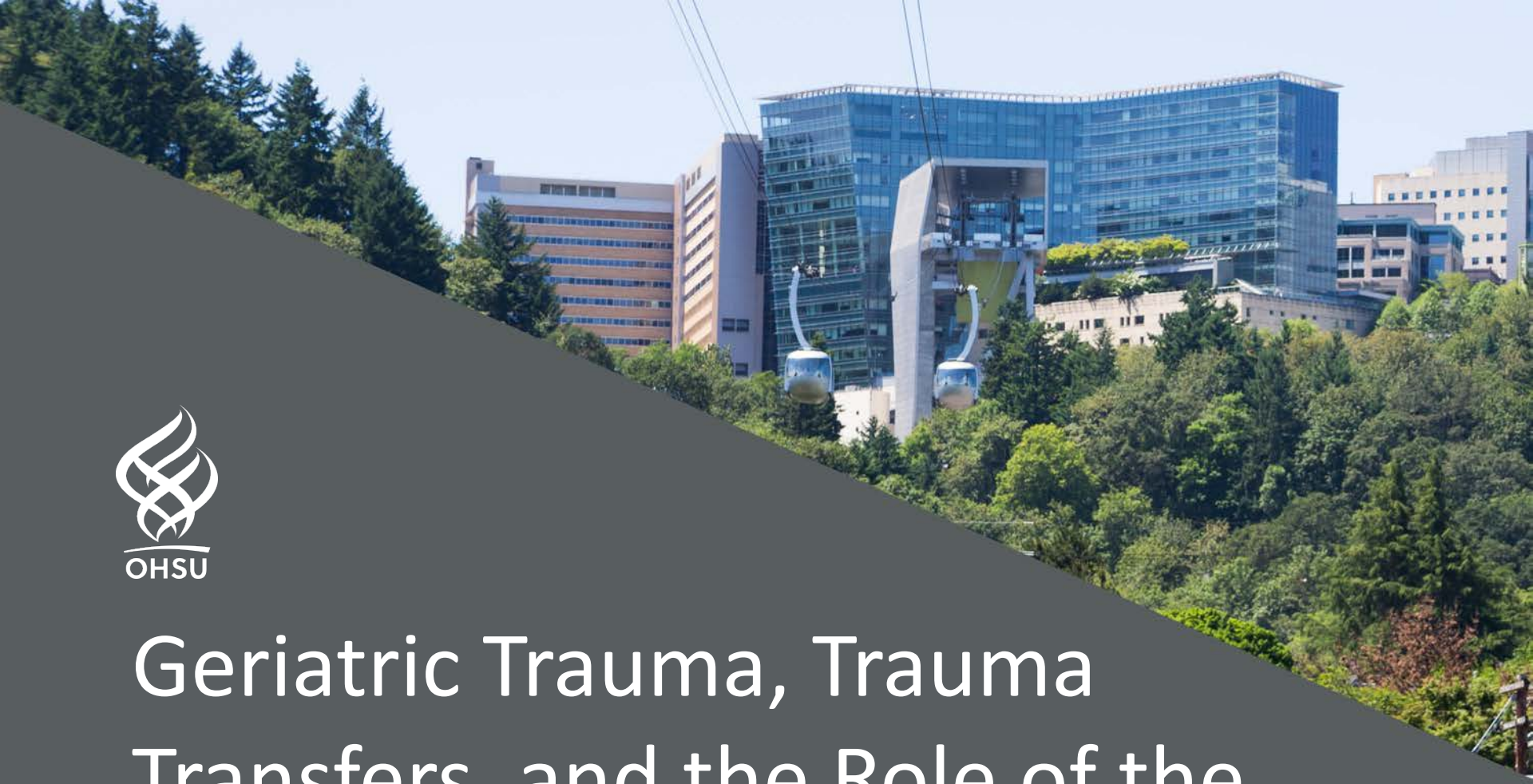

Geriatric Trauma, Trauma Transfers, and the Role of the POLST System

DATE: May 17, 2018

PRESENTED BY: Jessica Ballou, MD, MPH Resident, General Surgery

Disclosures

- None

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Overview

- What is Geriatric Trauma?
  - FALLS!
- Trauma Transfer System in Oregon
- Institutional Experience of POLST System and Trauma

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GERIATRIC TRAUMA

What is geriatric trauma?

- Typically defined as injury age 65+
  - Head injury worse outcomes beginning age 40

Calland, J.F., et al., *Evaluation and management of geriatric trauma: an Eastern Association for the Surgery of Trauma practice management guideline.* J Trauma Acute Care Surg, 2012. **73**(5 Suppl 4): p. S345-50.

Hukkelhoven, C.W., et al., *Patient age and outcome following severe traumatic brain injury: an analysis of 5600 patients.* J Neurosurg, 2003. **99**(4): p. 666-73.

What makes geriatric trauma different?

- Worse outcomes than younger trauma patients
- Distinct injury patterns, severity, and sequelae
- Frailty: Decreased physiologic reserve leading to impaired ability to withstand physiologic stress

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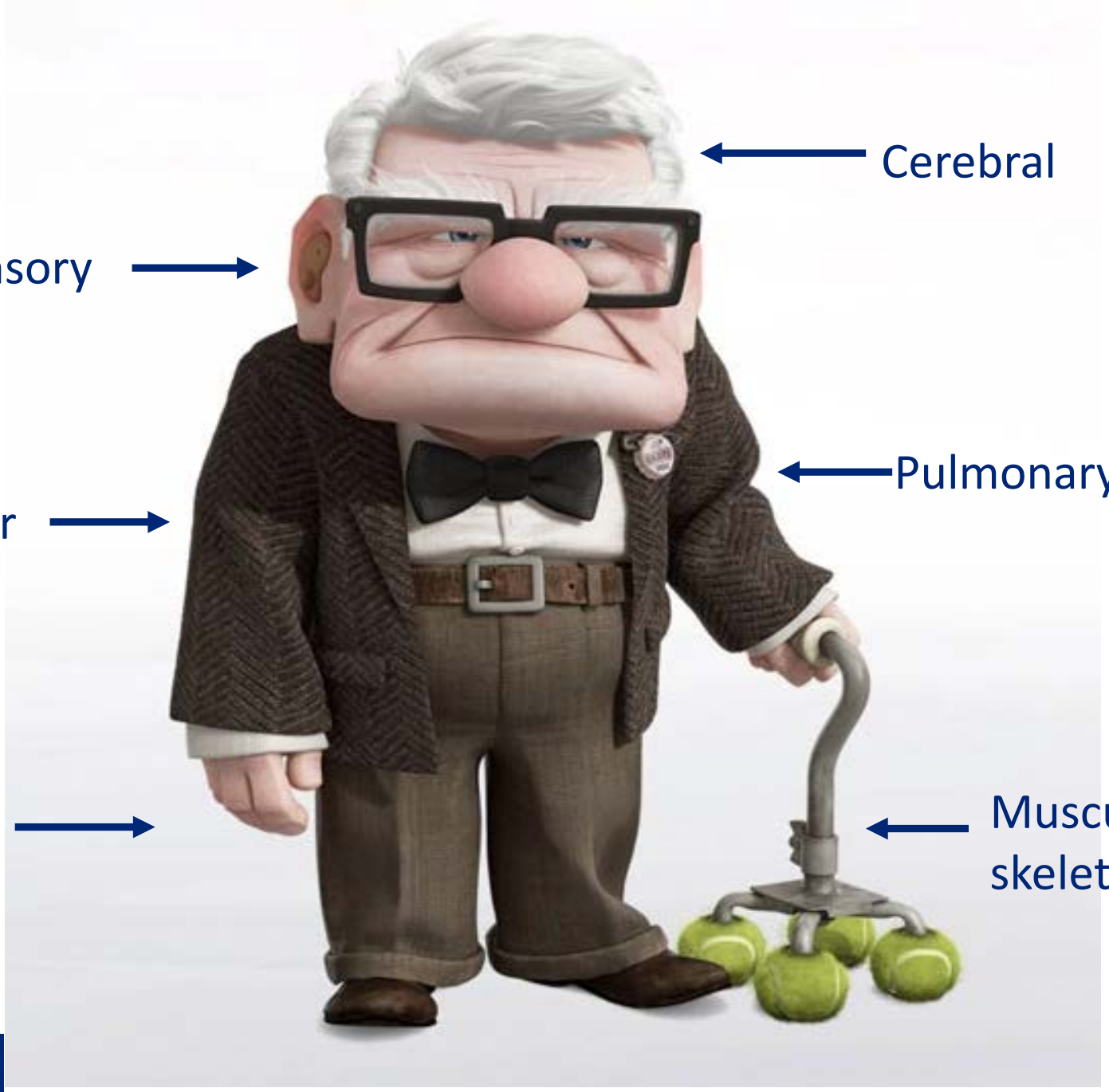
Kozar, R.A., et al., *Injury in the aged: Geriatric trauma care at the crossroads.* J Trauma Acute Care Surg, 2015. **78**(6): p. 1197-209.



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"Up." Walt Disney Studios Home Entertainment, 2013.

Cerebral

Age-Related Changes	Effect on Trauma	Implications
Increased intracranial space due to cerebral atrophy	Greater likelihood of intracranial bleed	Worse injury with minor trauma
Preexisting Dementia/ Neurovascular disorders		Difficult exam

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Adapted from: Dalton et al. Complexities in Geriatric Trauma Patients. Journal of Emergency Medical Services. Nov 2015.

Sensory

Age-Related Changes	Effect on Trauma	Implications
Decreased vision	Impaired pupil response	Difficult Exam
Decreased Hearing		
Neuropathies/ altered pain perception	Increase in pain threshold	May miss injuries

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Adapted from: Dalton et al. Complexities in Geriatric Trauma Patients. Journal of Emergency Medical Services. Nov 2015.

Cardiovascular

Age-Related Changes	Effect on Trauma	Implications
Vessels lose elasticity	Response to blood loss/hypotension blunted	Hypoperfusion not appreciated, pulse rate unreliable
Decreased sensitivity to catecholamines	Relative hypotension (SBP ≦110 mmHg)	
Arrhythmias/Valve changes	Anticoagulants	Major bleeding with minimal injury

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Adapted from: Dalton et al. Complexities in Geriatric Trauma Patients. Journal of Emergency Medical Services. Nov 2015.

