Occupational Health Nursing Informatics
Mapping Hearing Health Outcomes to the Omaha System

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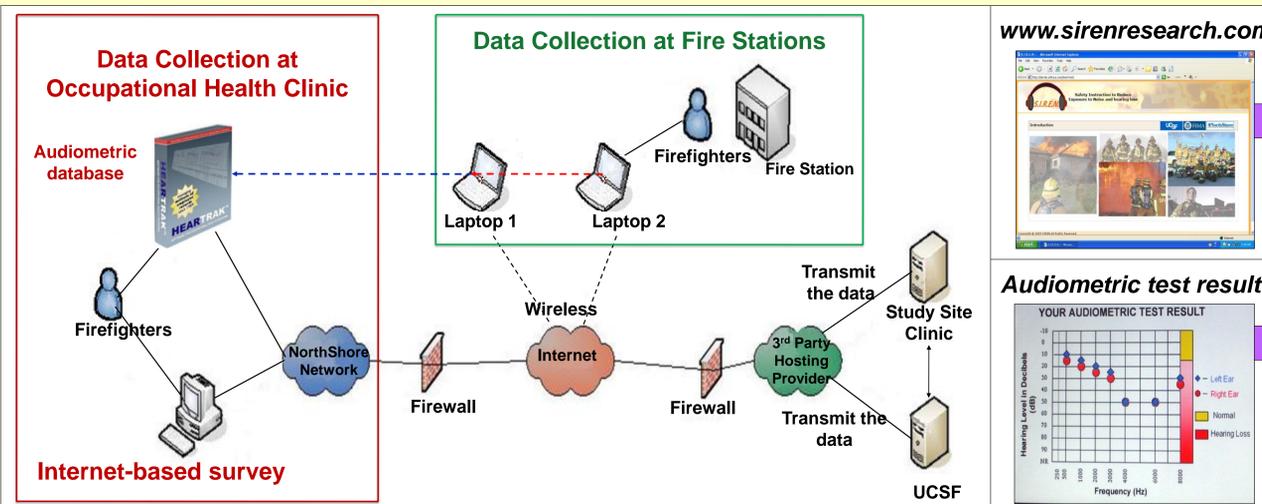UNIVERSITY OF MINNESOTA SCHOOL OF NURSING

Introduction

- Noise-induced hearing loss (NIHL) : One of most prevalent occupational injuries.
- There are limited data on hearing ability of workers.
- Data are needed to describe the extent of NIHL and to measure outcomes of hearing loss prevention programs.
- Standardized representation in the electronic health record (EHR) could fill this gap.

Purpose: To develop common indicators of hearing health for standardized representation in the EHR

Internet Data Collection

Data Collection at Occupational Health Clinic — Audiometric database — Firefighters — Internet-based survey

Data Collection at Fire Stations — Firefighters — Fire Station — Laptop 1 — Laptop 2 — Wireless — NorthShore Network — Firewall — Internet — Firewall — 3rd Party Hosting Provider — Transmit the data — Study Site Clinic — Transmit the data — UCSF

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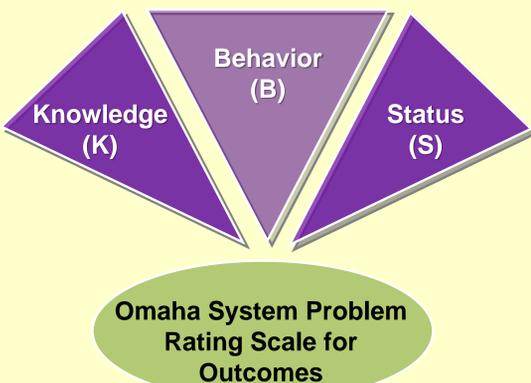
Audiometric test result

Sources of the electronic data

- Research data from internet-based survey questionnaires completed by firefighters provided the **K**nowledge and **B**ehavior variables.

- Clinical data from standard audiometric measurements provided the data for the **S**tatus variable.

Method

Participants: 346 firefighters from 35 fire departments in 3 states in the U.S

Theoretical rationale:

Knowledge (K) — Behavior (B) — Status (S)

Omaha System Problem Rating Scale for Outcomes

The OMAHA SYSTEM — A Key to Practice, Documentation, and Information Management — KAREN S. MARTIN

Algorithm development and transformation:
Experts in nursing informatics and occupational health nursing created algorithms based on definitions of Omaha System ratings and existing clinical and research data from firefighters were transformed using the algorithms.
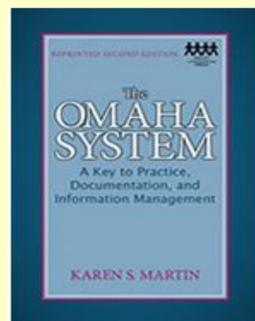
Result

Table 1. KBS questionnaire scoring using firefighter hearing data

Definitions of Omaha System ratings		Data	Score	Value	n (%)	Mean
K	Ability of the client to remember and interpret information					3.7
	1=No knowledge	4 items on NIHL & its prevention	1	None	0 (0.0)	
			2	1 right answer	1 (0.3)	
			3	2 right answers	7 (2.0)	
			4	3 right answers	79 (22.8)	
	5=Superior knowledge		5	4 right answers	259 (74.9)	
B	Observable responses, actions, or activities of the client fitting the occasion or purpose					2.2
	1=Not appropriate behavior	Mean use of hearing protection	1	0–20%	172 (49.7)	
			2	21–40%	49 (14.2)	
			3	41–60%	44 (12.7)	
			4	61–80%	40 (11.6)	
	5=Consistently appropriate behavior		5	81–100%	41 (11.8)	
S	Condition of the client in relation to objective and subjective defining characteristics					4.4
	1=Extreme signs/symptoms	Objective hearing status	1	> 80dB	1 (0.3)	
			2	61–80dB	9 (2.6)	
			3	41–60dB	40 (11.6)	
			4	25–40dB	101 (29.2)	
	5=No signs/symptoms		5	< 25dB	195 (56.4)	

Table 2. Correlations among KBS variables

Scale	K	B	S
K	1		
B	.13 (*p*=.01)	1	
S	-.07 (*p*=.19)	.12 (*p*=.02)	1

Significant positive relationships between:

Knowledge & **B**ehavior;
Behavior & **S**tatus

Conclusion

- Findings support the validity of the new Knowledge, Behavior and Status hearing health outcomes.
- Standardized hearing health outcomes will create opportunities for data exchange across health care settings.

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