FR20- This Year in Review for LTC

Friday, March 23
3:30 PM- 5:00 PM

Session Description

In this session, we present 8-15 articles published in the past year which have the potential to impact the practice of medicine and the processes of care for frail elders in the continuum of care. All articles are chosen through a Modified-Delphi approach and critically appraised by experienced, multidisciplinary practitioners and educators. This presentation has been well-received each year and is often the site of spirited discussion.

Learning Objectives

Consider changes in your practice based on recent publications.
Identify publications that are controversial and/or may affect the direction of research.
Describe techniques for critiquing publications.

Presenter(s): Milta Little, DO, CMD; Patricia Abele, MSN, RN, FNP-BC; Julie Gammack, MD, CMD; Angela Sanford, MD, CMD

Presenter(s) Disclosures: All speakers have reported they have no relevant financial relationships to disclose.
This Year In Review in Long Term Care

Patricia Abele, RN, MSN, FNP-BC
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Mitta Little, DO, CMD
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Learning Objectives

By the end of the session, participants will be able to:

- Consider changes in practice based on recent publications
- Identify publications that are controversial and/or may affect the direction of research
- Describe techniques for critiquing publications

TRANSITIONS OF CARE

- Older patients account for a large percentage of transfers between health care sites
- Disproportionately affected by poor transitions of care
- Frail older adults, especially those with cognitive impairment, often can't participate in discharge process
- Predisposes them to hospital readmission and adverse health outcomes
- Results in excessive health care costs
- Improving coordination of care is the challenge to improving effective transitions

Improving Transitions to Post-Acute Care for Elderly Patients Using a Novel Video-Conferencing Program: ECHO-Care Transitions

Improving Transitions to Post-Acute Care for Elderly Patients Using a Novel Video-Conferencing Program: ECHO-Care Transitions

- Project Extension for Community Healthcare Outcomes (ECHO), developed at the University of New Mexico in 2003 to treat patients with hepatitis, uses video-communication technology to connect relatively isolated rural providers with subspecialist experts at the academic medical center to improve care delivery at remote health care sites.
- Now addresses 60 disease areas and operates out of 94 academic and expert hubs in the US and in 16 other countries.
- In 2013 adopted by Beth Israel Deaconess Medical Center to improve transitions of care for older adult patients discharged from medical and surgical inpatient services to post-acute settings.

Speaker Disclosures

Drs. Sanford, Little, Gammack, and NP Abele have no financial relationship(s) to disclose.
OBJECTIVE:
To determine the impact of the ECHO-Care Transitions intervention (ECHO-CT) on patient mortality, hospital readmission, skilled nursing facility length of stay, and cost of health care within a 30-day period after discharge.

METHODS
• Prospective cohort study comparing 1-year outcomes of skilled nursing facilities participating in ECHO-CT program to those receiving standard care.
• All patients discharged in 2014 from hospital to SNF for short term rehab (<100 days) were eligible.
• Identified patients from a weekly hospital report (N=1059).
• Excluded:
  • Patients who were not members of ACO because data was not available (N=271).
  • Patients who were discharged to SNFs different in size and CMS quality rating (N=292).
  • Patients from SNFs from which baseline differences in facility case mix and outcome of interest could not be obtained (N=113).
• Patients with missing data (N=21).
• Intervention group consisted of ACO patients discharged to SNF ECHO-CT partner (N=148).
• Standard group consisted of ACO patients discharged to a non-ECHO-CT SNF partner (N=214).
• Each SNF in ECHO-CT group matched to between 4 to 11 standard-care facilities based on CMS 5-star rating and size.
• To establish a baseline, data on patients discharged in 2013 were collected following the same inclusion/exclusion criteria as 2014.
• Adjusted for baseline differences in facility case mix and baseline rate of outcome of interest.

INTERVENTION:
• ECHO-CT video-conference sessions were conducted weekly for 1.5 hours.
• Consisted of discrete 15-minute face-to-face discussions between hospital and SNF care teams using secure video-communication technology.
• SNF participants included nurses, doctors, physical therapists and therapists.
• Hospital team included pharmacist, social worker, hospitalist facilitator and project manager.
• Each individual patient discussed for varying lengths of time depending on medical complexity and post-discharge concerns. Although patient review was consistent.
• Sessions encouraged bidirectional collaboration.

