Avoiding Iatrogenic Complications in Hospitalized Elders

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Learning Objectives

On completion of this workshop, the learner should be able to:
- Discuss the magnitude of iatrogenesis for patients > age 65
- List 3 causes of iatrogenic injury that commonly occur in hospitalized older people
- Discuss 3 interventions that could reduce iatrogenic events for older patients
- List approaches to reducing errors when transitioning patients from one setting to another

Overview of Topics

- Immobility and Deconditioning
- Drugs
- Tubes and catheters
- Missing key issues that might impact a patient’s course, including discharge planning, end of life issues
Hospitalization in the Elderly

Background

• Patients >65 almost half of hospitalizations
• Current reimbursement demands “quicker and sicker” discharges
• Elders are at high risk for poor outcomes
  • High 1 year mortality
  • 30% functional decline
  • High rates of skilled nursing facility (SNF) placement

Adverse outcomes in Hospitalized Older Patients

• Harvard Medical Malpractice Study:
  • 5% rate of disabling injury if >65 yrs.
  • RR= 4.12 (2.6-6.5) for therapeutic mishap

• Northwestern:
  • Associated with immobility, abnormal mental status, worse initial physician assessment

Age is a Risk Factor for Bad Outcomes in the Hospital

<table>
<thead>
<tr>
<th></th>
<th>Age &lt; 65</th>
<th>Age ≥ 65</th>
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<tbody>
<tr>
<td>Adverse Events (AE)</td>
<td>2.8%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Preventable AE</td>
<td>1.6%</td>
<td>3.0%</td>
</tr>
<tr>
<td>-Procedure related</td>
<td>0.1%</td>
<td>0.7%</td>
</tr>
<tr>
<td>-Drug related</td>
<td>0.2%</td>
<td>0.6%</td>
</tr>
<tr>
<td>-Fall</td>
<td>0.01%</td>
<td>0.1%</td>
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Thomas and Brennan, BMJ 2000
The Case of Ms. R.

Ms. R. is an 80 y/o woman with a history of chronic obstructive pulmonary disease (COPD), depression, and poor medication adherence, who was admitted to the hospital with community-acquired pneumonia and a COPD exacerbation. This is her third COPD exacerbation and hospitalization over the past 6 months.
The Case of Ms. R.

She is treated with antibiotics, bronchodilators and prednisone with improvement in her respiratory status over the next 5 days.

Everyone is happy about the treatment success.

She is discharged home, where she lives alone. Her discharge medications are prednisone, doxycycline, ipatropium/albuterol metered dose inhaler, calcium, multiple vitamins, alendronate, and citalopram.

The Case of Ms. R.

Two days after discharge, Ms. R. is readmitted with a hip fracture. Her irate daughter calls you to say that her mother was barely able to walk at the time of hospital discharge, even though she was ambulatory prior to admission. Ms. R.’s daughter scrambled to put services in place, but felt overwhelmed by the task. She blames the hip fracture on a careless discharge plan.

What went wrong?

- Patient was at bedrest
- Nobody noted the amount of mobility she lost during bedrest
- There was little discharge planning and communication
How Could this Outcome have been Avoided?

By Addressing Two Domains
1. Mobility
2. More Thoughtful Planning and Communication Surrounding Transitional Care

Bedrest is a Health Hazard for Elders, and can lead to:
- Loss of muscle strength
- Increased orthostatic BP changes
- Decrease in cardiac output/aerobic capacity/increased resting heart rate
- Decrease in pulmonary function
- Loss of bone mass
- Pressure ulcers, contractures, constipation, incontinence
  - Combined with pre-existing problems -> loss of function
How Can Bedrest and its complications be Minimized?

- Make mobility part of a standard problem list if patient not fully ambulatory
- Rarely use bedrest orders
- When bedrest orders necessary:
  - Automatically time limited
  - Automatically generate PT consultation
- Some hospitals use walking clubs or have default as walking 3X daily

It Takes a Team

- Nurses -> Getting patients up, walking, self care
- Occupational Therapists -> Evaluate and improve activities of daily living (ADL) and instrumental activities of daily living (IADLs)
- Pharmacists -> monitor potential for drug side effects that might lead to falls, weakness, orthostasis
- Physical Therapists -> strength training, ambulation, assistive devices
- Physicians -> Writing appropriate activity orders
- Social Workers -> Addressing home services
- And more

How Could this Outcome have been Avoided?

