

DEVELOPING RISK MANAGEMENT STRATEGIES TO *P*REVENT *I*NJURIES AMONG *F*IREFIGHTERS



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SPIFi



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The Problem

- From 2004 to 2009, the incidence rate of injury averaged 17.86 injuries per 100 employees
 - ▣ National incidence rate of 7.3 injuries per 100 (NFPA, 2007)
- Primary aim:
Implement task-specific, risk-based intervention strategies within the Tucson Fire Department (TFD) and evaluate injury rates and effectiveness of the approach



SPIFi Objectives

□ Risk management

- An approach that creates a structure for individual organizations to develop solutions to the risks faced, based on the surrounding environment, conditions, equipment and personnel involved

□ Objectives:

- To identify, analyze, and characterize the hazards and risks associated with injuries during specific work processes

- Physical exercise
- Patient transport
- Fireground operations



Associated with the highest frequency of injuries among TFD personnel

- To reduce the number, severity and overall costs of injury
 - Increases in focused wellness, fitness, and prevention programs are showing positive effects in the fire service

Project Partners

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Funding through CDC/NIOSH (4-year RO1)

- Tucson Fire Department
 - ▣ Ed Nied, Deputy Chief H&S
 - ▣ John Gulotta, Captain
 - ▣ Study Participants
- Phoenix Fire Department
- University of Arizona
 - ▣ Jerry Poplin, MS, PhD candidate
 - ▣ Jeff Burgess, MD, MPH, MS
 - ▣ Wayne Peate, MD, MPH
 - ▣ Chengcheng Hu, PhD
 - ▣ Anastasia Sugeng, MS candidate
 - ▣ Virginia Day, MPH candidate
 - ▣ Timothy Houle
- Johns Hopkins University
 - ▣ Keshia Pollack, PhD, MPH