STATISTICAL ANALYSIS:
• To ensure model coherence and prevent double expression of covariate measures used individual-level covariates from 2014, participants while generating facility-specific means from individuals observed in 2013.
• To determine the effect of ECHO-CT intervention on outcomes used:
  • Multivariate conditional logistic regression at the individual level for categorical outcomes to estimate odds ratios and 95% confidence intervals.
  • Linear regression at the individual level for continuous outcomes to calculate differences and CI.
  • Generalized estimating equations to account for facility-level clustering and matched study design.
• Each model adjusted for age, sex, 2014 Charlson comorbidity index at individual level, 2013 Charlson comorbidity index at facility level, and 2013 facility average of the relevant outcome variable.

RESULTS
After adjusting for covariates and baseline 2013 rates of the relevant outcome, ECHO-CT was associated with a reduction in:
• Hospital readmission (OR 0.57; 95% CI, 0.34-0.96; P=0.04).
• SNF length of stay (mean estimate -5.52 days; 95% CI, -9.61 to -1.43; P=.01).
• Total health care spending (mean estimate -$2602 per patient; 95% CI, -$4133 to -$1070; P<.001).
• Decrease in 30-day mortality was not significantly different (P=.11).
Improving Transitions to Post-Acute Care for Elderly Patients Using a Novel Video-Conferencing Program: ECHO-Care Transitions

DISCUSSION/LIMITATIONS:
• Positive outcomes may be due to:
  - Reduction in medication errors arising post-discharge
  - Improved care coordination
  - Identification and adherence to goals of care
  - Disease management
• Unable to assess the root cause of re-hospitalization or prolonged length of stay, so cannot be certain ECHO-CT affected the outcomes
• Not a randomized controlled design therefore cannot exclude possibility of unmeasured confounders (example—SNFs agreeing to participate in intervention may have been more committed to improvement and innovation than non-intervention SNFs)
• Likely did not show improvements in mortality due to relatively few deaths overall and a short study period
• Primary care f/u within a week of SNF discharge is recommended as best practice by AGS and AMDA, yet there is little empirical evidence for this practice
• Overall, this study suggests that using video-communication to improve interdisciplinary teamwork during transition from hospital to SNF is a cost-effective investment and can improve patient outcomes
• Future studies are needed to determine if benefits can be replicated at other hospitals and partnering SNFs.

Transitions From Skilled Nursing Facility to Home: The Relationship of Early Outpatient Care to Hospital Readmission

OBJECTIVE:
To identify whether early post-SNF discharge care reduces likelihood of 30-day hospital readmission.

Methods:
• Secondary data analysis using Older Adults Transition Study (OATS) database. Included a cohort of 33,386 patients from a hospital in central Indiana and 8 community health centers.
• OATS Database combines:
  - Data from Medicare and Medicaid claims
  - Minimum Data Set (MDS)
  - Outcome and Assessment Information Set (OASIS)
  - Local electronic medical records
• Included patients who:
  - Medicare or dual eligible enrollee
  - Age >65
  - Discharged from hospital to SNF (fiscal year 2007-2010)
  - Discharged from SNF to home
• Excluded patients who:
  - Died in SNF
  - Did not enter SNF directly from hospital
  - Became long-stay patients (>106 days)

Transitions From Skilled Nursing Facility to Home: The Relationship of Early Outpatient Care to Hospital Readmission

Background:
• Little is known about the transition from SNF to home and risk factors for adverse outcomes such as hospital readmission.
• Care in SNFs has come under increased scrutiny as evidenced by Medicare rules to levy 30 day readmission penalties on SNFs.
• Primary care f/u within a week of SNF discharge is recommended as best practice by AGS and AMDA, yet there is little empirical evidence for this practice
• In hospital to home literature, early outpatient f/u such as early home health visits and early provider visits have been identified as potential interventions, yet the evidence for each is mixed.

Transitions From Skilled Nursing Facility to Home: The Relationship of Early Outpatient Care to Hospital Readmission

• Primary outcome variable:
  - Hospital readmission—defined as readmission to acute care hospital within 30 days of discharge from SNF
• Home Health Visits—identified first date of visit using billing data from OASIS home health data set
• Outpatient Provider Visits—identified first date of visit using billing data from CMS. Providers included specialists, generalists, physicians, advanced practitioners
Transitions From Skilled Nursing Facility to Home: The Relationship of Early Outpatient Care to Hospital Readmission

