Proactive ADL Monitoring: The Role of an Innovative Passive Technology in Preventing Hospitalizations

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David Wilner, MD, FACP, AGSF

❖ Medical Director for Central MA PACE Program.
   ▪ 1000 participants and 5 sites.

❖ Vice President of the Meyers Primary Care Institute, research organization with emphasis on health of patients, populations, and communities.

❖ Clinical Professor UMASS medical school.

❖ Focused on improving the health and well-being of older adults.
A technology-enabled remote monitoring, emergency response, and wellness management program which enrolls qualified PACE participants and has a goal of reducing care costs, increasing independence, and enhancing senior experiences.
**Real-World Case - Nutrition**

**Name:** Hattie  
**Age:** 84  
**Health:** Early Alzheimer’s Disease, Depression, CKD, Fall Risk, Abnormal weight loss  
**Dates of Note:** 1/15/2015

**ADL Category Changes:**  
Significant decrease in nutrition over 30 days and significant increase in toileting over 30 days.

**Assessment:**  
Note sent to clinician; Hattie was referred to a nutritionist

**Outcome:**  
Nutritionist discovered that Hattie is having a hard time adjusting to cooking for one since her husband died and that she eats frozen, store bought meals now. Hattie was provided healthy, easy alternatives to high sodium frozen meals.
Real-World Case - Depression

**ADL Category Changes:**
Significant increase in chair occupancy over 30 days.

**Assessment:**
Note sent to clinician; Hattie was referred to PCP because she feels she should have cried more when she lost her husband of 56 years.

**Outcome:**
PCP had detailed conversations regarding her normal grief process and her role as her husband’s caregiver over past 2 years. It was explained to her that she did much of her grieving during those two years as he was declining. No medications prescribed.

**Name:** Hattie
**Age:** 84
**Health:** Early Alzheimer’s Disease, Depression, CKD, Fall Risk, Abnormal weight loss
**Dates of Note:** 2/20/2015
Learning Goals

- Understand the Background and Evolution of Home Technology and Passive ADL Monitoring.


- Review the Process of Implementing in the home of Participants and the Staff Training.

- Review the Statistics of Long-Term Placement for one PACE program who implemented the technology.
Beth Carlson, EdD, RN, NHA

- Senior Consultant, Manager of Consulting Services Health Dimensions Group (HDG).

- Over 25 years of clinical and administrative experience in post acute and community based care models.

- Advises providers on design, development, and execution, including episodic and risk-based programs such as PACE and Bundled Payments for Care Improvement (BPCI).

- Provides expertise in care redesign across the health care continuum with an emphasis on care transformation models, episodic care, transitions management, and continuum development.
The Possibilities of Technology
A Look at Teleconnectivity in Healthcare
Assistive Technology

- Assistive Technology
- Medication dispensing
- Personal Responses Systems
- Reminder alerts
Telemedicine through Connectivity

- Videoconferencing
Telehealth through Remote Monitoring

- Telemonitoring
- Vital Signs
- Telerehabilitation
- ADL monitoring
“Patients participating in telehealth technology are more likely to have better health outcomes and less likely to be admitted (or readmitted) to the hospital”

“Comparative results have shown patients have comparable or better clinical outcomes compared with similar inpatients, and they show higher satisfaction levels”.

The American Telemedicine Association (2013), State Medicaid Best Practice: Remote Patient Monitoring and Home Video Visits and (April 2015) Telemedicine’s Impact on Healthcare Cost and Quality
Julie Carr RN, BSN

- 26 years experience within Healthcare management.

- Previously held positions:
  - Director of Case Management Integration
  - Director of Integrated Health Management.

- Key researcher and developer of Disease Management Program in a Minnesota Health Plan.