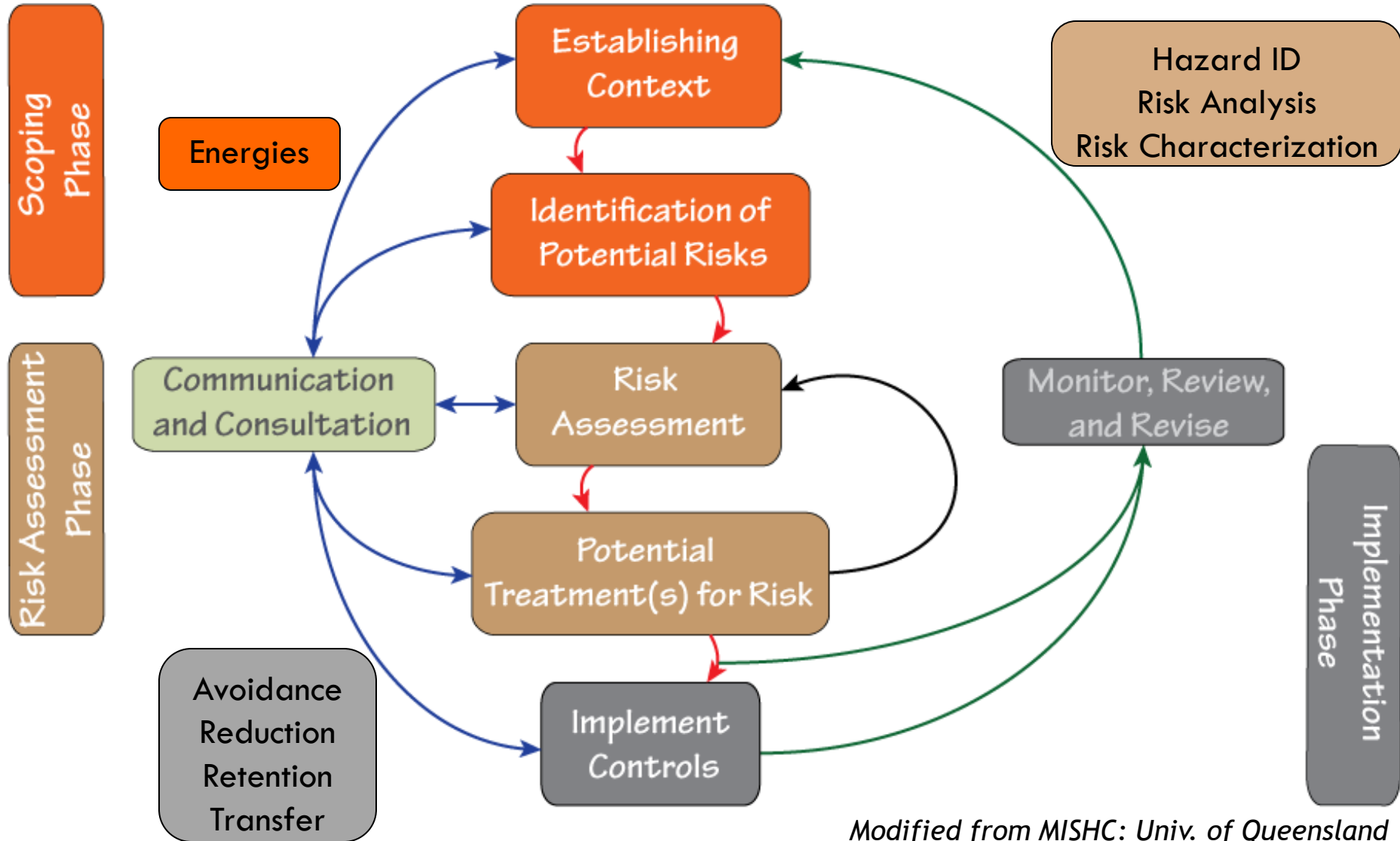
Intervention Model

- Participatory research model
 - ▣ Direct input for the development and implementation of the intervention is required from those the intervention is aimed at supporting
 - ▣ A “bottom-up” approach versus the more common “top-down” system

- Involves 3 cross-sectional teams (for each job-task) of 6-10 individuals
 - ▣ Captain, engineer, firefighter, paramedic, upper management, union rep, research team member, facilitator, scribe

Risk Management

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Modified from MISHC: Univ. of Queensland

Participatory Teams

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- 26 of 36 consented individuals (72%) participated during the 1st year
- Three teams contributed to 7 formal working group sessions
 - Patient Transport
 - 12 consented, 10 eligible, 4-6 in attendance
 - Fireground
 - 12 consented, 10 eligible, 5-8 in attendance
 - Physical Exercise
 - 9 consented, 8 eligible, 3-8 in attendance
- 92% Male
- Averaged 39 years in age (range 24-53 yr)
- 25 conducted baseline surveys
 - 28% Firefighter
 - 28% Paramedic
 - 24% Captain
 - 12% Engineer
 - 4% Deputy Chief
 - 4% Inspector
- Average time at current rank
 - Median 4; IQR: 9

Year 1 Progress

- Descriptive review of injuries (2004-2009)
 - ▣ Overall and specific to each job task
- Process mapping
- Task description & hazard identification
- Risk ranking of potential incidents
 - ▣ Based on perceived *likelihood* and *consequences* (hazard effects)
- Identification of possible control strategies
 - ▣ Education
 - ▣ Enforcement
 - ▣ Engineering
 - ▣ Economic (incentives/rewards)

Patient Transport

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START

Call Dispatch
& In-Transit
Response

** Note that this does not always
occur at the station*

Patient Release

FINISH

Patient Transport

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START

Call Dispatch & In-Transit Response
** Note that this does not always occur at the station*