**Independent Variables extracted from database:**
- Demographics
- Degree of pre-hospital health care use
- Pre-SNF inpatient hospital characteristics
- Post-discharge health care use
- In-SNF characteristics (common geriatric syndromes, chronic co-morbidities, ADL scores, polypharmacy)
- Hospital admission diagnoses and LACE score (score >10 identifies patients who have increased likelihood of 30-day hospital readmission or mortality)

**RESULTS**
Of the 1543 study subjects, 225 (14.6%) experienced hospital readmission within 30 days. Bivariate comparison of patients readmitted to hospital within 30 days of SNF against those who were not readmitted, found that 30D readmission was associated with:
- Hospital readmission diagnoses and LACE score (P<.001)
- Admission for index hospitalization due to respiratory disorders (P=.023) or pulmonary disorders (P=.011)
- Higher LACE scores (P<.001)
- Patients with falls within 30 days prior to index hospitalization were less likely to have readmission (P=.022)

**DISCUSSION**
- Not surprising that cardiovascular and respiratory disorders were associated with increased readmission as these are chronic conditions that contribute to re-hospitalization
- Perhaps outpatient provider visits could only be preventative but also causative when clearly sick patients are sent back to the hospital from home.
- Not surprising that cardiovascular and respiratory disorders were associated with increased readmission as these are chronic conditions that contribute to re-hospitalization
- Intergroup analysis of variables and outcomes prior to index hospitalization were less likely to be associated with hospital readmission after SNF. Likely because falls represent an acute event—those with some physical reserve recuperate to previous function during SNF stay, while those who do not return to pre-fall levels of function are more likely to convert to being truly patients
- Retrospective design of the study and using a cohort composed only of patients seen in a single urban safety-net hospital in Indiana identified as limitations of the study, feasibility to generalize to other populations.
- More study of what aspects of an HHC visit are preventative, and why outpatient provider visits may or may not be preventative, is warranted.

Transitions From Skilled Nursing Facility to Home: The Relationship of Early Outpatient Care to Hospital Readmission

**Statistical Analysis:**
- Bivariate associations between hospital admission within 30 days and independent variables were determined using chi-square tests for categorical data, t tests for continuous variables, and Wilcoxon tests for comparison of skewed variables.
- Survival analysis to evaluate distributions of time from SNF discharge to hospital readmission
- Cox proportional hazard models used to model times from discharge to readmission

**RESULTS**
Kaplan-Meier estimates of time to readmission showed:
- Those who had a home health visit within one week of hospital discharge were less likely to have readmission at all intervals of 1, 2 and 3 weeks.
- Those who had a home health visit within one week were not.
- Cox proportional hazard model analysis confirmed:
  - A lower hazard of 30 day post-SNF hospital readmission when outpatient visits occurred within one week of SNF discharge were less likely to have early outpatient clinic visit (P=.025) or without early outpatient visit (P=.025)

**BACKGROUND**
- **Missouri Quality Initiative (MQO)** developed in response to the 2012 call from CMS to engage in collaborative efforts to reduce hospital readmissions among Nursing Facility Residents
- MQO was one of 17 program sites in U.S.
- Goals of initiative for LTC residents:
  - Reduce frequency of avoidable hospital admissions
  - Improve resident health outcomes
  - Improve processes of transitional care
  - Reduce overall healthcare spending without reducing quality scores.
Successfully Reducing Hospitalizations of Nursing Home Residents: Results of the Missouri Quality Initiative

DESIGN AND METHOD

- Prospective, single group intervention design
- 16 nursing homes (NH) in urban, metro, and rural communities within 80 mile radius of St. Louis, Missouri. Ranged in size from 120-321 beds
- APRN embedded full-time within each NH to influence resident outcomes
- Data collected continuously for more than 3 years from average of 1750 Medicare, Medicaid and private pay NH LTC residents (residing in NH >100 days)
- Other key interventions included:
  - Use of INTERACT III processes
  - Improved health information technology
  - Support team consisting of Care Transitions Coach (MSW), INTERACT Coach, HIT Coordinator, and Project Medical Director
- All cause hospitalizations and potentially avoidable hospitalizations of LTC residents were monitored and reported back to facilities throughout the project

INTERVENTION

- APRN provided direct services to resident while mentoring, role modeling, and educating nursing staff about early symptom/illness recognition, assessment and management of common NH health conditions.
- Facilitate the use of INTERACT tools, particularly for early illness identification (Stop and Watch and communication with providers (SBAR).
- Focused on common reasons for rapid functional decline associated with increase hospitalization (pneumonia, CHF, COPD, UTI, dehydration, skin ulcers, falls)
- Completed INTERACT Root Cause Analysis for each hospital transfer. Study staff reviewed with APRN monthly to determine potentially avoidable transfers and how to improve nursing home systems and processes. Feedback reports of hospital transfers shared with MOQI team and nursing home leadership.
- Developed and implemented proactive discussions about end-of-life decision making and goals of care.
- Worked to improve unavoidable hospital transitions: improve communication between settings, medication reconciliation, and reduce polypharmacy