- Focus: Disease, Health Management, and Health Policy and Research.
Defining the Need

Between 2011 and 2030

10,000 Baby Boomers Per Day will celebrate their 65 birthday

Acuity rates are rising by 2.5% annually

Nationwide Median Averages in 2013

- Assisted Living: $3,450 per month (up 4.26% Annually over the last 5 years)
- Skilled Nursing: $6,210 per month (up 4.22% Annually over the last 5 years)
Demand for Home-Based Solutions

- **Boomers**
  - The number of Americans over 65 will double from 35 million to 70 million by 2030

- **Caregiver Shortages**
  - In addition to the 2.6 million current RNs, 1.2 million more needed by 2020
  - Primary care physician shortage of 52,000 by 2020

- **Facility Shortages**
  - 2007-2011 nursing homes construction declined by 33%
  - Average loss on Medicaid patient is $20/day
HOW DID WE GET HERE
WHAT ARE WE SUPPOSED TO DO
WHERE ARE WE GOING
HOW DO WE GET THERE
Cost Containment & Utilization Management

- Hospital Concurrent Review
  - Reduction in bed days
  - Decrease rate of increases in hospital cost
- Evidence-based medicine clinical guidelines
- Computer-based decision support systems
- Financial risk shifting – monitoring physician behavior
- Case Management/Health Coaching
  - Monitoring the member’s vital signs
  - Monitoring the member’s behavior
Claims – a registry of health care dollars spent

Case Management- attempting to manage further cost by understanding what has already been spent

Health Coaching – understanding past behavior in order to change future behavior
Introduction of Home Monitoring
The Compliance Factor

- The member must DO something
  - Stand on a scale first thing in the morning
  - Put an arm in a blood pressure cuff
  - Put a finger in an oximeter

- RN resources frequently used to remind members to DO something

- “I’ll do it when I think something is going on” or “I’ll do it if I don’t feel well”
We’re Always Stuck Behind the Eight Ball!
Let’s Stop Trying to Change People

You can lead a horse to water...

Drink?  
Nope
Monitoring Activities of Daily Living

• Improve **Observation** through remote monitoring combined with analytics

• Accelerate **Action** based on early, improved observation of behavior when it is happening

• Drive better **Outcomes**, reduce costs, and improve care
Monitoring at the Point of Behavior

Activity of Daily Living (ADL) Monitoring
- Contact Sensors
- Motion Sensors
- Bed & Toilet Sensors
- Occupancy Fob or optional Call Pendant

Continuously Monitor Daily Living Activities

Analyze Data to Identify Indicators of Changing Health

Intelligently Inform Care Managers of Patient’s Needs
“...reduced or absent appetite or overeating represent powerful prognostic indicators regarding all-cause mortality risk in patients with CHF hospitalized for cardiac decompensation.”

“...progression of renal disease is accompanied by a progressive worsening of sleep quality; ... the prevention of sleep disorders by early and appropriate treatments could beneficially influence the course of the disease.

Poor Appetite or Overeating Predict Shorter Survival in Chronic Systolic Heart Failure: Circulation Issue: Volume 126(21) Supplement, 20 November 2012

“in patients who are hospitalized because of COPD, underweight and weight loss during the follow-up period are related to a higher risk of having new exacerbations”

“Dementia is an important determinant of functional status. Deterioration in ADL is more significant than deterioration in IADL, suggesting that factors other than cognition, such as motivation or perceptual, sensory and motor abilities, may be important in IADL performance.”
Major depressive episodes are associated with an increased risk of transition from an active to an inactive pattern of activity.

* Literature supports that ADLs are affected by exacerbations of chronic disease.
ADL Monitoring Platform

- Passive, Continuous Monitoring
- Wireless sensors placed in the home
- Individual baseline established
- No member education; nothing to learn, remember, or do
- 100% compliance rate
Sensors in the Home

- Toilet Sensor
- Motion Sensor
- Bed Sensor
Sensors Trigger Dashboard Warning
Mitigating Episodes of Care
Shawn Berkowitz, MD, CMD

- Staff Physician for Central MA PACE Program.
- Fellowship-trained, Board Certified Geriatrician and Certified Medical Director with AMDA.
- Established an organized research center with Upstate NY Hospitals, SUNY Upstate Medical University, and SUNY Binghamton research university.
  Assistant Clinical Professor at UMASS medical school.
- Focused on improving the health and well-being of older adults.
PACE Interest

- PACE program interest in PASSIVE ADL Monitoring.