Arrival at Scene

Gaining Access to Patient

Initial Assessment of Patient

Focused Assessment & Treatment

Move
No move

Life Threatening
Non-Life Threatening

Patient Packaging

ALS Transport
** Note: contains aspects of focused assesemnt*

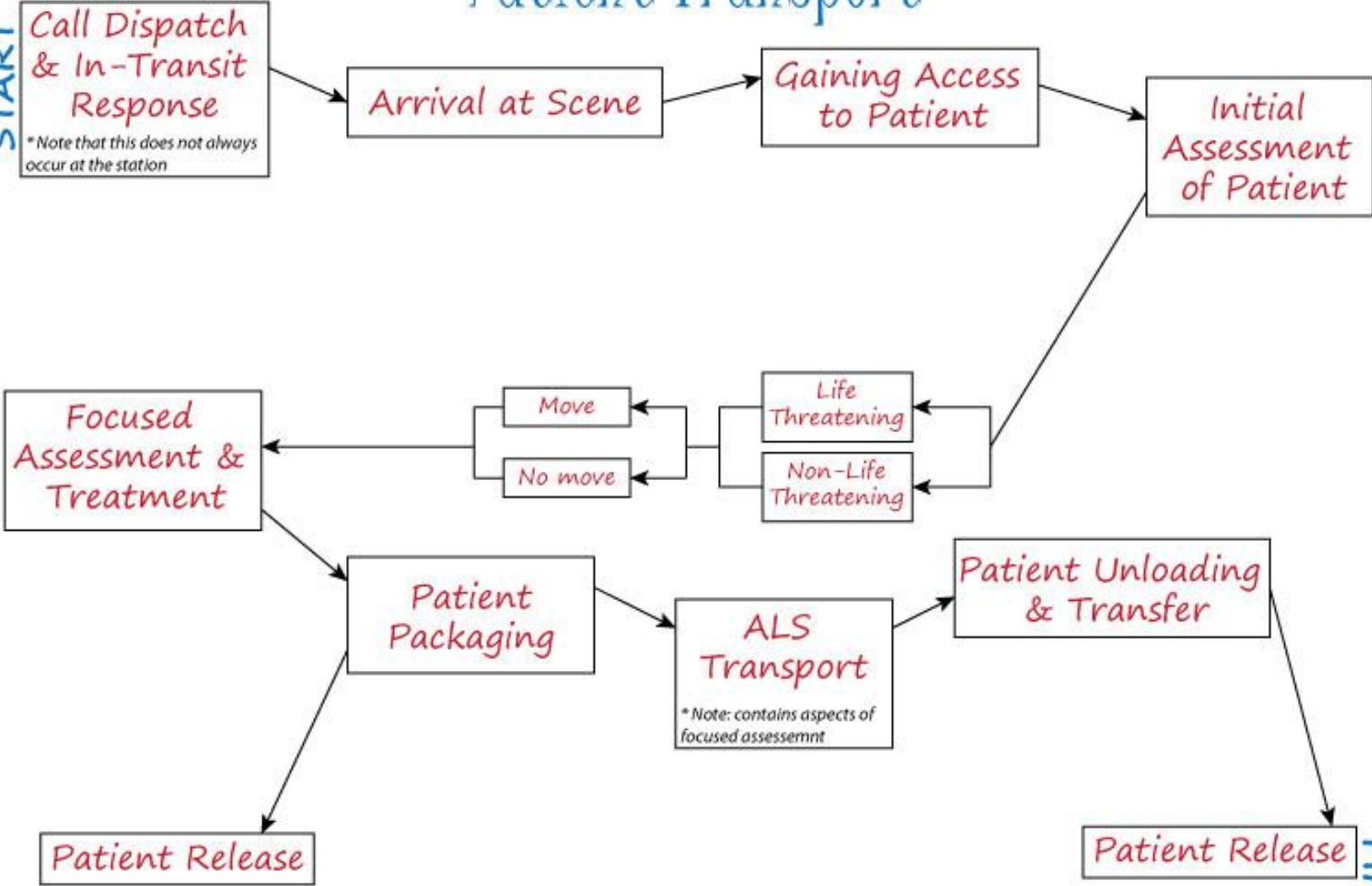
Patient Unloading & Transfer

Patient Release

Patient Release

FINISH

FINISH



Patient Transport

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START

Call Dispatch & In-Transit Response

** Note that this does not always occur at the station*

- Understanding the nature of the call
- Out-of-shoot time (SOP)
- Sliding down pole
- Changing clothes (PPE, gear)
- On truck