Pulmonary

Age-Related Changes	Effect on Trauma	Implications
Stiffened chest wall Reduced oxygen exchange	Chest muscles may fatigue	Hypoxia causing AMS
Emphysema	Susceptibility to pneumothorax with blunt trauma	Higher risk respiratory failure
Decreased airway protection		Higher rate aspiration Pneumonia

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Adapted from: Dalton et al. Complexities in Geriatric Trauma Patients. Journal of Emergency Medical Services. Nov 2015.

Integumentary (Skin)

Age-Related Changes	Effect on Trauma	Implications
Atrophy oil glands	Skin tears/breakdown	Bleeding
Loss of structural support from elastin fibers		
Fewer cells	Difficulty regulating body temp	Hypothermia

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Adapted from: Dalton et al. Complexities in Geriatric Trauma Patients. Journal of Emergency Medical Services. Nov 2015.

Musculoskeletal

Age-Related Changes	Effect on Trauma	Implications
Osteoporosis, brittle bone Kyphosis/Lordosis Arthritis Degenerative Spine disease	More prone to fractures Spinal cord vulnerable to injury	Low impact or Ground level falls associated with fractures More difficult intubation
Rigid Chest Wall	Rib fractures prone to contusion	Rib fractures predispose to pneumonia

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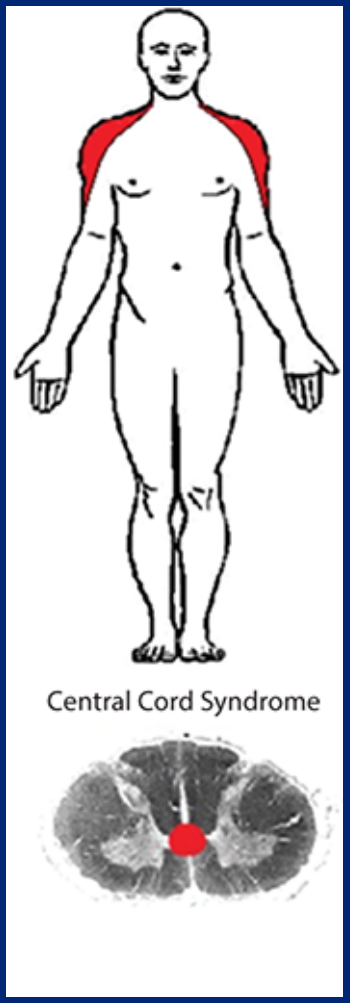
Adapted from: Dalton et al. Complexities in Geriatric Trauma Patients. Journal of Emergency Medical Services. Nov 2015.

Central Cord Syndrome

- Hyperextension of neck
- May not have bony injury
- Motor and sensory loss in Arms > Legs



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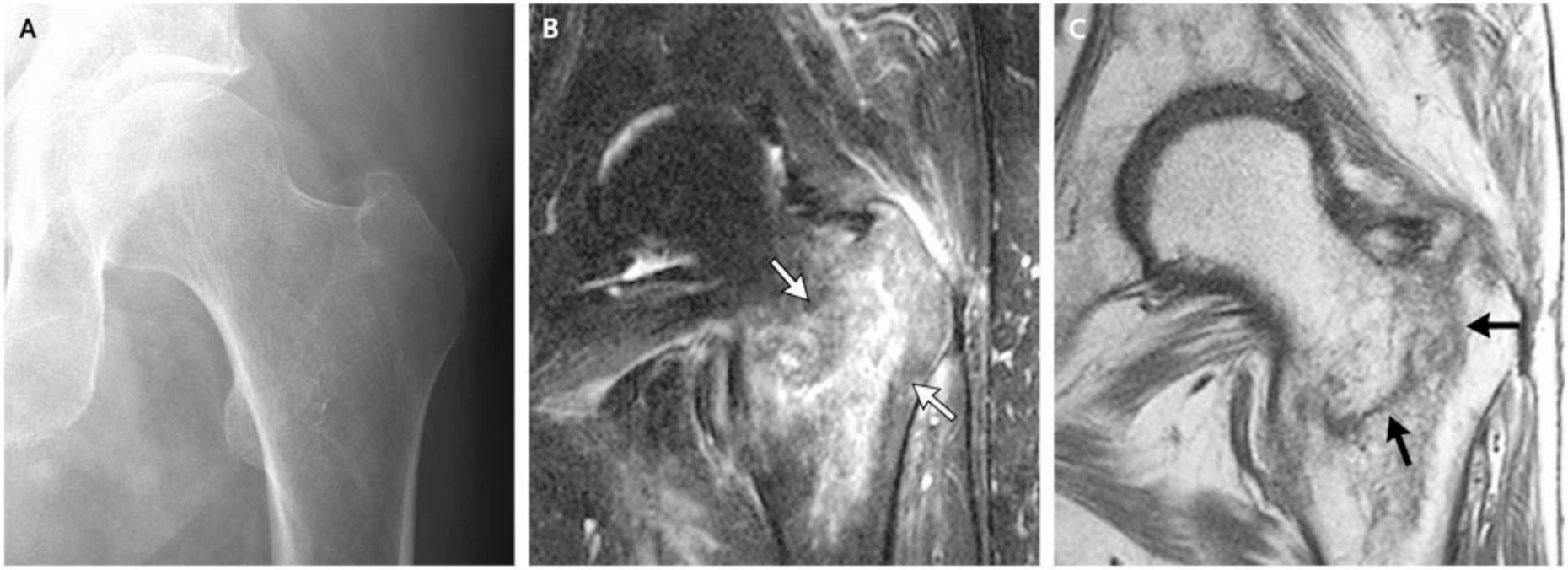
Hip pain after a fall…

Occult Hip Fracture



Vinson EN. N Engl J Med 2008;359:e33.

The NEW ENGLAND JOURNAL of MEDICINE

Occult Hip Fracture

- Moderate evidence supports **MRI** for diagnosis of presumed hip fracture not apparent on initial radiographs.

American Academy of Orthopedic Surgeons. Management of Hip Fractures in the Elderly Evidence-based clinical practice guideline. 2014

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Take Home:

Age-related changes can lead to missed injuries in elderly trauma patients

Friday, May 18 (cont.)