By Addressing Two Domains
1. Mobility
2. More Thoughtful Planning and Communication Surrounding Transitional Care
Know The Risk Factors for Poor Discharge Outcomes

- Age >80
- Multiple, active chronic health problems
- Moderate-severe functional impairment
- Poor or fair self rating of health
- Multiple hospitalizations in past 6 months
- Hospitalized past 30 days
- Noncompliance
- Poor support system


Other Problem Areas

- Poor literacy or health literacy
- Language barriers
- Cognitive impairment
- Sensory impairment
- Cultural differences in understanding of medications and their function

Post Discharge Recommendations Common

- 36% of recommended post hospital discharge procedures not done
- Lack of PCP access to discharge summary associated with worse completion rates (p < 0.01)

Moore C. et al Arch Intern Med 2007
Optimize Transitional Care

- Assess discharge problem areas early in the hospital course
- For highest risk patients, consider:
  - Transitional care intervention with transition coach, case manager, discharge planner, or other approach
- Check out resources at:
  - http://www.caretransitions.org/
  - Care Transitions Measure 3 and 15 (CTM-3, CTM-15)
  - Medication Discrepancy Tool (MOT)

Transitional Care

- Transitional care interventions can improve outcomes, reduce hospital readmissions, and Emergency Department Visits

  Coleman 2006
  Coleman 2004
  Naylor 1999

The Case of Mr. W. - Part 1

Mr. W. is a 84 year old man with hypertension (HTN), benign prostatic hypertrophy (BPH), and dementia who is admitted for community-acquired pneumonia. On admission: T=38.5, O2 sat 89%, BP 110/60, pulse 100. Exam is notable for crackles at the right lung base. His mental status is described as inattentive, and his son reports this is a change. Chest x-ray shows a right lower lobe consolidation.
The Case of Mr. W. – Part 2

Mr. W. is admitted and started on ceftriaxone, doxycycline, and his previous ASA and metoprolol.

His other medications – terazocin, finasteride, and donepezil – are held.

The Case of Mr. W. – Part 3

An order is written for diphenhydramine 25 mg at bedtime (HS), with an additional 25mg for insomnia, and lorazepam for agitation. He receives all three medications after singing loudly much of the evening.

The next morning, he is less responsive and not oriented to person, place, or time. His vital signs are stable, but he repeatedly grabs his abdomen and moans. He has new lower abdominal fullness, and has had almost no urine output for the past few hours.

The Case of Mr. W. – Part 4

He is ordered to get a straight catheterization and a post-void residual urine volume. The nurse reports 1.5 liters of urine output on placement (with some difficulty) of the catheter, which is kept in. The patient's abdominal pain has resolved. The patient tries to pull out the urine catheter, so the nurse requests an order for additional lorazepam and restraints.
Drugs

Adverse Drug Events

- Elders are at increased risk of adverse drug events (ADEs)
- Other ADE Predictors:
  - Multiple medical problems
  - Multiple medications
  - New medications added
  - Low weight, female gender, impaired creatinine clearance


Adverse Drug Events

- Potential for interaction:
  - 2 drugs 6%
  - 5 drugs 50%
  - ≥ 8 drugs nearly 100%
- 70-80% of adverse drug events in the elderly are dose related
- 30-50% preventable

Carbonin P et al. JAGS 1991
Common Problem Drugs

- Anticholinergic medications increase delirium risk
- For Diphenhydramine:
  - Odds ratio (OR) of catheter placement 2.5
  - OR delirium 1.8
- Psychoactive medications increase ADEs
- Non-steroidal, cardiac medications

Agostini Arch Intern Med 2001
Han Arch Intern Med 2001

Most Common Causes of preventable ADE post discharge in frail elders

- Antidiabetic agents 12%
- Anticholinergic medications 11%
- Warfarin 11%
- Diuretics 10%
- NSAIIDs 7%
- Digoxin 6%
- Opioids 5%

Hanlon et al. J. Gerontology 2006

Transitions are High Risk Times for Drug Mishaps

- High volume changes:
  - 40% of admission meds stopped
  - 45% of discharge meds were new
- At discharge:
  - Serious prescribing problem in 22%
  - Other prescribing problem in 66%

Beers MH et al, Lipton HL et al, Cornish 2005
Examples of Drug Problems

- Patient takes two different forms of the same class of medicine from hospital discharge and previous meds (e.g., lisinopril and fosinopril)
- Patient discharged with new medication (e.g., antibiotic) that interferes with prior med (e.g., warfarin) -> adverse event
- Patient given Rx for meds -> can't afford

Preventing Drug Problems

- Computerized Medical Records in an integrated health system (e.g. VA)
- Post discharge Home Visits with drug reconciliation
- Have pre-discharge medications brought in and reviewed with inpatient and outpatient team