- Previous ACTIVE monitoring unsuccessful.

- Triple-Legged Stool:
  - Improve PATIENT CARE
  - Increase COST SAVINGS
  - Heighten PATIENT SATISFACTION
Early Intervention Opportunities
Name: Sylvia
Age: 80
Health: CHF, CKD, Chronic Pain, Diabetes, Obesity
Dates of Notes: 2/10/2015, 2/15/2015

**ADL Category Changes:**
Significant decrease in movement and toileting over 15 days.

**Assessment:**
Note sent to clinician;
Clinician discovered 8 pound weight gain in two weeks and that Sylvia was having shortness of breath and edema.

**Outcome:**
Sylvia saw her PCP and was given a temporary increase in her Lasix
Real-World Case - CHF

Name: Pamela  
Age: 82  
Health: CHF, Diabetes, CKD, Chronic Pain  
Dates of Notes: 2/10/2015 and 2/16/2015

ADL Category Changes:  
Increase in eating,  
decrease in toileting,  
decrease in movement

Assessment:  
Note sent to clinician;  
Pamela was snowed in, and was eating more.  
Decrease in toileting and movement followed.  
Pamela had significant weight increase and shortness of breath.

Outcome:  
MD increased Lasix.  
Pamela slowly returned back to baseline.  
Avoids possible ED visit and in-patient stay for exacerbation of CHF.
Real-World Case - Safety

**Name:** Arnold  
**Age:** 66  
**Health:** Abnormal Gait, Morbid Obesity, Liver Disease, Lymphedema  
**Dates of Note:** 1/15/2015

**ADL Category Changes:**  
Significant decrease in chair occupancy over 30 days.

**Assessment:**  
Note sent to clinician; Case Manager discovered that Arnold’s recliner chair is broken and that he sits in a folding chair or in scooter all day.

**Outcome:**  
Order placed to have chair fixed so that legs can be elevated and to reduce the risk of pressure sores from sitting on hard surfaces.
Real-World Case - DME need

**ADL Category Changes:**
Significant decrease in sleep quality over 30 days

**Assessment:**
Note sent to clinician;
Member reports he has not been sleeping properly because CPAP mask seal is broken.

**Intervention/Outcome:**
Case Manager called DME company to have new equipment delivered and assembled.

**Name:** Paul
**Age:** 84
**Health:** Diabetes, CKD, Dementia
**Dates of Note:** 4/7/2015
Real-World Case - Pneumonia

**ADL Category Changes:**
Significant increase in sleep quality over 15 days

**Assessment:**
Note sent to clinician; Member reports she has been sick for almost a month and has been sleeping more lately. Concerned about pneumonia because she is experiencing shortness of breath.

**Intervention/Outcome:**
Case Manager referred member to PCP for evaluation the same day. Pneumonia was diagnosed and medications prescribed.

**Name:** Jolene
**Age:** 84
**Health:** CHF, COPD, Falls
**Dates of Note:** 5/4/2015
Fallon Health Dual Eligible ROI Analysis: Phase 1 Only

Summary
• 12 month, third party managed study
• D-SNP population; all LTC certified (*long term care)
• n=170 (*Dual, Special Needs population)
• Phase I → 8 months data;
• Results compiled by health plan medical economics team

Result*
• Costs were $551.70 per member per month (PMPM) lower when members had passive remote monitoring
• 24% reduction in cost for the enrolled population

ROI = 4.8 to 1
Implementation with PACE Population

1- Create **Buzz** for clinicians, staff, participants and families.
   Generate excitement and interest.