Track 3

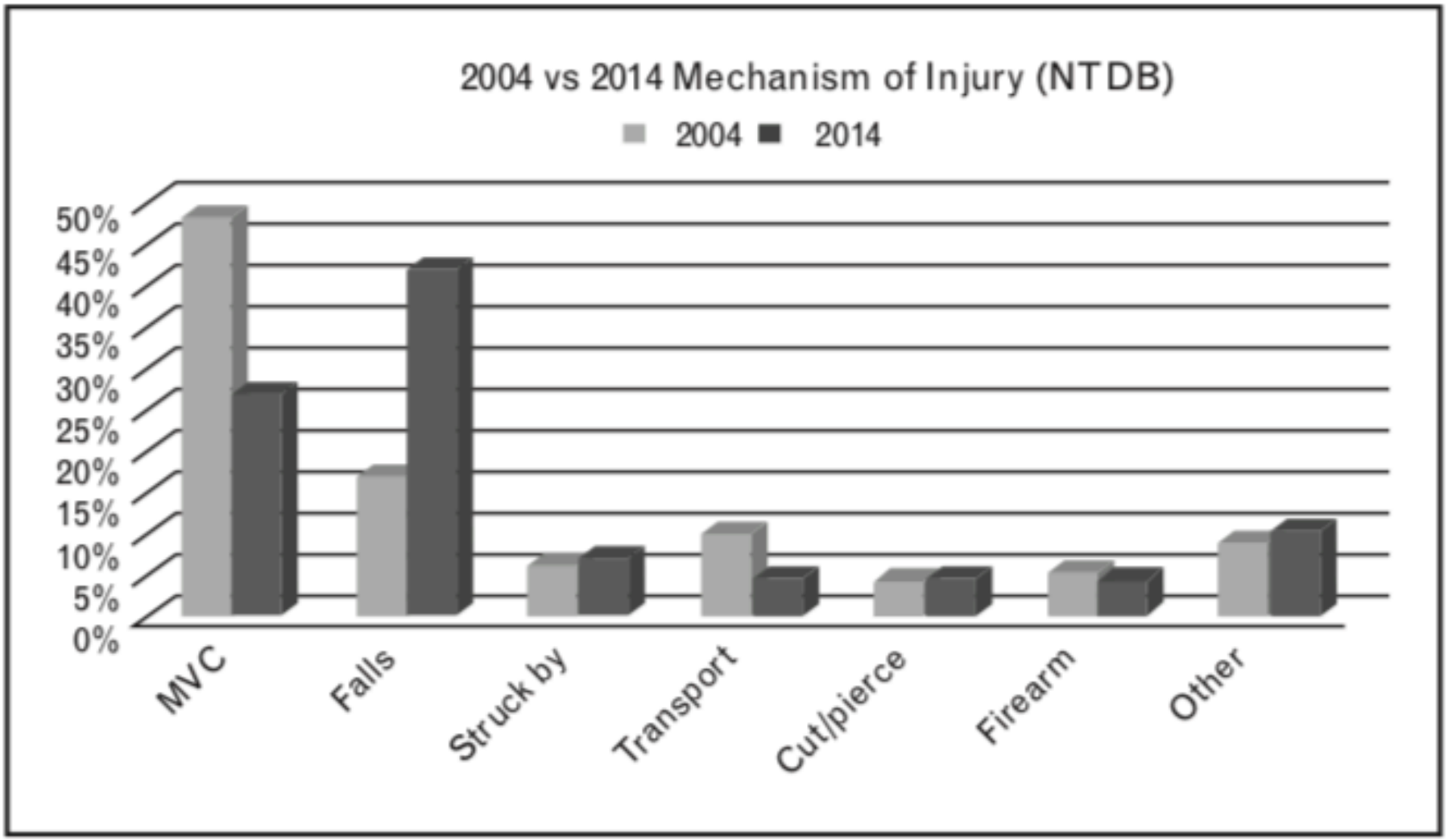
9:00—9:55am

Interprofessional Team Approaches to Reducing Falls In Rural Communities

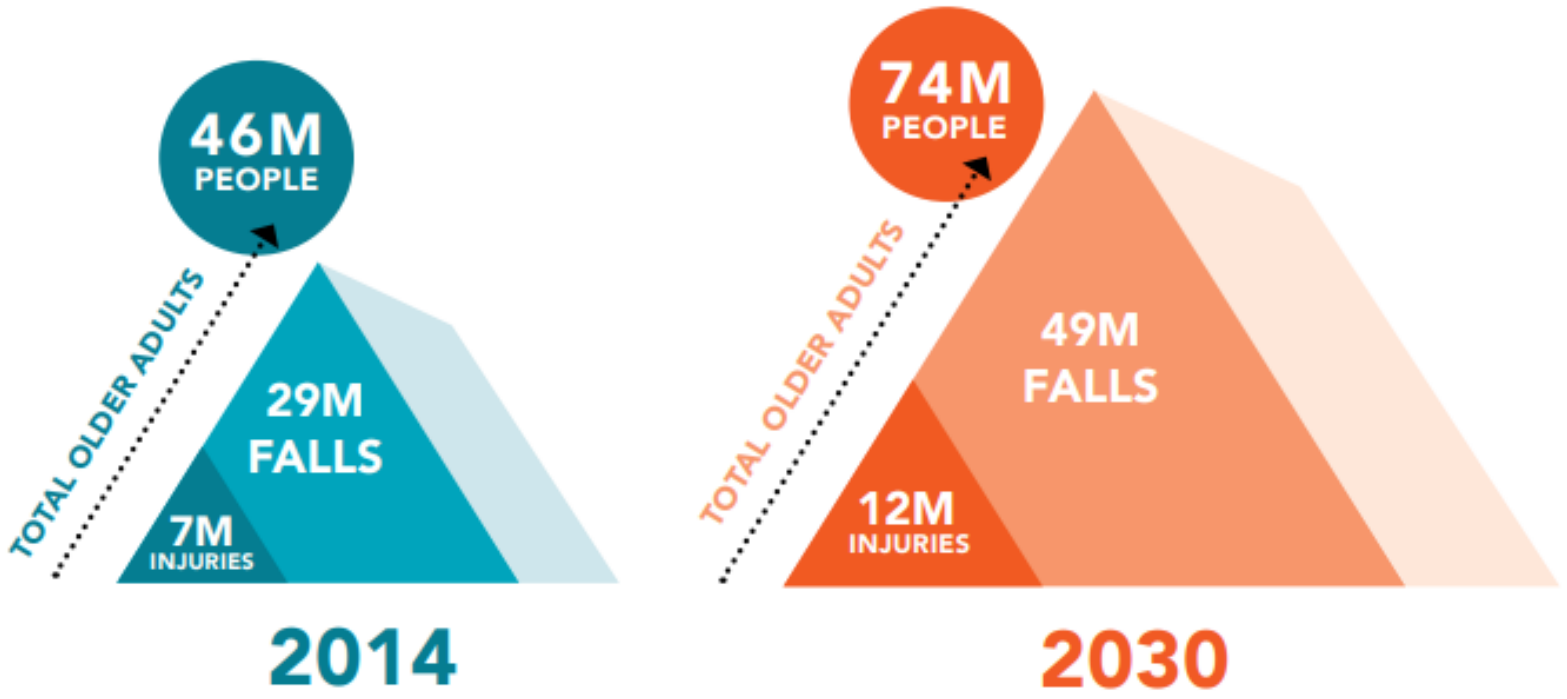
Snake

Elizabeth Eckstrom, MD, MPH, Professor & Section Chief, Geriatrics, Division of General Internal Medicine & Geriatrics, Oregon Health & Science University
Glenise McKenzie, PhD,RN, Associate Professor of Nursing, Oregon Health & Science University

This workshop will share best practices for primary care team-based interventions to reduce falls by older adults in rural settings. The presenters will briefly review the CDC's STEADI (Stopping Elder's Accidents, Deaths, and Injuries) falls prevention initiative, share tips we found to be successful when rolling out falls prevention in primary care, and leave plenty of time for group discussion and brainstorming ways to improve fall prevention in your local communities.



Adams SD, Holcomb JB. Geriatric trauma. Curr Opin Crit Care. 2015 Dec;21(6):520-6.



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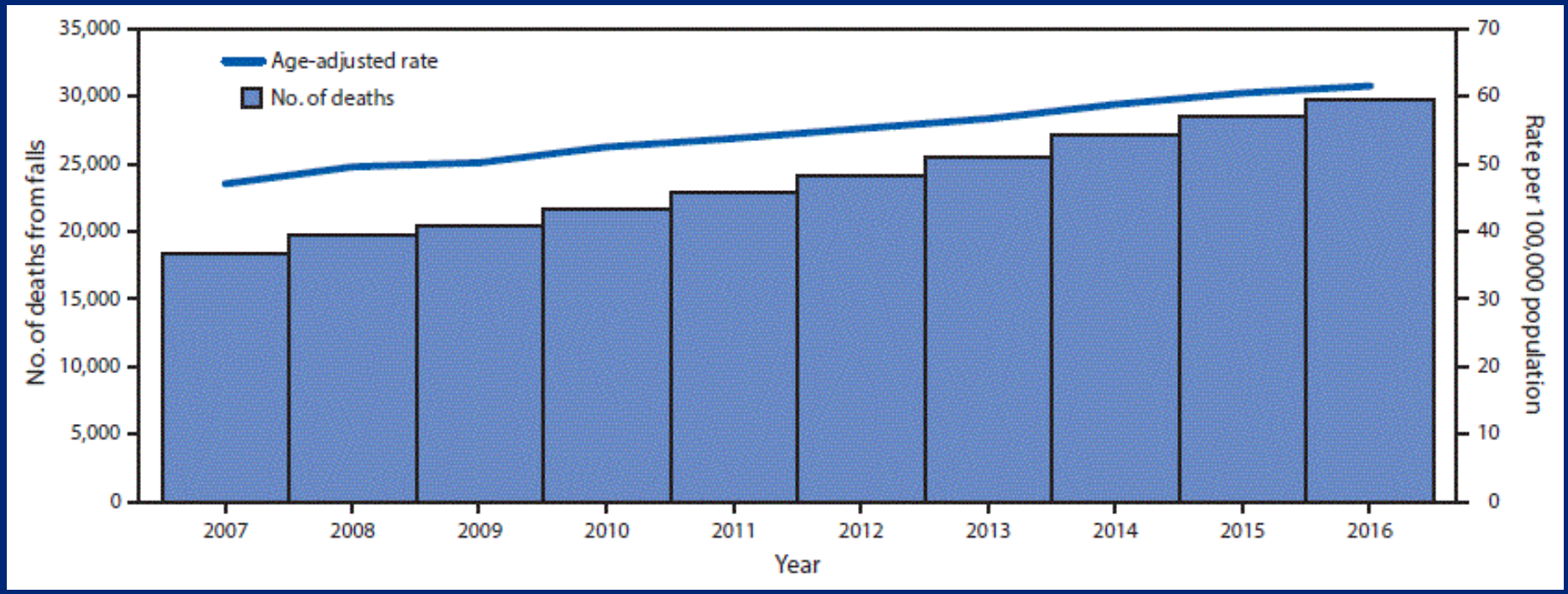
Source: https://www.cdc.gov/steadi



Burns E, Kakara R. Deaths from Falls Among Persons Aged ≥65 Years — United States, 2007–2016. MMWR Morb Mortal Wkly Rep 2018;67:509–514. DOI: http://dx.doi.org/10.15585/mmwr.mm6718a1.

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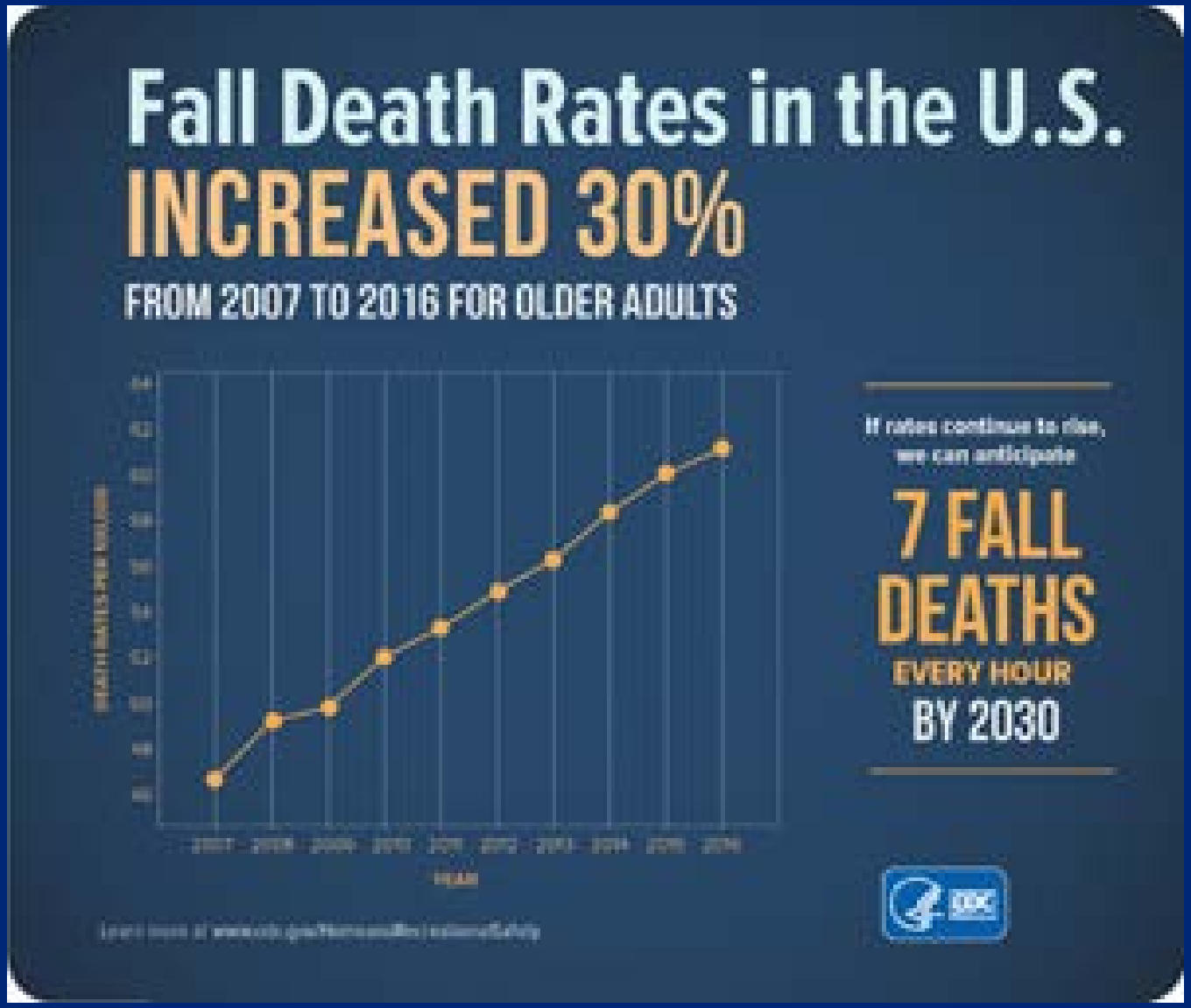

Burns E, Kakara R. Deaths from Falls Among Persons Aged ≥65 Years — United States, 2007–2016. MMWR Morb Mortal Wkly Rep 2018;67:509–514. DOI: http://dx.doi.org/10.15585/mmwr.mm6718a1.

