASES USE THEM?
- HOW DO 2 COMMON TYPES COMPARE?
- WHAT IS BEST MEASURE OF “PUBLIC HEALTH” EFFICACY?

TWO APPROACHES:

- DECISION ANALYSIS
- EXPERIMENTAL

DECISION ANALYSIS:

- DEFINE KEY FACTORS & "TYPCAL" VALUES
- ESTIMATE # OF PERSONS OVERXPOSED
- DETERMINE IMPACT OF INCREMENTAL IMPROVEMENT OF 1 FACTOR ON # OVEREXPOSED

RESPIRATOR	PF
	WPF
SITES	NUMBER OF SITES
	WORKERS/SITE
	SITES IDENTIFIED
	SITE HAS A PROGRAM
PROGRAM	PROPER SELECTION
	RESPIRATOR AVAILABLE
PERSON	EVER USES
	PROPORTION OF TIMES USED
EXPOSURE	EXPOSURE LEVEL
	TYPICAL HAZARD LEVEL
VARIABILITY	% OUTLIERS
RESULTS	NO. ABOVE HAZARD LEVEL
	DIFFERENCE

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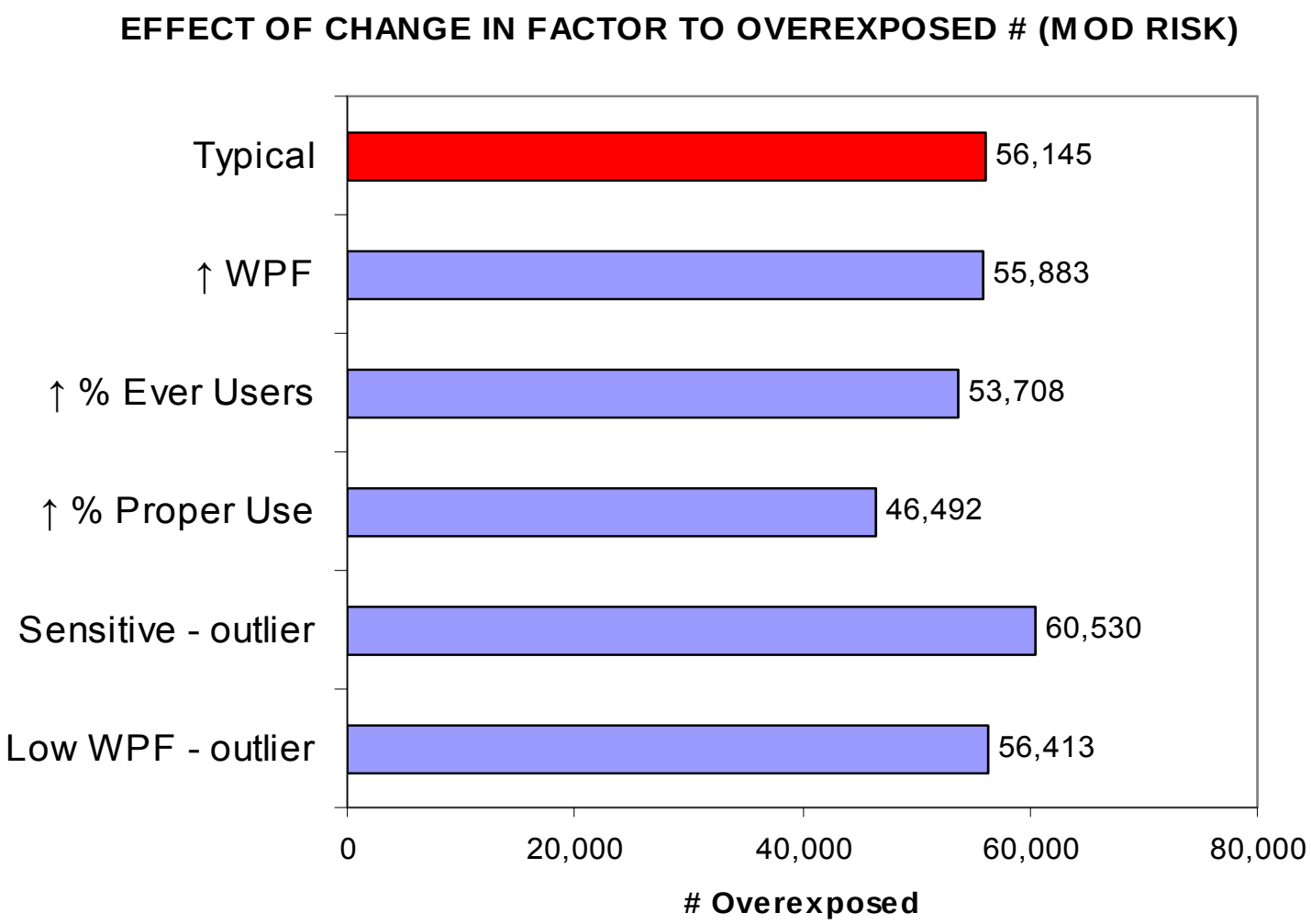
PUBLIC HEALTH: IMPROVE USER %