DATA ANALYSIS

- Hospital transfer rates were calculated for each of the 16 nursing facilities for each quarter.
- Hospital rate calculated using the formula:
  \[ \frac{\# \text{hospital transfers}}{\# \text{of days (all residents) stayed in NH}} \times 1000 \]
- Rates summarized quarterly with mean, median, and standard deviations as well as minimum, maximum, and lower and upper confidence levels.
- Wilcoxon signed rank tests used to test rate changes.
- Individual facility changes examined over time for transfer trends.
- Linear regression lines calculated and used to visually examine for trend improvements, slight improvements, worse, slightly worse and same.

RESULTS

- This figure displays the analysis of all-cause hospitalization rates categorized using avoidable and non-avoidable definitions guided by the INTERACT RCA tool.
- Avoidable transfers remained fairly consistent (53% to 50%)
- However, the relationship between percentage of avoidable and non-avoidable hospitalizations reversed themselves in the 1st Qtr 2015.
- Non-avoidable decreased 64% to 47%
- Avoidable increased 47% to 54%
- The research team believed that over time APRNs identified more hospitalization as avoidable, in other words, their idea of what was avoidable changed over time.

- This figure displays the relative hospital transfer rate of change per quarter from baseline.
- As an aggregate, the 16 facilities had an approximate 30% reduction in all-cause hospitalizations from study beginning to end.
Successfully Reducing Hospitalizations of Nursing Home Residents: Results of the Missouri Quality Initiative

LIMITATIONS
• Used a targeted sample of NHs willing to participate, in a region where readmission to hospital of NH Medicare residents is high, which may limit generalizability
• Lack of comparison group limits interpretation
• However, CMS did a larger evaluation of all sites in the initiative and had an independent evaluation team (RTI) match comparison groups from each state. In this comparison they found for MOQI:
  • 40% reduction in all-cause hospitalization and 57% reduction in potentially avoidable hospitalizations (P=.001)
  • 54% reduction in all-cause ED visits and 65% reduction in potentially avoidable ED visit (P=.001)
  • 33.6% reduction in all-cause Medicare expenditures and 45.2% reduction in potentially avoidable Medicare expenditures

CONCLUSION
• MOQI Initiative resulted in a 30% reduction in all-cause hospitalizations. This reduction is important for NH residents who are most frail and vulnerable when experiencing health declines and for whom hospitalization poses a significant risk.

Julie Gammack

Vitamin D Supplementation in Nursing Home Residents: Randomized Single Cholecalciferol Loading Protocol vs. Individualized Loading Dose Regimen.

Background
• Many nursing home residents are vitamin D deficient
• Daily 800-1000IU of vitamin D replacement may not result in levels > 30 ng/ml for months
• High dose vitamin D regimens (>1000 IU daily) are associated with increased falls/functional decline
• 25-OH vitamin D levels are expensive
• 50,000 IU weekly is still a common dosing regimen
• Hypothesis: non-adjusted loading dose of cholecalciferol is equally effective in normalizing vitamin D levels compared to loading based on levels in nursing home residents

Methods
• Randomized, single blind, controlled
• Single French nursing facility: Age 75+ new admissions
• Exclusion: on vitamin D > 400 IU
• Treatment group: 100,000 IU of cholecalciferol every two weeks over 8 weeks
• Control group: 400,000 vs 300,000 vs 200,000 total over 8 weeks based on vitamin D level
• Primary endpoint: 25(OH)Vit D values >20 ng/mL
• non-inferiority analysis
• Secondary endpoint: 25(OH)VitD values >30 ng/mL
• Tertiary endpoint: safety of high dose cholecalciferol
Results

- 111 residents; mean age 85 years; 2/3 female
- 53 treatment and 58 control group
- Baseline 25-OH vitamin D levels
  - 31% > 30 ng/ml (sufficient)
  - 38% 20-30 ng/ml (insufficient)
  - 31% <20 ng/ml (deficient)

Discussion

- Baseline level dosing adjustment non-inferior to empiric loading
- Most achieved goal levels with loading
- Serum and electrolyte side effects not noted

Limitations

- Not powered for subgroup analysis
- Subgroup data not presented
- No falls/functional assessment
- Not appropriately blinded

Take Home

- Electrolyte abnormalities not seen in very high dosing
- Most achieved target level (> 30 ng/ml) at equivalent 50,000 weekly dosing
- At this dosing, measuring levels not needed
- If 50,000 weekly for 8 weeks was safe (functionally), it is effective in achieving target levels

Association of Antioxidant Supplement Use and Dementia in the Prevention of Alzheimer's Disease by Vitamin E and Selenium Trial (PREADVISE).