Arrival at Scene

- Off truck
- Unloading of equipment
- Traffic (conspicuity)
- Environmental, wildlife

Gaining Access to Patient

- Carrying equipment
- Forcible entry
- Extrication
- Environment (atmosphere)
- HAZMAT, hygiene
- Confined spaces
- Violence (e.g., drunk patients)
- Animals

Initial Assessment of Patient

- Sick or not sick?
- Movement or no?
- LOC
- ABCs
- Patient positioning
- Stabilization
- Violence (from patients), weapons
- Fluids/fecal matter

Life Threatening

Non-Life Threatening

Move

No move

Focused Assessment & Treatment

- Checking vitals
- Airway management (e.g., intubation)
- IV lines (needle use)
- Dressing wounds
- Stabilizing fractures (e.g., splinting)
- Environmental (gas, glass, arbags)
- Violence
- Defibrillator

Patient Packaging

- Moving patients
- Secure to gurney (or device) and load
- Movement toward truck
- Pushing, pulling
- Lifting (esp. into truck)
- Accessibility
- Stairs, stones, terrain
- Confined spaces
- Averting obstacles
- Level of gurney to truck
- Technical rescue

ALS Transport

** Note: contains aspects of focused assessment*

- In-transit to hospital
- Standing/balancing (unsecured)
- Driving style (speed)
- Weather
- Vibrations
- Projectiles
- Fatigue/awareness

Patient Unloading & Transfer

- On/Off Truck
- Carrying/lifting (patient, gurney, equipment)
- Transfer to hospital bed, chair, etc.
- Lowering gurney with patient
- Environmental obstacles

Patient Release

- Loading equipment
- On truck

FINISH

Patient Release

- Legal separation
- No more patient contact
- Loading of equipment on rig
- Leaving scene

FINISH

Workplace Risk Assessment & Control (WRAC)

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Project Title: Risk Management Strategies to Prevent Injuries among Firefighters - SPiFi				Date Originated: 5/21/10 Date Revised: 7/29/10
Operation Description: Patient Transport	Team Members:	Team Facilitator: Jerry Poplin	Recorded By:	Relevant SOPs & Docs: Equipment & Procedure EMT manual