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Predicting Falls

- Past falls
- Living alone
- Use of walking aid
- Depression
- Cognitive deficit
- ≧ 6 medications

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Carpenter CR, Avidan MS, Wildes T, et al. Predicting geriatric falls following an episode of emergency department care: a systematic review. Acad Emerg Med 2014; 21:1069 – 1082.

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"Up." Walt Disney Studios Home Entertainment, 2013.

Fall Screening

1. Have you fallen in the past year?
2. Do you feel unsteady when standing or walking?
3. Do you worry about falling?
4. Review and manage medications

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Check for Safety

A Home Fall Prevention Checklist for Older Adults

Contact your local community or senior center for information on exercise, fall prevention programs, or options for improving home safety.

For additional information on fall prevention, visit go.usa.gov/xN9XA

Centers for Disease Control and Prevention
National Center for Injury Prevention and Control

2017

STEADI
Stopping Elderly Accidents, Deaths & Injuries

Use this checklist to find and fix hazards in your home.

STAIRS & STEPS (INDOORS & OUTDOORS)

Are there papers, shoes, books, or other objects on the stairs?

- [ ] Always keep objects off the stairs.

Are some steps broken or uneven?

- [ ] Fix loose or uneven steps.

Is there a light and light switch at the top and bottom of the stairs?

- [ ] Have an electrician put in an overhead light and light switch at the top and bottom of the stairs. You can get light switches that glow.

Has a stairway light bulb burned out?

- [ ] Have a friend or family member change the light bulb.

Is the carpet on the steps loose or torn?

- [ ] Make sure the carpet is firmly attached to every step, or remove the carpet and attach non-slip rubber treads to the stairs.

Are the handrails loose or broken? Is there a handrail on only one side of the stairs?

- [ ] Fix loose handrails, or put in new ones. Make sure handrails are on both sides of the stairs, and are as long as the stairs.

FLOORS

When you walk through a room, do you have to walk around furniture?

- [ ] Ask someone to move the furniture so your path is clear.

Do you have throw rugs on the floor?

- [ ] Remove the rugs, or use double-sided tape or a non-slip backing so the rugs won't slip.

Are there papers, shoes, books, or other objects on the floor?

- [ ] Pick up things that are on the floor. Always keep objects off the floor.

Do you have to walk over or around wires or cords (like lamp, telephone, or extension cords)?

- [ ] Coil or tape cords and wires next to the wall so you can't trip over them. If needed, have an electrician put in another outlet.

KITCHEN

Are the things you use often on high shelves?

- [ ] Keep things you use often on the lower shelves (about waist high).

Is your step stool sturdy?

- [ ] If you must use a step stool, get one with a bar to hold on to. Never use a chair as a step stool.

BEDROOMS

Is the light near the bed hard to reach?

- [ ] Place a lamp close to the bed where it's easy to reach.

Is the path from your bed to the bathroom dark?

- [ ] Put in a nightlight so you can see where you're walking. Some nightlights go on by themselves after dark.

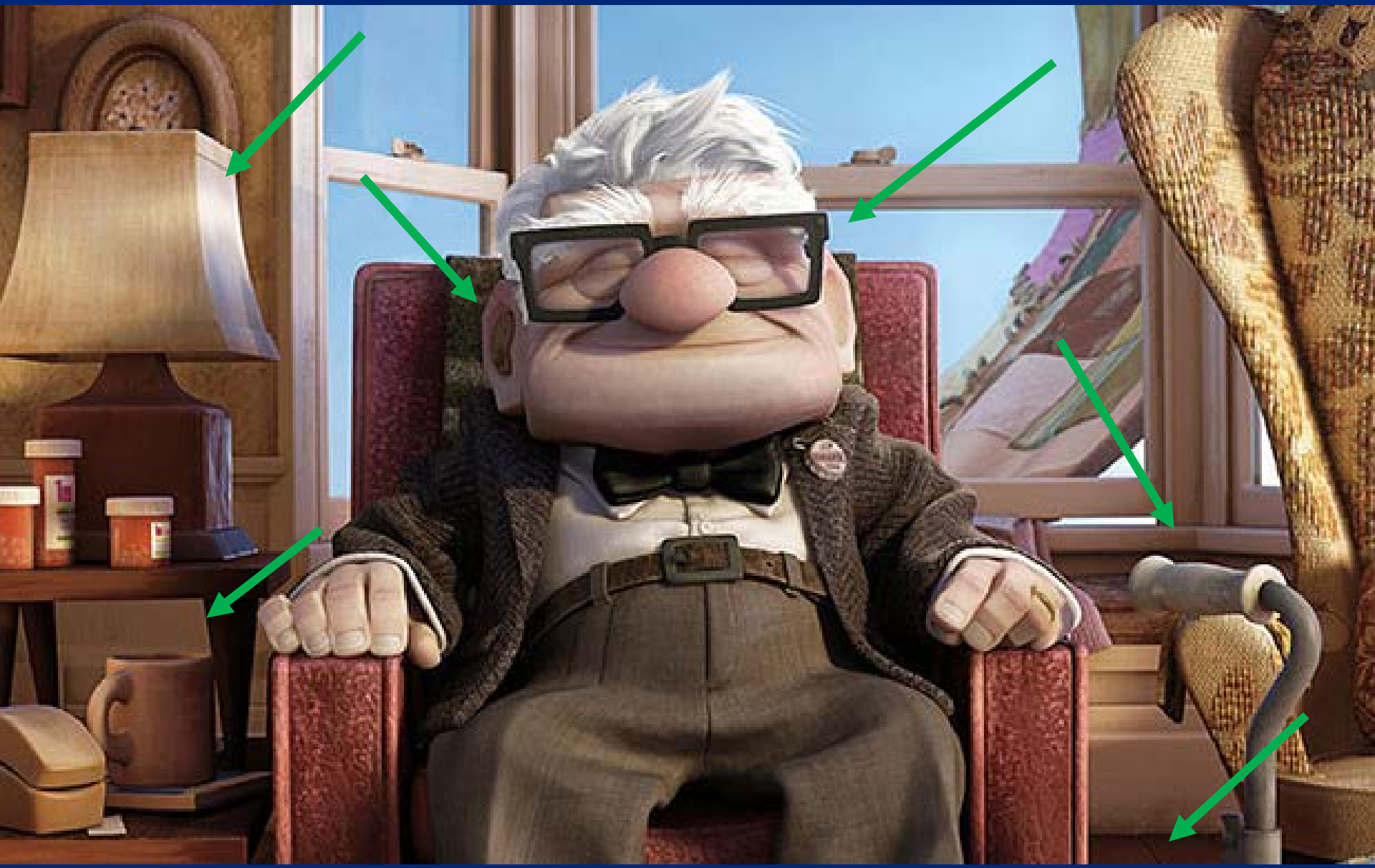
BATHROOMS

Is the tub or shower floor slippery?

- [ ] Put a non-slip rubber mat or self-stick strips on the floor of the tub or shower.

Do you need some support when you get in and out of the tub, or up from the toilet?

- [ ] Have grab bars put in next to and inside the tub, and next to the toilet.



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"Up." Walt Disney Studios Home Entertainment, 2013.

WHAT HAPPENS AFTER AN INJURY?

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Rural Trauma Team Development Course©

Pam Bilyeu, MN RN TCRN
OHSU Trauma Coordinator
bilyeup@ohsu.edu

https://www.facs.org/quality-programs/trauma/education/rttdc

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Rural Trauma Team Development Course decreases time to transfer for trauma patients

Bradley M. Dennis, MD, Michael A. Vella, MD, MBA, Oliver L. Gunter, MD, MPH, Melissa D. Smith, MSN, RN, Catherine S. Wilson, MSN, RN, Mayur B. Patel, MD, MPH, Timothy C. Nunez, MD, *and* Oscar D. Guillamondegui, MD, MPH, *Nashville, Tennessee*

- RTTDC group, n = 130; Control group, n = 123
- 41-minute reduction in time to transfer call (p = 0.03).
- 61-minute reduction in referring hospital LOS (p = 0.02)
- No difference in mortality