Kryscio RJ et al. JAMA Neurol. 2017 May 1;74(5):567-573
Background

- Antioxidant damage is a proposed mechanism for cognitive decline/dementia
- Antioxidant prevention and treatment trials have not consistently demonstrated benefit in cognition
- PREADVISE is the largest antioxidant primary prevention trial in AD
  - Started 2002
  - Selenium & Vitamin D
  - Subset of SELECT prostate cancer prevention trial
- Hypothesis: Selenium + Vitamin E will reduce incident dementia in men

Methods

- RCT double blind 4-arm
  - Vitamin D 400 IU/d, Selenium 200 ug/d, both or neither
  - Enrollment 2002-2008 (halted due to cancer inefficacy)
  - 130 U.S., Canada, Puerto Rico sites
  - Age 62 • (60+ African American) men
  - 1° endpoint: incident dementia in combined treatment group
  - 2° endpoint: incident dementia in single drug group

- 7540 enrollees without dementia
  - Excluded (self-report) head trauma, major neuro/psych conditions, substance abuse
  - Powered: 80% at p=0.05 to detect 40% reduction in incidence (N=10560)
  - Reference incidence 2-3%/yr

- Initial and annual cognitive screening
  - Memory Impairment Screen (MIS) primary instrument: 4+ at entry
  - 0-8 points (5-8 normal): 4 word recall
  - Secondary screening: expanded CERAD + GDS (RCT phase); TICS-m (cohort phase)
  - CERADe 45 min= MMSE, Short Blessed, Boston Naming Test, Word-list learning task, Verbal recognition task, Verbal fluency, Constructional praxis tasks
  - Third screen: referral to PCP or affiliated Alzheimers Disease Research center
  - If meds/self-report of dementia, records or repeat CERAD abnormal
  - Medical/lab/imaging testing done to exclude medical illness
  - 5-member panel consensus on dx

Results

- Avg f/u 5.4 +/- 1.2 yr
- 325 incident dementias
  - 228 during cohort phase
  - 37% medical record confirmed
Strengths

• Length of study
• Exposure-compliance weighted adjustment
• Cohort and entire study analyses
• Medical record confirmed case analysis

Limitations

• Male only
• Younger age
• Lower risk-prevalence population
• 50% drop outs (negative cancer study, side effects)
• Study design changes
• Cognitive assessments/adjudication
• Underpowered for initial enrollment

Discussion/Conclusion

• Vitamin E and selenium alone or in combination are not preventive for incident dementia in men
  • Methodologic challenges
• Other Vitamin E studies in treatment/progression of dementia also negative

Is there an association between the use of opioids versus other analgesics with functional decline and/or mortality after hip fracture in nursing home residents?

Angela Sanford
Background

- There are >300,000 cases of hip fracture/year in the US\(^1\)
  - NH residents have 2x higher risk of hip fx compared with community dwellers\(^2\)
- Mortality rate is high after hip fractures in the NH
  - 36% of pts died within 180 days of their fracture\(^3\)
  - Likely stems from immobility \(\rightarrow\) increased risk of pressure ulcers, aspiration PNA, DVT/PE


Background

- Pain control after hip fracture is important to encourage mobility and improvement in functional status
  - Poor pain control is associated with delirium\(^1\), delayed ambulation\(^2\) and long ‐ term functional impairment\(^2\)
  - “Oligoanalgesia” is a known entity in elderly adults\(^3\)

1. VAURIO L, SANDS L, WANG Y, ET AL. POSTOPERATIVE DELIRIUM: THE IMPORTANCE OF PAIN AND PAIN MANAGEMENT. ANESTH ANALG 2006;102:1267 ‐ 73

Background

- But, there are concerns about opioid analgesia use in the elderly population
  - Constipation
  - Over ‐ sedation
  - Dependency
  - Fall risk
  - Confusion
  - Drug ‐ drug interactions