No	A Step in operation	B Potential Incident(s)	C Likelihood	D Hazard Effect/ Consequence	E Risk Rating	F Current Controls	G Possible New controls
1	Call Dispatch & In-Transit Response	MVC, rollovers	4	4	16 (High)	<ul style="list-style-type: none"> speed to scene (≤ 10 mph over limit) seatbelts (people & equipment) no horseplay protocol 3-points for on/off truck foam landing pads swing-down steps <p><i>*fatigue status prior to call dispatch may affect likelihood</i></p>	<ul style="list-style-type: none"> improved dispatcher queuing Zone dispatching in station (clausen & hearts saver system for dispatch) No running in station to apparatus Training (CE) at academy (<i>"first to truck" academy training & mentality</i>) Responsibility lies upon the individual FF with the captain's enforcement Captain sets the tone
		struck by vehicle	1	4	10 (High)		
		sprains/strains, including static motion (e.g., ankles)	2	2	5 (Medium)		
		falls, slips, trips	3	1	4 (Low)		
		crush, caught between (e.g., doors)	1	2	3 (Low)		
		struck by (e.g., head, "Nissen")	2	1	2 (Low)		
struck by (e.g., projectiles)	1	1	1 (Low)				
2	Arrival at scene	struck by vehicles	1	4	10 (High)	<ul style="list-style-type: none"> placement of engine to block medic or other truck reflective vests (conspicuity tape) 	<ul style="list-style-type: none"> SOP/training for medic/truck placement (<i>At scene, medics should pull in front of truck with best ease of access to patient location</i>) Training and communication with Captain
		sprains/strains (w/ gear)	2	2	5 (Medium)		
		sprains/strains (w/o gear)	2	2	5 (Medium)		
3	Gaining Access to Patient	combative patient	2	4	13 (High)	<ul style="list-style-type: none"> Don't turn your back (combative patient) Additional CE on street survival (DVD?) Captain's role in improving knowledge & awareness Awareness of situation and environment 	
		fall from height	1	4	10 (High)		
		cuts, lacerations, bruises	3	2	8 (Medium)		
		electrical shock, burn	1	3	6 (Medium)		
		hydraulic line pressure (pinhole)	1	3	6 (Medium)		
		struck by, crush (w/ equipment)	1	3	6 (Medium)		
		sprains/strains	2	2	5 (Medium)		
airbag deployment	1	2	3 (Low)				

Control Type Distribution

- In total, 45 potential control strategies were identified among the three workforce groups
 - ▣ *A number of which are interrelated*

	Patient Transport	Fireground	Physical Exercise	Total (%)
Education	8	7	6	21 (47%)
Engineering	4	2	1	7 (16%)
Enforcement	4	6	5	15 (33%)
Economic	--	1	1	2 (4%)
<i>Total</i>	<i>16</i>	<i>16</i>	<i>13</i>	<i>45</i>

Control Themes

- *Captains' roles are pivotal*
- Patient Transport
 - ▣ Ergonomics
- Fireground
 - ▣ Awareness and Reinforcement
- Physical Exercise
 - ▣ Structure and Management

- *Five intervention decision criteria* (Runyan, 1998) used to guide prioritization of controls
 - ▣ Effectiveness, Cost effectiveness, Feasibility, Sustainability, Potential for Unintended Risk

Implementation Phase

- Establish a Safety & Wellness Committee, comparable to *SPIFi* participatory groups and commensurate with NFPA 1500 guideline to:
 - “...conduct research; develop recommendations, study and review matters pertaining to occupational safety and health; review policies, carry message”

- Research partners will continue to assist in the planning and development of control strategies
 - Includes individual evaluation plans
 - Provide recommendations to committee

Baseline Perceptions of Injury

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- All injuries during firefighting are preventable
 - ▣ 92% Agree
- Getting injured is “part of the job”
 - ▣ 68% Disagree
- Injuries specific to their focused job task are preventable
 - ▣ 76% Agree
- Control over personal risk of sustaining injury
 - ▣ 80% Agree
- The individual is responsible for preventing injuries during firefighting activities
 - ▣ 72% Agree
- Responsible for managing their injury risk
 - ▣ 44% say the individual
 - ▣ 36% captain/chief in addition to the individual

Additional developments (*partial list*)...

- Enhanced surveillance and reporting system needed
- More centralized and organized medium for H&S information
 - ▣ Resource for distributing project details, progress and injury control strategies
 - ▣ Project website
- Process evaluation
 - ▣ Participatory process highly valued and appreciated by participants

Monitor, Review & Revise

- Impact and process evaluation of the intervention, as well as individual controls
 - ▣ Assess for change in injury rates
 - Overall and specific to job tasks
 - ▣ Adherence to control strategies
 - Adjusting controls as deemed necessary
 - ▣ Measure change in perceptions, attitudes, learning, etc.
 - ▣ Measure the implementation of the intervention (part of the process evaluation)

Questions?

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<http://www.spifi.publichealth.arizona.edu/>

Sincere thanks to all project partners and CDC/NIOSH!