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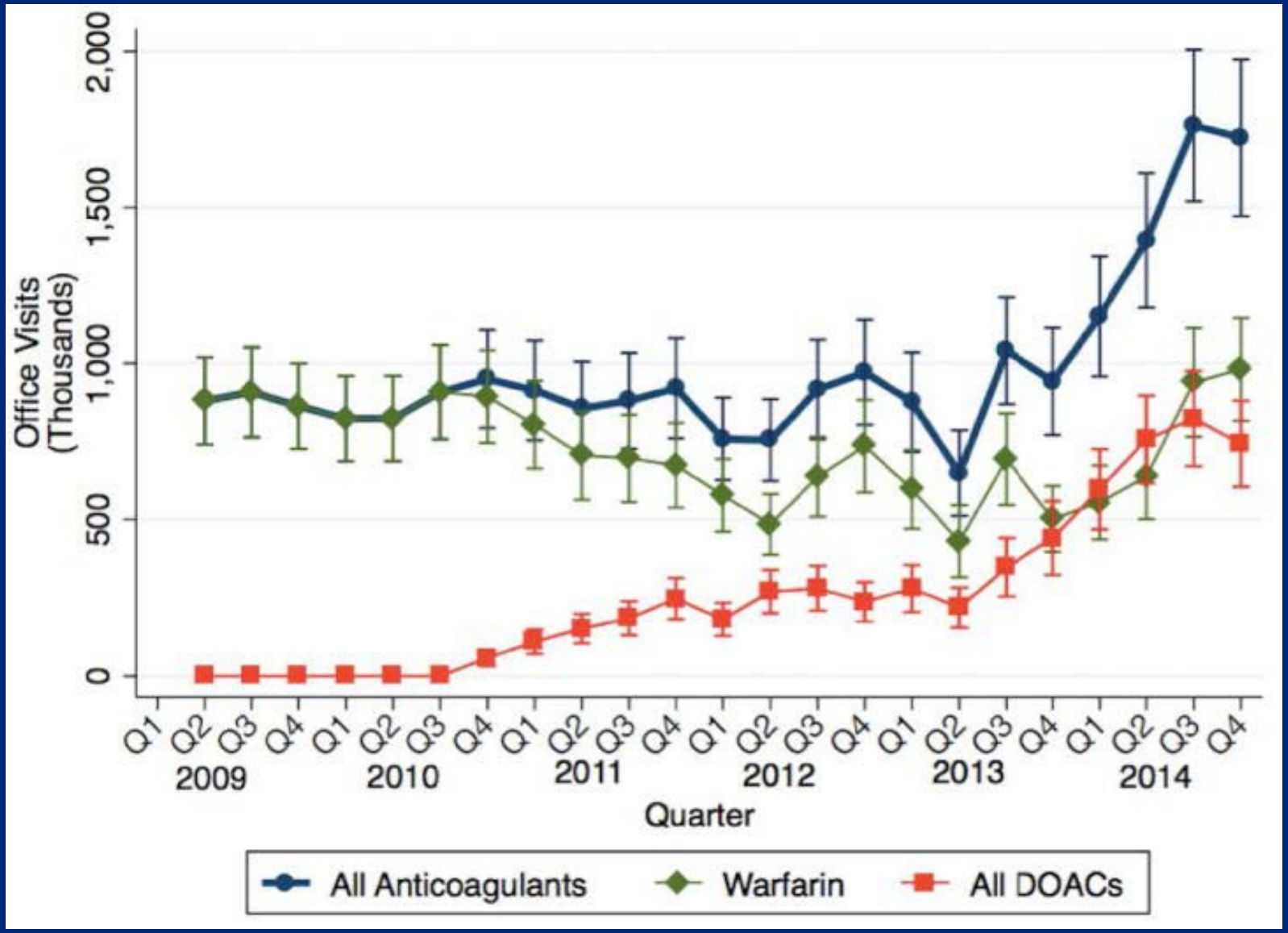
J Trauma Acute Care Surg
Volume 81, Number 4

Contributing/Confounding Comorbidities:

- Acute coronary syndrome
- Hypovolemia
- Urinary Tract Infection
- Pneumonia
- Acute Renal Failure
- Cerebrovascular event
- Syncope

Notable Medications

- Anticoagulants (ASA, Plavix, Coumadin, DOAC, etc.)
- Beta blockers
- ACE inhibitors
- Diabetes--Insulin/glycemic agents



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Barnes et al. National Trends in Ambulatory Oral Anticoagulant Use. Am J Med. 2015 December ; 128(12)

AAST 2013 PLENARY PAPER

Mortality after ground-level fall in the elderly patient taking oral anticoagulation for atrial fibrillation/flutter: A long-term analysis of risk versus benefit

Tazo Stowe Inui, MD, Ralitza Parina, MPH, David C. Chang, MBA, MPH, PhD, Thomas S. Inui, MD, MSc, *and* **Raul Coimbra, MD, PhD,** *San Diego, California*

- 42,913 on oral anticoagulant (OAC) and 334,960 controls.

TABLE 4. Calculated Annual Mortality With Associated Head Injury Compared With the Literature-Based Annual Risk for Stroke

CHA_2DS_2-VASc Score	Annualized Mortality With Head Injury if Patients Survive Their First Fall, %			Literature-Based Annual Stroke Risk, %
	OAC	No OAC	*p*	
0	2.0	1.0	0.589	0.0
1	0.5	0.9	0.450	1.3
2	2.3	1.1	<0.001	2.2
3	2.2	1.0	<0.001	3.2
4	2.1	1.0	<0.001	4.0
5	2.1	1.6	<0.001	6.7
6	2.5	2.1	0.014	9.8
7	4.6	2.2	<0.001	9.6
8	2.1	2.4	0.881	6.7
9	n/m	n/m	n/a	15.2

Conclusion:

Patients with CHA2DS2-VASc scores **1 to 3** should give **strong consideration** to discontinuing their OAC ***if they are deemed high risk for falls.***

TRAUMA TRANSFER SYSTEM IN OREGON

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Right Patient **Right Place** **Right Time**

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- **Major Trauma or Need Exceed Capacity of Site**
- Glasgow Coma Scale <14 or lateralizing signs
- Spinal fracture or spinal cord deficit
- Complex pelvis/acetabulum fractures
- >2 rib fractures or bilateral rib fractures with pulmonary contusion (if no critical care)
- Significant torso injury with advanced comorbid disease

Any doubt: Call

WHERE SHOULD PATIENTS BE TRANSFERRED?

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Types of Trauma Facilities

Definitive Care

- Level 1: OHSU and LEH
  - 24hr full trauma capabilities, including neurosurgery, resident training and research
- Level 2: Same as level 1, may not have residents or research

Stabilization

- Level 3: Provide initial evaluation and stabilization, including surgical intervention
- Level 4: Provide resuscitation and stabilization prior to transport

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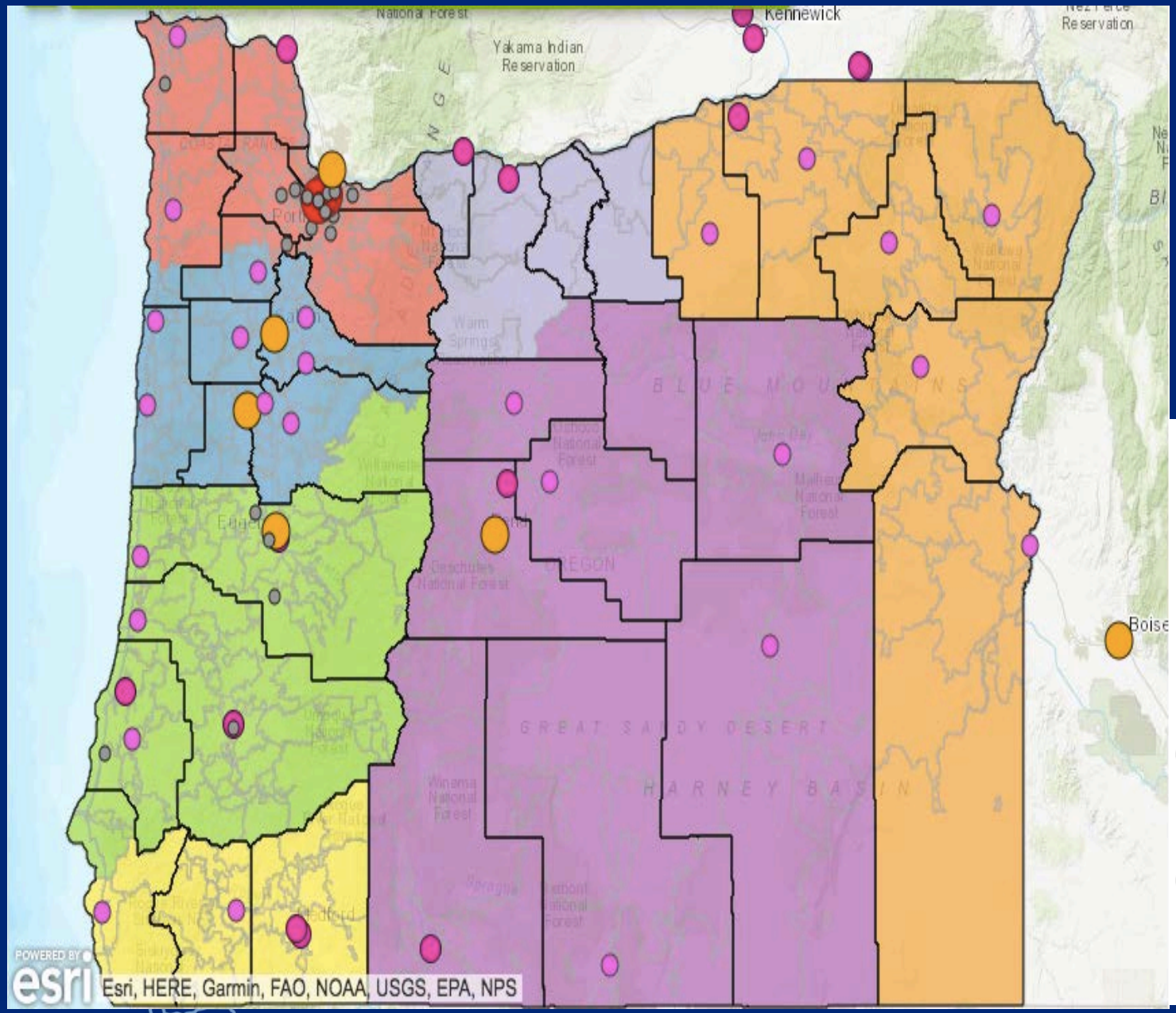

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Source: http://www.oregon.gov/oha/ph/providerpartnerresources/emstraumasystems/traumasystems

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OREGON HEALTH & SCIENCE UNIVERSITY

2016 Trauma Program Report

Transforming Trauma Care

- 21 Trauma ICU beds
- 11 adult trauma staff

- 3000 trauma patients
- 1044 (35%) transfer patients

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Most Common Subspecialties for Transfers

Transfer patients are a special patient population: patients are transferred for services distinct to AMCs.