Background

- Primary Study Aim: examine the association between use of opioids vs. other analgesics with death and functioning during the post ‐ acute period after hip fx among NH residents
  - Included 2,755 NH residents w/ hip fx
    - Mean age of 86 y/o
    - 73% female
    - 86% Caucasian

Methods

- Retrospective cohort study
  - Used Medicare fee ‐ for ‐ service claims linked to Minimum Data Set (MDS) for US NH residents >65 y/o who fractured their hip and returned to the NH
  - Long ‐ term care residents only (eliminated SNF)
  - No hx of analgesic medication in 60 days prior to hip fx
  - 2 groups:
    - Opioid users in the first 14 days after hip fracture
    - Those who used non ‐ opioid analgesics or nothing

Methods

- Outcomes were death and significant functional decline
  - Functional decline = 3 point increase on MDS ADL scale
  - Index date = return to NH from hospital after hip fx
  - F/U occurred at 30, 60, 90 days as well as occurrence of death, decline and completed at 120 days
Methods
- Pre-analgesic confounding covariates were adjusted for using inverse probability of treatment weighting (IPW)
- Inverse probability of treatment weighting:
  - A statistical method to account for observed confounding biases
  - Similar to propensity score matching

Methods
- Estimated intention-to-treat association between opioids vs other analgesics and outcomes using IP-weighted multinomial logistic regression models
- Intention-to-treat analyses:
  - Include every subject who was randomized to a particular group even if they did not adhere to the protocol in every respect
  - Preserves sample size in light of dropouts and preserves original power calculated to show differences

Results
- Baseline characteristics were similar between opioid and non-opioid users
  - Of 2,755 participants:
    - 1,155 (42%) were opioid users
    - 1,600 (58.1%) were non-opioid users

Results
- Before IPW, opioid use was associated with:
  - Lower likelihood of death (OR = 0.5, 95% CI = 0.42-0.59)
  - Lower likelihood of functional decline (OR = 0.35, 95% CI = 0.27-0.45)
- After IPW, opioid use was associated with:
  - Lower likelihood of death (OR = 0.47, 95% CI = 0.39-0.56)
  - Nonsignificant decrease in functional decline (OR = 0.77, 95% CI = 0.58-1.03)

Discussion
- Authors concluded that opioid analgesics are associated with reduction in death and functional decline in NH residents after hip fx
- Limitations:
  - Risk of bias still high despite IPW
  - Exclusion of SNF pts! reduces generalizability
  - Study spanned two versions of MDS (2.0 and 3.0) and many of the covariates differed between the versions and could not be used
Can an intelligent sensor system embedded in an Assisted Living environment detect changes in chronic diseases or functional status and alert health care providers of early signs of illness or functional decline?

Background

• Recognition of small changes in chronic health conditions are essential so that early interventions can occur
  • Prevent hospitalizations/ER visits
  • Reduction in healthcare costs
  • Prevent functional/physical decline

• Early illness recognition and treatment (in both acute and chronic conditions) is key to reducing morbidity and mortality in older adults

Background

• Intelligent sensor systems have the capacity to measure functional ability in older adults and detect changes in chronic dz/acute illness 10 days-14 days before usual assessment methods
  • Uses inexpensive sensors embedded in environment
  • Subjects do not wear any devices
  • Motion sensors installed in common rooms
  • Bed sensors collect data: HR, RR, restlessness during sleep
  • Gain sensor monitors fall risk and alerts when fall has occurred

Background

• Study Aim: measure clinical and cost effectiveness of using sensor data to detect early signs of illness or functional decline in a randomized sample of older adults living in AL communities as compared to usual health assessment methods
Methods

- **Randomized prospective intervention study**
  - Rolling enrollment over 2 1/2 yrs
- **171 participants**
  - 86 in intervention group
  - 85 in control group
  - Baseline demographics similar

**Inclusion criteria:**
- AL resident in one of 13 communities in MO
- Walk a minimum of 20 ft w/o staff assistance (cane, walker ok)
- Ability to grip w/ hands to perform grip strength measurement
- Willing to have sensor systems installed and participate in quarterly data collections for one year

**Sensor System:**
- Motion sensors → measure overall activity
- Under mattress sensor → RR, HR, restlessness
- Gait sensors → continuously measures gait speed, stride length, time and assess for increasing falling risk
- Continuously running computer algorithms were applied to sensor data and sent alerts via email to staff if changes in patterns were detected so that clinical assessment could occur