EXPERIMENTAL

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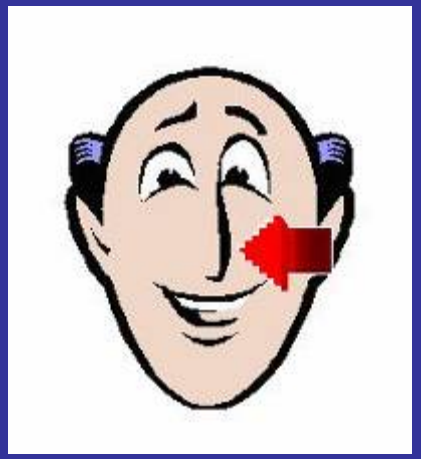
EXPERIMENTAL APPROACH

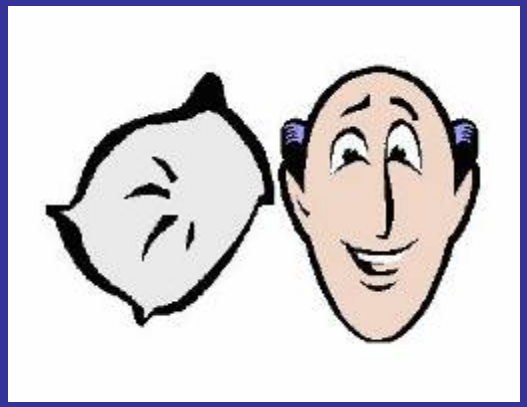
- **COMPARE 2 RESPIRATOR TYPES** AND LABORATORY SURROGATES ▶ N95 ▶ DUAL CARTRIDGE HALF MASK (HFM) ▶ INDIVIDUAL LOADS
- **IN 4 USER GROUPS**: NORMAL, COPD, RHINITIS, ASTHMA
- WITH SIMULATED WORK & IN LAB

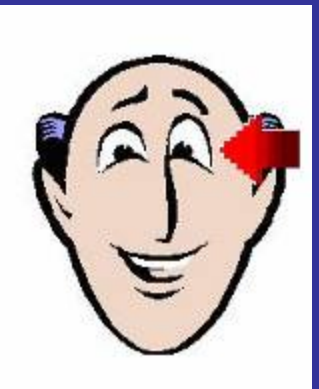
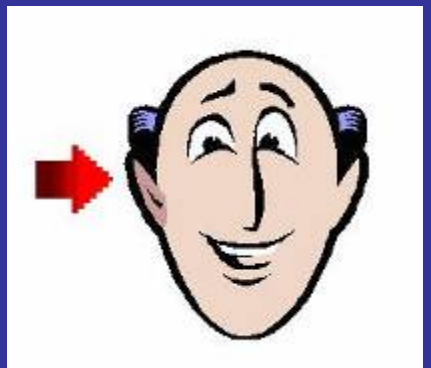
OUTCOME MEASURES

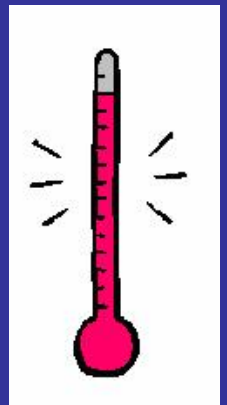
- PHYSIOLOGIC RESPONSE
- PHYSIOLOGIC ADAPTATION
- WORK PRODUCTIVITY
- MASK POSITION MOVEMENT
- SUBJECTIVE RESPONSES (12)