UHC Service/Subservice Line	Percentage of All Transfers
Trauma/Trauma	9.4%
Cardiology/Invasive Cardiology	6.7%
General Medicine/Gastroenterology	5.6%
Psychiatry/General Psychiatry	4.4%
Cardiac Surgery/Cardiac Surgery	3.7%
General Medicine/Hepatobiliary	3.3%
General Medicine/Sepsis & Infectious Disease	3.1%
Cardiology/Noninvasive Cardiology	3.1%
General Medicine/Respiratory Disorders	3.0%
Neurosurgery/Neurosurgery	3.0%

Source: UHC Clinical Data Base/Resource Manager™, Peer Group A

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RESUS 3
IntelliVue
MP5
71
20
100
72
PHILIPS

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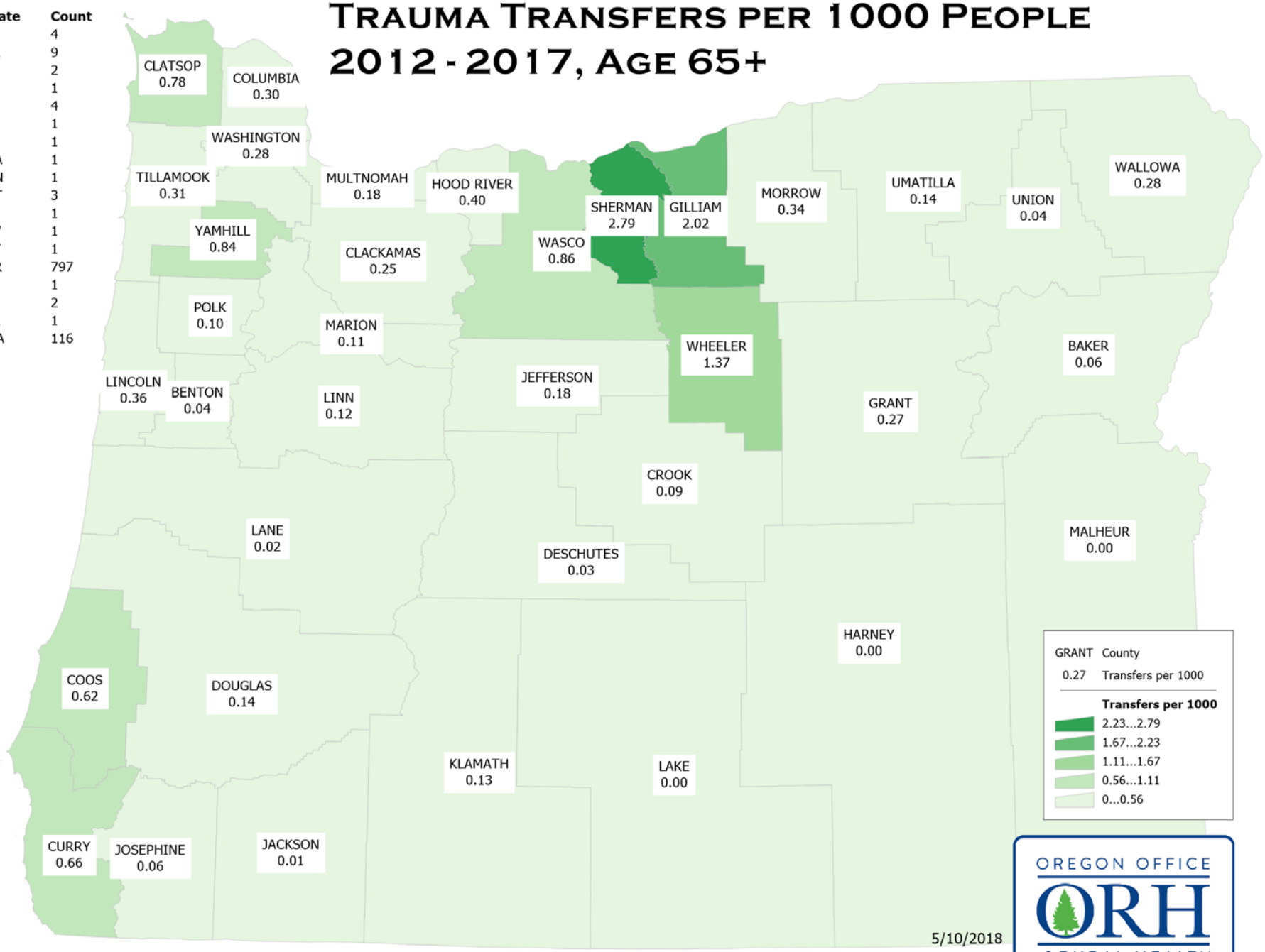
Trauma Transfers per 1000 People
2012 - 2017, Age 65+

State	Count
AZ	4
CA	9
HI	2
IA	1
ID	4
IL	1
IN	1
MA	1
MN	1
MT	3
NJ	1
NV	1
NY	1
OR	797
SC	1
TX	2
VA	1
WA	116



5/10/2018

OREGON OFFICE of RURAL HEALTH

Trauma Transfers, 2012-2017

Variable	Age 15-64 N=1532	Age 65+ N= 952	P-value
Male gender	1095 (71%)	561 (59%)	<0.001
Blunt trauma	1418 (93%)	946 (99%)	<0.001
Severe Trauma (ISS>15)	560 (36%)	378 (40%)	0.115
Mortality	34 (2%)	55 (6%)	<0.001
Ground miles from OHSU (median, IQR)	50 (15-132)	21 (8.5-87)	<0.001

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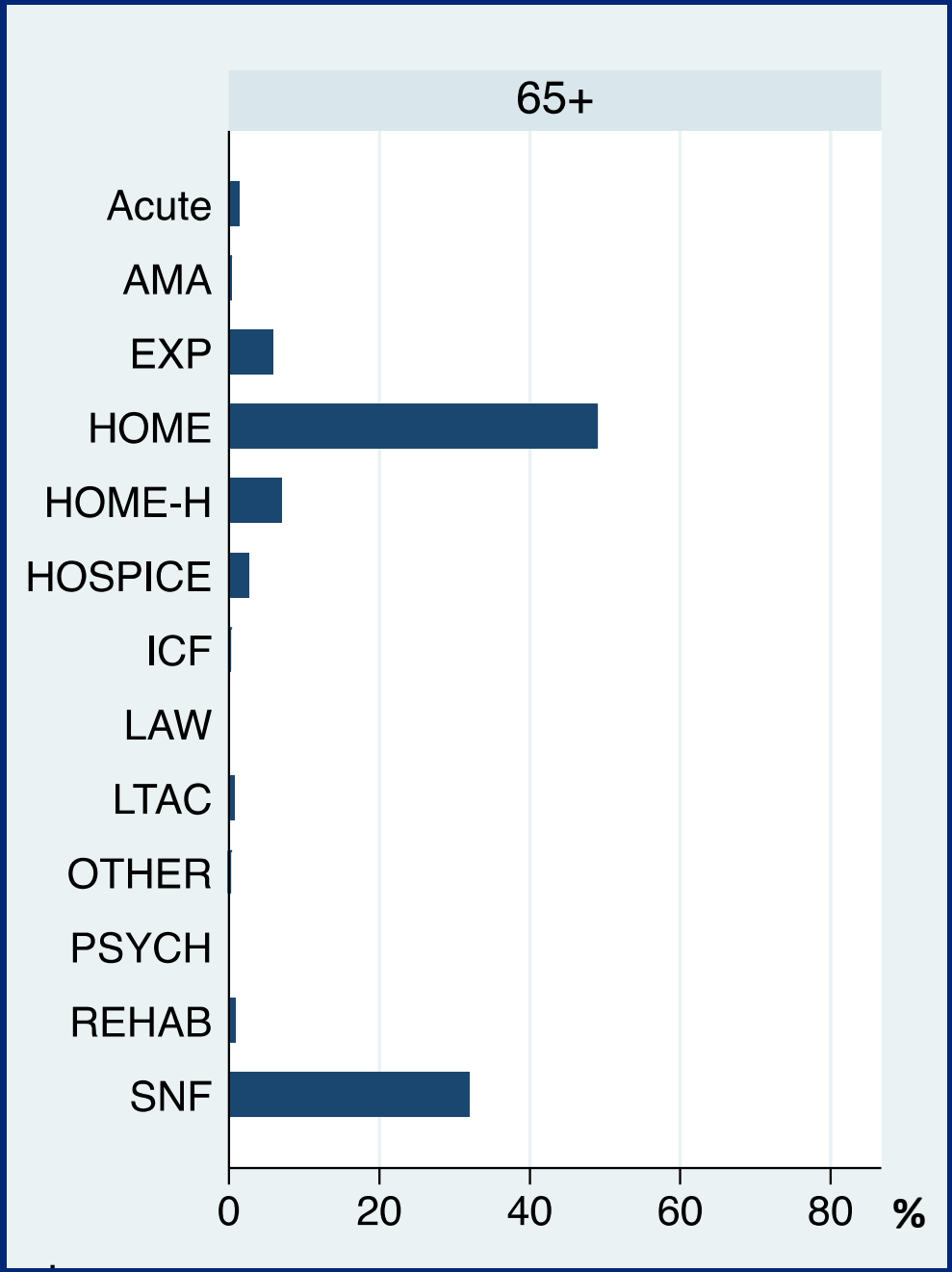
Trauma Transfer Injuries

Injury	Age 15-64 N=1532	Age 65+ N= 952	P-value
Head	666 (43%)	532 (56%)	<0.001
Chest	531 (35%)	360 (38%)	0.111
Abdomen/ Pelvis	372 (24%)	129 (14%)	<0.001
Extremities	590 (38%)	240 (25%)	<0.001



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Key Transfer Information

- Care Everywhere (EPIC)
- Medical/Medication history
- Neuro Exam
- Imaging (PACS)
- Labs: CBC, Chem, Coags
- Advance Directives/Surrogate Info

Physician Orders for Life-Sustaining Treatment (POLST)