**Baseline data collection:**
- 12-item Short Form Health Survey
- Geriatric Depression Scale
- MMSE
- ADL/IADLs
- Gait speed
- Grip strength
- GAITRite → automated matt that measures velocity, step time, step length, stride length, and calculates a functional ambulation profile

**Results**

- **Walking speed:**
  - Measured by how long it would take for participant to walk 10 feet
  - No statistically significant change in intervention group
  - Control group’s walking speed increased more than intervention group, but not statistically significant
Results

- **Velocity:**
  - Measured by GAITRite specialized mat
  - Velocity decline was statistically significant for both groups
  - Intervention group has a more stable slope than control group on graph, meaning less of a drop in velocity (0.027 m/s vs 0.073 m/s)

- **Stride Length and Step Length:**
  - Measured by GAITRite
  - Declined in both intervention and control groups over time (not statistically significant)
  - Decline in control > intervention

- **Functional Ambulation Profile:**
  - Performance Index Composite Score
  - Measured by GAITRite
  - Scores declined over time in both intervention and control group (no statistical significance)
  - >decline in control group than intervention

- **Other measurements:**
  - Health measurements: SF-12, GDS, MMSE, ADL, IADL, grip strength → no significant differences between groups
  - Falls → more falls in control (85) vs intervention (78), but no significant differences
  - ER visits, hospitalizations, SNF stays → no significant differences
  - Cost analysis → no significant differences between groups

Discussion

- **No statistically significant positive results, but authors felt several results were clinically significant:**
  - Control group functionally declined more rapidly than intervention group
  - Walking velocity declined in control group by 0.073 m/s exceeding the pre-determined clinically significant difference of 0.051
  - Stride length decline places control group more at risk of falls
  - More subjects in intervention group were referred to SNF (5 vs 2) which may have been the result of “early alerts” from sensors to staff

- **Study limitations:**
  - Never discussed how many “early” interventions were done and what those consisted of
  - Authors noted that there were numerous technical difficulties with networks and internet connections and some pts were not “connected” for days/weeks at a time which interfered with pt’s receiving full intervention
  - Staff were frequently unable to see real-time data in email health alerts
  - Lack of generalizability (nearly all one ethnic group from one area in MO)

Milsta Little

**Background**
- Infection control in LTC is a major CMS focus.
- Microbial contamination of environmental surfaces in nursing homes is well documented and can persist for weeks to months.
- Little evidence on the impact of decontamination of high-touch surfaces on infection rates.

**Aim**
Examine if pulsed-xenon ultraviolet (UV) disinfection of environmental surfaces led to:
- Changes in microbial counts
- Changes in adenosine triphosphate (ATP) hygiene measures
- Changes in facility-wide nursing home acquired infection rates
- Changes in facility-wide infection-related hospitalizations

Infection rates expressed in 1,000 resident/care days/month.

**Methods: Protocol**
- One 160-bed LTC facility in the Midwest.
- Used pretest-posttest design with repeated measures.
  - 36 months pretest data
  - 12 months posttest data
- Xenex Germ-Zapping Robot provides germicidal UV:
  - Photohydration
  - Photosplitting
  - Photodimerization: Prevent cell replication
  - Irreversible cell wall damage and cell death.

**Measurement Outcomes**
30 consecutive discharge rooms
- Luminometers to test amount of ATP on high-touch surfaces
- Culture swabs in three locations
  - Surfaces prepared
  - UV disinfection at 3 locations
  - ATP measurements repeated
  - culture swabs obtained

BMC INFECT DIS. 2017; 17: 186.

CHRISTINE R. KOVACH, YAVUZ TANELI, TAMMY NEIMAN, ELAINE M. DYER, ALVIN JASON A. ARZAGA, AND SHERYL T KELBER.
**Understanding the Statistics**

- ATP samples analyzed via Wilcoxon signed rank test
- Culture samples analyzed using Cochran’s Q test
- Infection rates analyzed a priori ANOVA testing
- Infection-related hospitalizations analyzed using Chi-Square
  - Three pre-study periods (2012, 2013, 2014)
  - One post-study period (2015)

**Results**

- Statistically significant decrease in ATP
- Statistically significant difference cultures
  - Enabler bar (p < 0.001)
  - Over bed table (p < 0.001)
  - NOT faucet handle (p = 0.069)
- Baseline culture 30/90 positive surfaces
- Post-disinfection 6/90 positive surfaces
- Post UV 4/90 positive surfaces