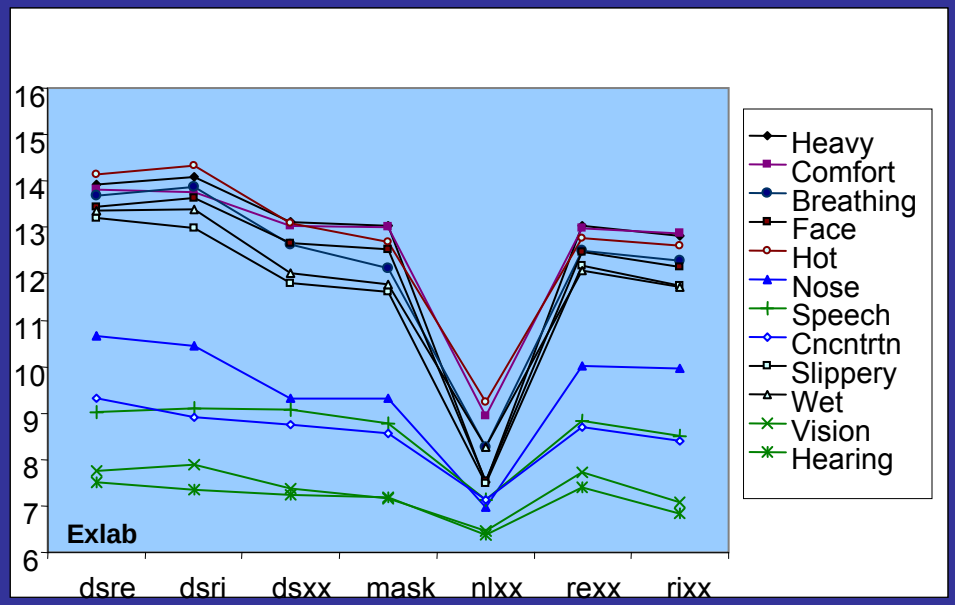





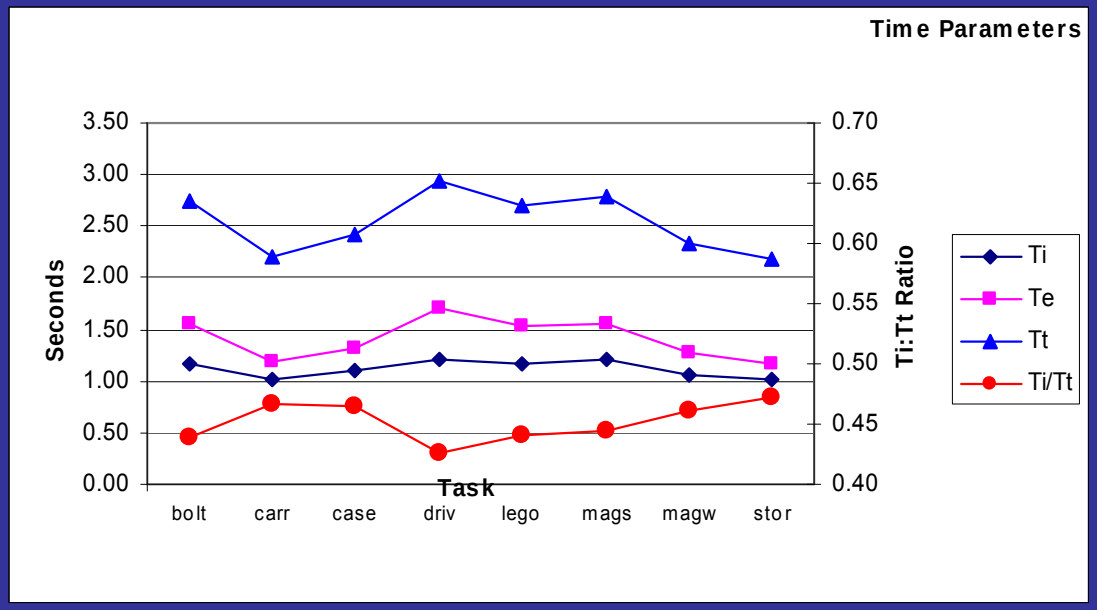
HOW SHOULD SUBJECTIVE RESPONSE BE MEASURED?

- ONE QUESTION IS NOT ENOUGH: MULTIPLE SUBJECTIVE RESPONSES MUST BE MEASURED
- 3 DISTINCT GROUPINGS OF RESPONSES: ▶ "PHYSIOLOGIC SENSATION", ▶ "FUNCTIONAL IMPACT", ▶ "MINIMAL"



HOW SHOULD PHYSIOLOGIC RESPONSE BE MEASURED?

- ADAPTATION OF RESPIRATORY PATTERN IS THE MOST CONSISTENT EFFECT



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HOW DO THE 2 RESPIRATOR TYPES COMPARE?

- HFM PRODUCED MORE ADVERSE SUBJECTIVE RESPONSE ON MULTIPLE SCALES
- HFM PRODUCED GREATER PHYSIOLOGIC ADAPTATION IMPACT (ALBEIT LIMITED IN MAGNITUDE)

IMPLICATIONS:

- BOTH THE DECISION ANALYSIS AND EXPERIMENTAL APPROACHES SUGGEST:
- THERE IS A **"TRADE-OFF"** BETWEEN RESPIRATOR PROTECTION FACTOR AND PROTECTION OF WORKERS! I.E., HIGHLY PROTECTIVE RESPIRATORS THAT ARE NOT USED MAY ACTUALLY BE LESS PROTECTIVE TO PUBLIC HEALTH THAN LESS EFFECTIVE DEVICES THAT FAR BETTER TOLERATED & MORE WIDELY AVAILABLE
- **SINCE WE DO NOT (YET) KNOW WHICH OUTCOMES ARE MOST IMPORTANT,** RESPIRATOR DESIGN & EVALUATION SHOULD CONSIDER MULTIPLE DOMAINS: ► (PHYSIOLOGIC IMPACT, ► RESPIRATORY ADAPTATION, ► *MULTIPLE* SUBJECTIVE COMPONENTS, ► WORK PRODUCTIVITY, & ► ACTUAL UTILIZATION)

THANK YOU!