Resuscitation: Unresponsive and not breathing

CPR vs DNR

Medical Interventions: Pulse and breathing

Comfort Measures Only

Limited

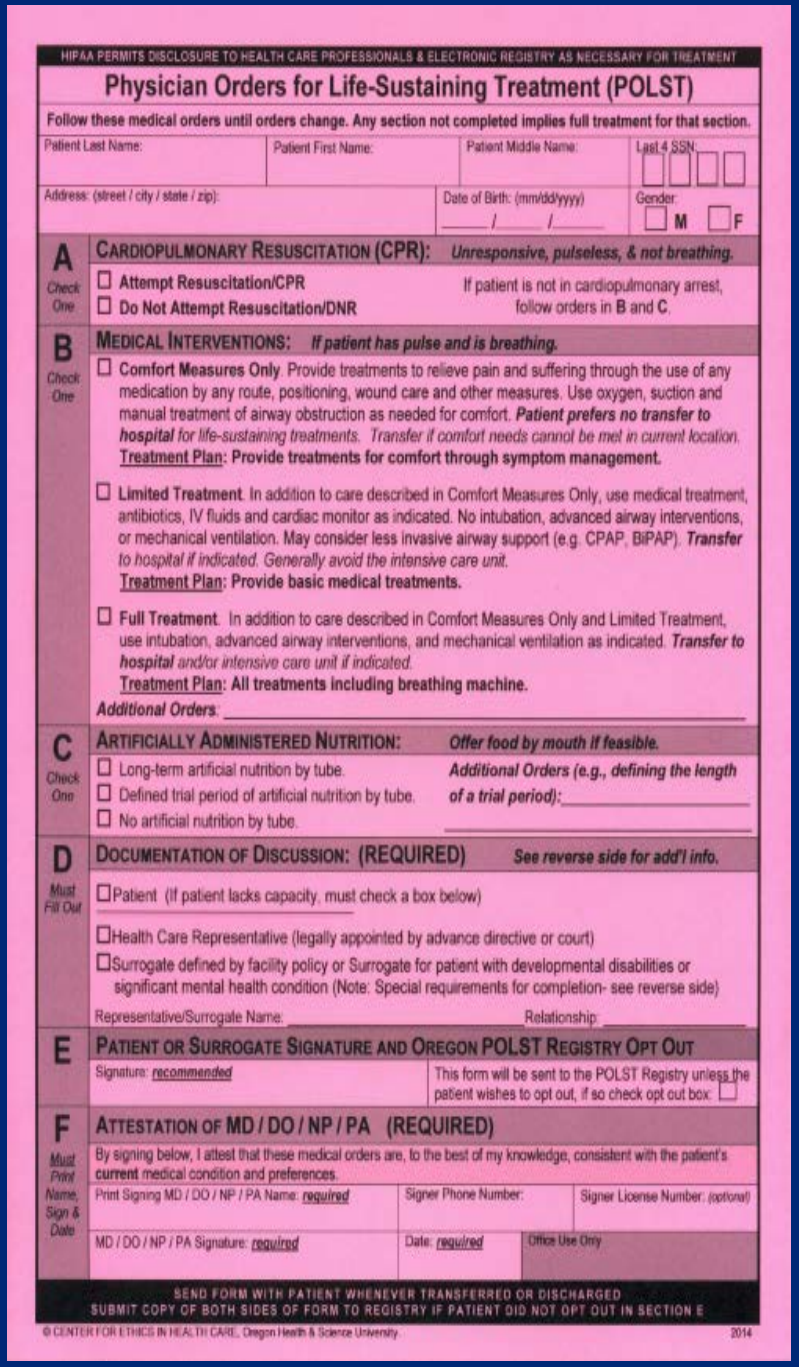
Full

Artificially Administered Nutrition

No

Defined Trial Period

Yes



HIPAA PERMITS DISCLOSURE TO HEALTH CARE PROFESSIONALS & ELECTRONIC REGISTRY AS NECESSARY FOR TREATMENT

Physician Orders for Life-Sustaining Treatment (POLST)

Follow these medical orders until orders change. Any section not completed implies full treatment for that section.

Patient Last Name: | Patient First Name: | Patient Middle Name: | Last 4 SSN:

Address: (street / city / state / zip): | Date of Birth: (mm/dd/yyyy) ___/___/___ | Gender: ☐ M ☐ F

A Check One — **CARDIOPULMONARY RESUSCITATION (CPR):** *Unresponsive, pulseless, & not breathing.*

☐ Attempt Resuscitation/CPR
☐ Do Not Attempt Resuscitation/DNR

If patient is not in cardiopulmonary arrest, follow orders in **B** and **C**.

B Check One — **MEDICAL INTERVENTIONS:** *If patient has pulse and is breathing.*

☐ **Comfort Measures Only**. Provide treatments to relieve pain and suffering through the use of any medication by any route, positioning, wound care and other measures. Use oxygen, suction and manual treatment of airway obstruction as needed for comfort. ***Patient prefers no transfer to hospital*** *for life-sustaining treatments. Transfer if comfort needs cannot be met in current location.*
Treatment Plan: **Provide treatments for comfort through symptom management.**

☐ **Limited Treatment**. In addition to care described in Comfort Measures Only, use medical treatment, antibiotics, IV fluids and cardiac monitor as indicated. No intubation, advanced airway interventions, or mechanical ventilation. May consider less invasive airway support (e.g. CPAP, BiPAP). ***Transfer*** *to hospital if indicated. Generally avoid the intensive care unit.*
Treatment Plan: **Provide basic medical treatments.**

☐ **Full Treatment**. In addition to care described in Comfort Measures Only and Limited Treatment, use intubation, advanced airway interventions, and mechanical ventilation as indicated. ***Transfer to hospital*** *and/or intensive care unit if indicated.*
Treatment Plan: **All treatments including breathing machine.**

Additional Orders: _____

C Check One — **ARTIFICIALLY ADMINISTERED NUTRITION:** *Offer food by mouth if feasible.*

☐ Long-term artificial nutrition by tube.
☐ Defined trial period of artificial nutrition by tube.
☐ No artificial nutrition by tube.

Additional Orders (e.g., defining the length of a trial period): _____

D Must Fill Out — **DOCUMENTATION OF DISCUSSION: (REQUIRED)** *See reverse side for add'l info.*

☐ Patient (If patient lacks capacity, must check a box below)
☐ Health Care Representative (legally appointed by advance directive or court)
☐ Surrogate defined by facility policy or Surrogate for patient with developmental disabilities or significant mental health condition (Note: Special requirements for completion- see reverse side)

Representative/Surrogate Name: _____ Relationship: _____

E — **PATIENT OR SURROGATE SIGNATURE AND OREGON POLST REGISTRY OPT OUT**

Signature: *recommended* | This form will be sent to the POLST Registry unless the patient wishes to opt out, if so check opt out box: ☐

F Must Print Name, Sign & Date — **ATTESTATION OF MD / DO / NP / PA (REQUIRED)**

By signing below, I attest that these medical orders are, to the best of my knowledge, consistent with the patient's **current** medical condition and preferences.

Print Signing MD / DO / NP / PA Name: *required* | Signer Phone Number: | Signer License Number: *(optional)*

MD / DO / NP / PA Signature: *required* | Date: *required* | Office Use Only

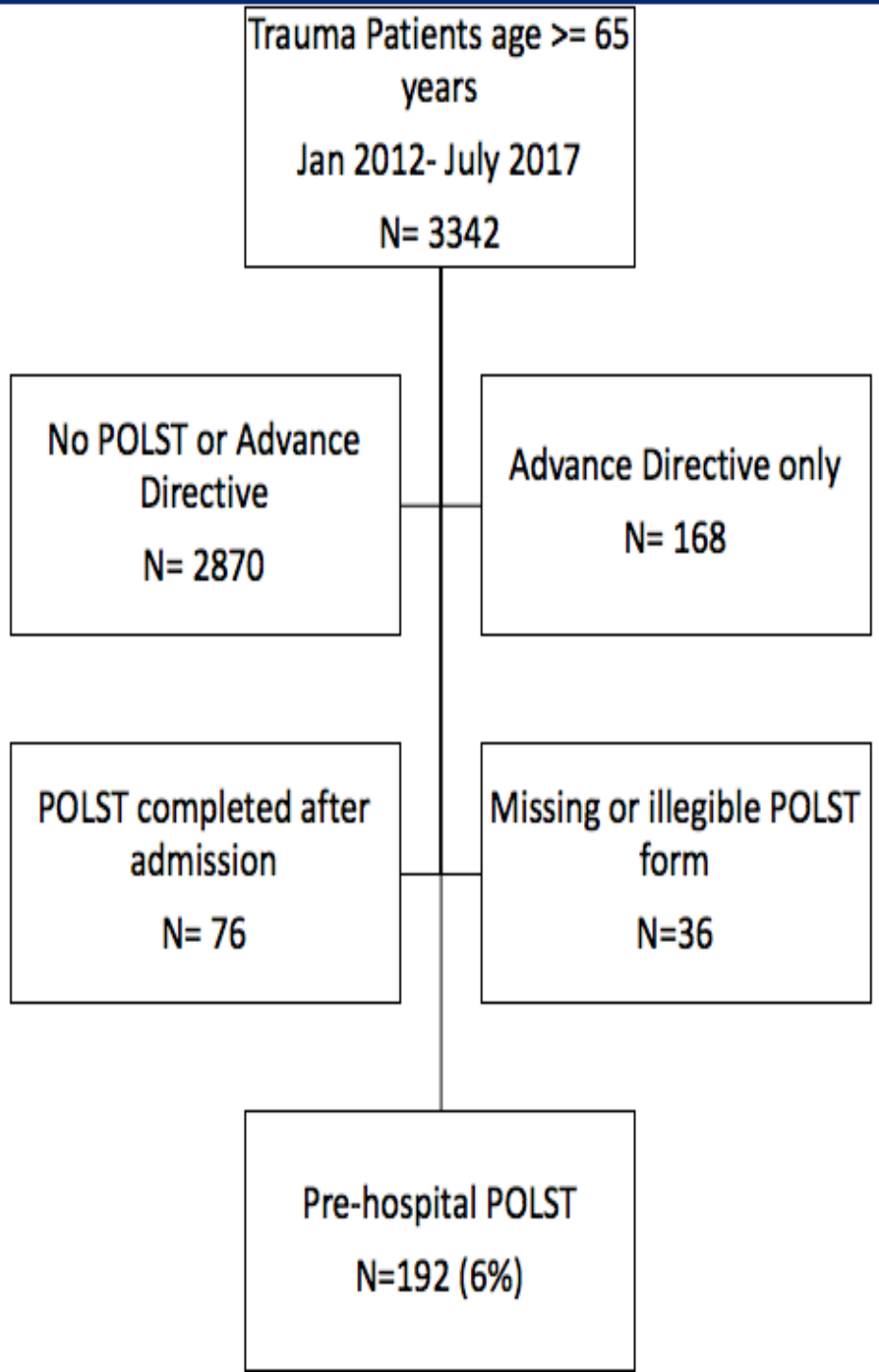
SEND FORM WITH PATIENT WHENEVER TRANSFERRED OR DISCHARGED
SUBMIT COPY OF BOTH SIDES OF FORM TO REGISTRY IF PATIENT DID NOT OPT OUT IN SECTION E

 2014

POLST and Trauma

Methods:

- All trauma patients age 65+
- POLST identified by prospective trauma registry
- Charts manually reviewed for:
  - Presence of POLST pre-arrival
  - Clinical course


Trauma Patients age >= 65 years
Jan 2012- July 2017
N= 3342
No POLST or Advance Directive
N= 2870
Advance Directive only
N= 168
POLST completed after admission
N= 76
Missing or illegible POLST form
N=36
Pre-hospital POLST
N=192 (6%)