**Results: Infection Rates**

- NH-acquired rates flat using univariate ANOVA
- No difference in UTI
- Small but statistically significant decrease in respiratory and skin/soft tissue infections
- Hospital-acquired rates increased over the four time periods
  - Statistically significant decrease in hospitalizations for infections p = 0.006

**Limitations**

- One nursing home (lack of control group)
- Could not account for temporal fluctuations in infection types/rates
- Other things could have impacted infection rates
  - Antibiotic stewardship programs (not investigated)
  - Contact precautions
  - Nurse protocols
- ATP cannot distinguish cleaning from UV impact
Discussion (by the authors)

- Majority of high-touch environmental surfaces were effectively disinfected with standard (IDEAL!) cleaning practices.
- The ultraviolet disinfection decreased the number of positive cultures by an additional 2.7%.
- UV light is able to reach and treat many hard and soft surfaces that are not routinely cleaned with a disinfectant.
- A hospital-based study showed a 22% difference between manual cleaning with a disinfectant and the ultraviolet light disinfection.
- UV-C light exposure contributes to degradation and more rapid aging of plastics and other nonmetal objects.

Remaining Questions

- Did they test the wrong surfaces?
- What would the results look like without a strict research protocol for cleaning/disinfecting?
- What is the cost (of the machine plus replacement of more rapidly degraded objects) versus savings (reduced treatment of infections and hospitalizations)?

Effect of the Goals of Care Intervention for Advanced Dementia

Aims

- Primary aim: does the GOC intervention improve quality of communication and decision-making?
- Secondary aim: does the intervention improve palliative care for advanced dementia?
- Single-blind cluster RCT compared with an attention control

Methods

- 22 nursing homes, April 2012 – September 2014
  - Randomized in blocks of 4
  - Matched by profit status and % African Americans
- Eligible dyads:
  - Age ≥ 65
  - Severe to advanced dementia
  - English-speaking family member
  - Legally authorized representative: guardian, DPOA, decision maker under NC law (spouse, adult children, sibling)
Goals of Care (GOC) Intervention

- 18 minutes video decision aid
  - Viewed with research staff
  - Given print copy of decision aid and guide
- Structured care plan meeting
  - Nurses, social workers, therapists and nutritionists
  - Received 1-hr training session and written discussion guide
- Control sites
  - Decision-makers got informational video on interacting with someone with dementia plus usual care plan
  - NH staff got 45 min training on study procedures

Primary Outcome Measures:
Quality of Communication and Decision Making at 3 Months

- Quality of Communication scores for NH staff
- Concordance with clinicians on goals of care
- Advance Care Planning problem score

Assessed using intention-to-treat analysis

Secondary Outcome Measures:
Improved Palliative Care in Advanced Dementia, 6 & 9 mo

- Family-rated Symptom Management at the End of Life in Dementia (SM-EOLD)
- Family-rated Satisfaction with Care at the End of Life in Dementia (SWC-EOLD)
- Palliative Care Treatment Plan Domain score
- Medical chart reviews recorded advance care planning orders, hospice enrollment, hospital transfers, and resident deaths.

Results

- No differences in facility characteristics at baseline
- 387 eligible family decision-makers contacted
  - 302 (78%) agreed and enrolled
  - 99% complete at 3 and 6 months; 100% at 9 months
- Comfort was increasingly the primary goal of care over time for both groups.

Family decision makers reported better overall scores on the Quality of Communication questionnaire at 3 months (6.0 vs 5.6, P = .05)

Secondary Outcomes

Effect of Goals of Care Intervention on Quality of Palliative Care for Dementia
Secondary Outcomes

Intervention group half as likely to experience hospital transfers
(0.078 vs 0.163 transfers per 90 person-days; RR, 0.47; 95% CI, 0.26–0.88).

No difference in survival

Discussion (by the authors)

• Family dyads typically communicated with nurses or social workers, not physicians, reflecting current roles in nursing home care.
• Provides the first evidence that a decision aid can be used to enhance implementation of the POLST paradigm.
• Resulted in half as many hospital transfers for nursing home residents with advanced dementia, without affecting survival.
• The GOC study was an efficacy trial, but the intervention was designed for practical implementation in nursing homes.

Remaining Questions

• Generalizable?
  • Single state
  • Predominately white (over 80%)
  • Only long-stay residents

• How could enhanced physician/APP involvement in communication improve these measures?
• How to best disseminate?