The Case of Mr. W. – Part 5

Mr. W.’s fever has resolved, he has improved oxygenation, decreased pulse, and appears more oriented. Despite receiving his diphenhydramine and lorazepam before bedtime, late that evening Mr. W. becomes agitated and tries to get out of restraints. This time he gets a dose of haloperidol.
Delirium is Important in Elders

- Common
- Associated with increase in mortality, morbidity, and NH placement
- Delirium Caused By:
  - Patient (intrinsic) factors +
  - Precipitating Factors

Risk Factors

**Intrinsic Factors**
- Vision impairment (< 20/70)
- Cognitive impairment (MMSE < 24)
- Severe illness (APACHE II > 16)
- BUN/Cr ratio > 18

**Precipitating Factors**
- Restraint Use
- Malnutrition
- 3 new meds
- Bladder Catheter
- Any iatrogenic Event

Inouye et al JAMA 1996
Prevention & Treatment

- At least 3 clinical trials suggest that minimizing risk factors in hospital can reduce delirium
  - Pain, sleep, hydration, orientation, minimizing tubes and lines, minimizing problem drugs
- Ideal treatment unclear
- High risk patients for iatrogenic problems

Inouye NEJM 1999
Lundstrom M et al 2007
Marcantonio, JAGS 2001

Treatment

- Almost no drug studies of established delirium
- Most experts would use traditional or atypical antipsychotic agents in low dose for agitated delirium treatment
- Although anticholinesterase inhibitors have biological appeal, 2 trials negative, though 1 showed + trend

A little evidence exists...

- 430 hip fracture patients aged 70+ at risk for post-op delirium
  - Visual impairment, APACHE 16+, MMSE < 25, BUN/Cr > 18
- Randomized to receive haloperidol 1.5mg day started pre-op and continued until 3 days post surgery

Kalisvaart et al. JAGS 2005; 53: 1658-1666

Results

<table>
<thead>
<tr>
<th></th>
<th>Haloperidol</th>
<th>Placebo</th>
<th>P</th>
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<tbody>
<tr>
<td>Delirium Incidence</td>
<td>15.1%</td>
<td>16.5%</td>
<td>NS</td>
</tr>
<tr>
<td>Delirium Severity</td>
<td>14.4</td>
<td>18.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Delirium Duration</td>
<td>5.4 days</td>
<td>11.8 days</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Hospital Days</td>
<td>17.1</td>
<td>22.6</td>
<td>&lt;.001</td>
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Bottom Line

- Would I use haloperidol prophylactically in high risk patients based on this study? No
- Also evidence that gabapentin may reduce delirium associated with postoperative pain

Kalisvaart KJ JAGS 53: 2005: 1658-1666
The Case of Mr. W. – Part 6

The next day, he is more sleepy and disoriented, and is not feeding himself. His albumin is 2.9. With input from the nutritionist, tube feeding is begun. The patient has to continue to be restrained to keep the tube feeding and a urinary catheter in place, and now is given lopezapam during the day and haloperidol at night to reduce his agitation.

Procedures

Bladder catheters

- About a quarter of hospitalized patients have indwelling urinary catheter
- Estimated to be inappropriate about half of the time
- UTI's: almost half of nosocomial infections
- Bladder catheter: 5% bacteriuria/day
- Condom Catheters result in fewer infections & complications
- May increase risk of delirium/immobility

Saint 2006
Saint 2000
Preventing Bladder Catheters

- **Physician and Pharmacist Role**
  - Check if patient has a catheter/needs a catheter/can be tried off a catheter
  - Minimize diphenhydramine and other anticholinergics that increase risk of bladder catheter placement
  - For older men, continue BPH meds (consider increasing dose if anticholinergic medications must be used)
- **Nursing Role (and PT)**
  - Timed voiding & promoting mobility
  - Remind the physician to try off catheter

Agostini 2001

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Intravenous Lines

- Huge part of culture of hospital ("need emergency access"), but are not always needed
- Potential sources of nosocomial infection, (especially emergency starts & femoral lines)
- **IV Fluids:**
  - Older people have difficulty excreting saline load in a timely way
  - Diastolic dysfunction common in elders
  - => increased risk of iatrogenic congestive heart failure

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The Case of Mr. W. – Part 7

The following day, Mr. W. is tolerating his tube feeding but is now starting to have some diarrhea. A trial off of the urinary catheter fails, and it is reinserted. He continues to require restraints. The nurse finds an early stage II decubitus ulcer. The next day he develops a fever, and has evidence of a urinary tract infection. His antibiotic coverage is broadened to piperacillin/tazobactam and vancomycin.
The Case of Mr. W. - Part 8

Despite his broad spectrum antibiotics, his urine output drops off. A nurse finds him pulseless and unresponsive, and calls a CODE BLUE. Mr. W. is intubated and sent to the intensive care unit on multiple medications. He appears quite agitated, and 4 hours later another CODE BLUE is called when his heart stops. Despite attempts to revive him for 30 minutes, he dies. His family comes in shortly after saying that he had not wanted resuscitation attempted.