6%

Had a POLST on arrival*

*Available in medical record

Results: POLST vs No POLST

	Pre-hospital POLST (N=192)	No POLST (N=3150)	p value
Median Age	86.4 (81-91)	76.7(70-85)	<0.001
Female Sex--no. (%)	123/192 (64%)	1403 (44%)	<0.001
Medicare--no. (%)	118/192 (61%)	1488 (47%)	<0.001

Comorbidities

	Pre-hospital POLST (N=192)	No POLST (N=3150)	p value
History of CHF--no. (%)	32 (17%)	299 (9%)	0.001
History of CVA--no. (%)	30 (16%)	271 (9%)	0.001
History of Alz/Dem/Parkinsons--no. (%)	85 (44%)	425 (13%)	<0.001
No Known Comorbidities	3 (2%)	312 (10%)	<0.001*

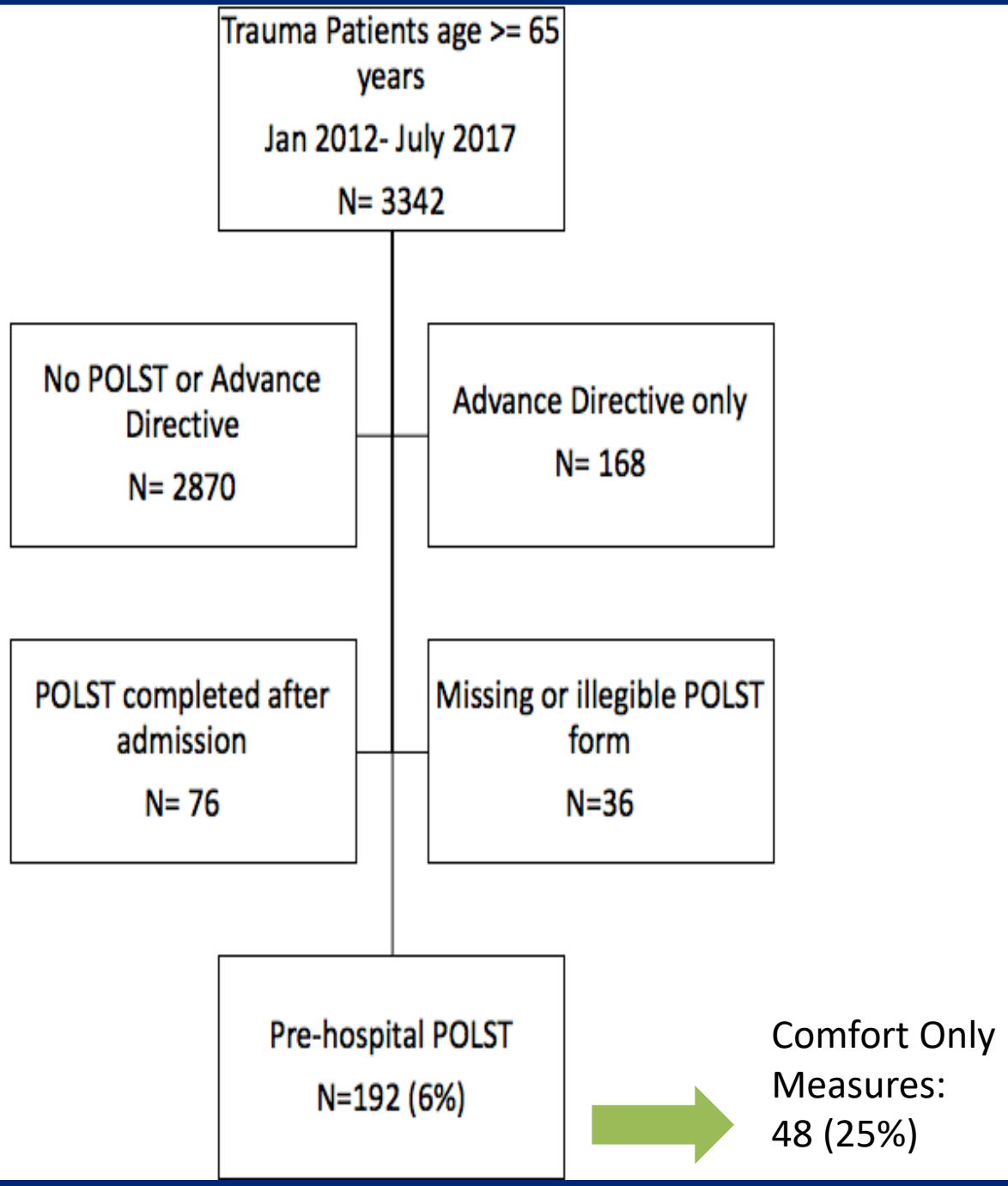
Breakdown of POLST Preferences

POLST Resuscitation	n(%)
Attempt Resuscitation	38 (20%)
Do Not Attempt Resuscitation	152 (80%)

POLST Treatment	n(%)
Full Treatment	40 (21%)
Limited Interventions	102 (54%)
Comfort Care	48 (25%)

POLST and Trauma: Comfort Only Measures

☐ **Comfort Measures Only**. Provide treatments to relieve pain and suffering through the use of any medication by any route, positioning, wound care and other measures. Use oxygen, suction and manual treatment of airway obstruction as needed for comfort. ***Patient prefers no transfer to hospital*** *for life-sustaining treatments. Transfer if comfort needs cannot be met in current location.* **Treatment Plan: Provide treatments for comfort through symptom management.**


Trauma Patients age >= 65 years
Jan 2012- July 2017
N= 3342
No POLST or Advance Directive
N= 2870
Advance Directive only
N= 168
POLST completed after admission
N= 76
Missing or illegible POLST form
N=36
Pre-hospital POLST
N=192 (6%)
Comfort Only Measures:
48 (25%)

POLST and Trauma: Comfort Only Measures

Mean age: 88 years (SD 6.6, range 65-98)

Female: 26 (55%)

Mechanism of Injury: Falls (92%)

Time since POLST completion: Mean 24 months (SD 21, range 0-85)

POLST and Trauma Comfort Only Measures

Palliative procedures:

- Repairs of the pelvis, femur, lacerations, chest tubes placement

In-hospital mortality: 6% (3/48)

Conclusions

- Age-related changes make elderly prone to significant injury even with minor trauma
- FALLS are the major source of traumatic morbidity and mortality for elderly persons
- Level 1 and 2 Trauma Centers provide definitive care for complex trauma patients
- Being comfort care does not exclude palliative procedures

Many Thanks

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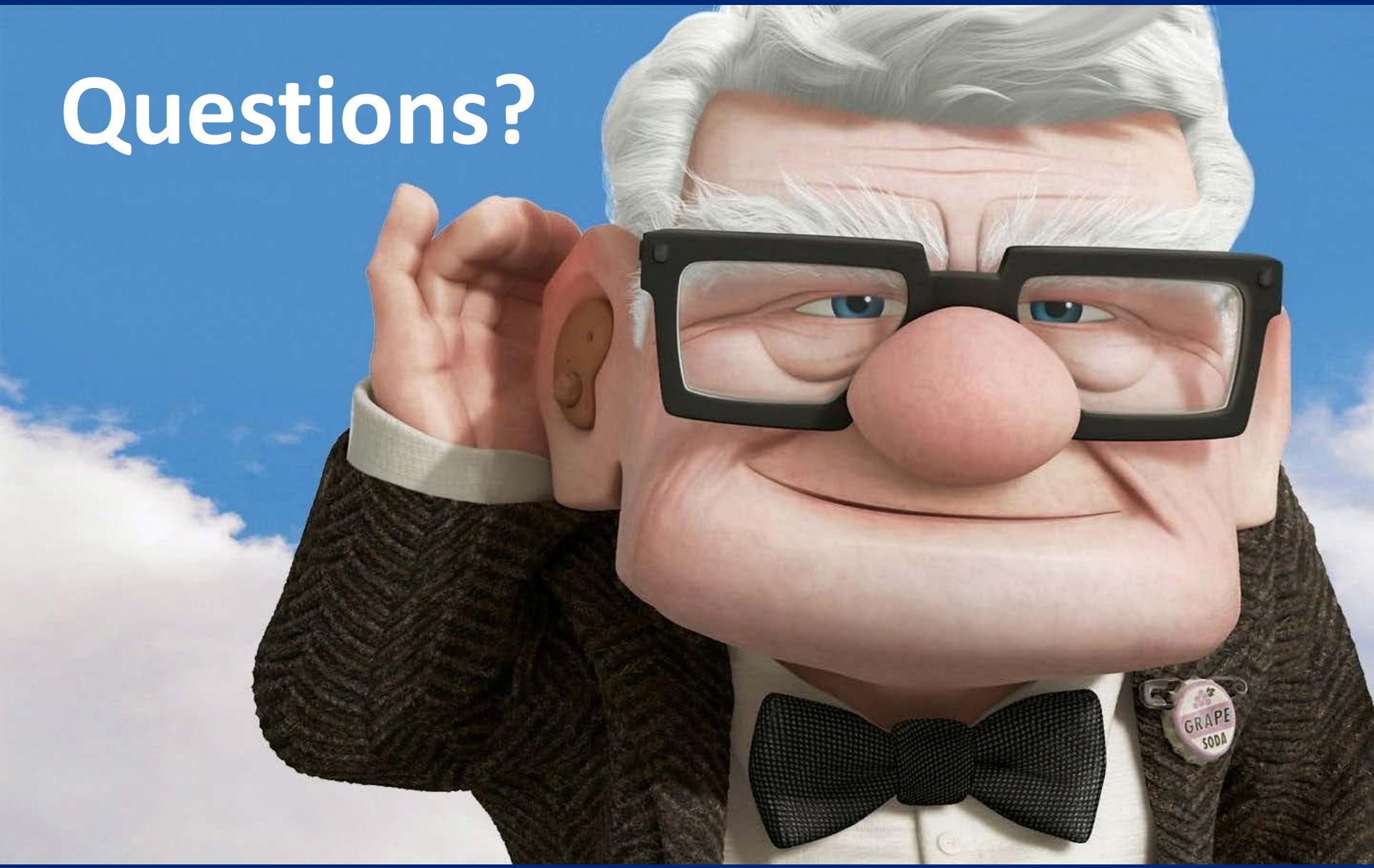
Questions?



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"Up." Walt Disney Studios Home Entertainment, 2013.

Thank You