What could we have done differently for Mr. W.?

- Avoided anticholinergics like Benadryl
- Continued his BPH medications
- Which would then prevent urine catheter
- And would then reduce the infection risk
- And might also prevent need for restraints
- Which might also avoid the need for tube feeding
- Which might then avoid the pressure ulcer
- And discussed goals of care/code status/etc.
- Mr. W. might still have died, but might have died more peacefully and at home

Increased Teamwork Could Have Helped

- Pharmacists – Advising on medications
- Nurses – Delirium reduction program
- Physicians – Multiple roles – medications, catheter alternatives, communication
- Social Workers – Helped with family involvement, goals of care, advance directive paperwork was brought to the hospital
- And much more would have been possible
And Remember the Big Picture

The Big Picture:
Is This Patient Dying?

• Less than one in ten hospitalized people with “end stage” dementia had discussions about goals of care or limiting care
• The vast majority of patients with end stage dementia and hip fracture received no pain medications
• Tube feeding may increase discomfort for patients close to death

PROGNOSIS AFTER HOSPITALIZATION

• Prognostic index using ~1500 patients 70+ yo discharged from general medical service of tertiary care hospital
• Mean age 81
• Female 67%
• Identified 6 independent risk factors for 1-year mortality following discharge
RISK FACTORS FOR 1-YEAR MORTALITY

- Male sex: 1 point
- Dependent in 1-4 ADL at discharge: 2 points
- Dependent in all ADL at discharge: 5 points
- CHF: 2 points
- Solitary cancer: 3 points
- Metastatic cancer: 8 points
- Admission Cr>3: 2 points
- Admission alb 3.0-3.4: 1 point
- Admission alb <3.0: 2 points

For Mr. W.

- Comfort-type interventions might have been better for him:
  - Oral medications
  - Avoidance of "problem" medications
  - Home nursing care
  - Opioids for pain and respiratory distress
  - Continued BPH medications
  - Creative solutions from a well functioning team
What are some solutions?
- Consider burdens/benefits of ANY intervention, no matter how benign
- Awareness of iatrogenic problem areas
  - Immobility, tubes, drugs, procedures, transitions
- Remember the big picture
  - Is this patient failing at home?
  - Is the patient dying? Is she comfortable?

DAILY WORK ROUNDS
(slide courtesy of Bill Lyons)
- ADL status and trajectory?
- Eating?
- Eliminating and continent?
- Mobility? Has this patient been out of bed?
- Does she need all those attachments?
- Anticipated discharge location and arrangements?

Can better Elder Care Models make a difference?
- Yes.
- A multifactorial delirium prevention trial decreased delirium incidence
  (NNT = 20 to prevent one delirium episode)
  (Hospital Elder Life Program = HELP)
- An advanced practice nursing transitional care intervention decreased hospital readmissions and ED visits post discharge

Inouye 1999, Naylor 1999
ACE Unit: Inpatient unit focuses on “prehabilitation” with 4 components:

1. Prepared environment for mobility and orientation
2. Primary nurse assessment & protocols
3. Early SW intervention in interdisciplinary framework for d/c planning
4. Geriatrician review

CS Landefeld, R Palmer, S Counsell et al

ACE Unit, cont’d

- RCT of 651 patients in Cleveland academic medical center
  - Greater ADL independence at d/c
  - Less frequent nursing home admission
  - Slightly shorter LOS
- Akron community hospital
  - Better process measures & satisfaction
  - Better composite ADL-decline-or-NH-placement

CS Landefeld, R Palmer, S Counsell et al

ACE Unit, cont’d

- Intervention reduced cost at academic center ($6608 vs. $7240 per hospitalization)
- No significant financial impact in community hospital

CS Landefeld, R Palmer, S Counsell et al
Hospital at Home

- Treatment at home with 24 nurse X 24 hours, daily MD visits
- Tried for pneumonia, CHF, COPD, cellulitis
- Shorter treatment times, lower cost, greater satisfaction, lower delirium rates (OR 0.26)
  
  Leff et al Annals Intern Med 2005

Thank You!

Bill Lyons
Scott Flanders
Seth Landefeld
Adrienne Green
Eric Coleman
http://www.caretransitions.org/

References

References


References


Other:
- Website of Interest: http://www.caretransitions.org/