2- **Educate** Staff about how the system works.
   How it will benefit work flow, benefit participants, and help with the 3 main PACE goals. *(patient care, cost savings, satisfaction)*

3- **Engage** Participants and **Launch prep**

4- Determine **Protocols and Information Flow**.
   Who is sent alerts and notes. How is information tracked and followed to resolution?
Develop Timeline

Create Buzz
Aug - Sept

Educate, Engagement

Launch Prep and Protocol
Determination
Oct-Nov-Dec

Run Pilot
Jan - July
Announcements via E-mail and newsletters.

Discussion at IDT meetings.

Presentations at Staff meetings.

Presentations at Participant and Family Council meetings.

Clinicians discussing individually with participants and families.
2a- Educate Staff

Multiple Phases of Training:

1. Explain the **overview and background**

2. Learn to **appreciate the benefit** for participants and staff.

3. Understand the **work flow** and intervention strategies.

4. Continued **encouragement and validation** while improving clinician engagement.
3- Engage PPTs & Launch prep

- **Trifold Brochures and Engagement Letters**
  Sent to all eligible participants.

- One week later →
  **Engagement Calls** with participant and families.
  - Talking Points Script to Invite into pilot.

- **Agrees** to participate → Start Enrollment Process
- **Declines** → follow as subgroup.
Those deemed eligible for enrollment during the evaluation period (evaluation group) were members who were:
- Not in long-term care at the start of the program.
- Living alone or with only one other person in the home setting.

Some Evaluation Group Participants were approached by a PACE Program RN and invited to participate in the trial.
- Those who agreed joined the **Active group**.
- Those who declined after invitation were evaluated as a separate group in the study – the **Declined group**.
- Those eligible but not invited remained in the **Control group**.

The Long-term placement rate and Death rate of the **Active**, **Declined**, and **Control** groups were analyzed after **6 months**.
4b-Information Flow

1. **Significant ADL change** recognized by sensors and algorithm
2. **Note sent to PACE RN** with significant change explained.

3. **RN Reviews note and Calls** member/family to gather info.
4. **RN Tasks Provider** → If Intervention deemed needed.
   FYI to provider if no immediate intervention needed.

5. **Provider Reviews RN note** and determines action needed.
   Ex: Phone call, Med change, Clinic visit, IDT review, etc.

6. **Provider Sends Action Task** to appropriate team member.

7. **Appropriate Documentation** of follow-up for records.
Number of Notes per month

- With a trial of 64 ppts. 4 sites. With about 12-20 ppts each.

- Approximately 50-60 notes per month once established.

- So anticipate about 1 Note PMPM (per member per month)
The Numbers

- 515 PACE participants were deemed “eligible” based on the admission criteria to the study.
  - 121 were reserved for the control group and never contacted
- 394 were placed in the group to be called to participate
  - 125 members agreed to participate and became the active group
  - 269 member declined the invitation to participate
- Of the 125 that agreed to participate:
  - 24 declined at last minute
  - 7 died before the start of the pilot study
- 94 installations were completed by February 2015 to become the initial Active group.
- 64 Ppts Completed the 6 month pilot trial and were analyzed as the final Active group.
  - 30 ppts were deinstalled after go-live due to LTC placement, death, moving, other.
- Almost 50% of those who declined did not provide a reason for choosing not to participate.
- 26% of declining participants felt they did not need the technology for their health/safety.
- Some expressed privacy concerns about having the technology in their home.
Outcome – Long-Term Placement

**Control** - 8 ppts admitted to Long-term care out of 121 participants. **Rate = 6.6%**

**Active** – 6 ppt admitted to Long-term care out of 94 participants. **Rate = 6.4%**

We did not anticipate an appreciative difference at the six month mark. The pilot study is planned for 18 months to determine if a true difference exists.
Limitations

- We conducted a Controlled Trial but not Randomized.

- Although we attempted to age match controls to those in the active group; Some of the eligible participants in the control group may be different in their values and health status from the participants who agreed to participate and become the Active group.

- The control group, which included eligible members not invited to participate should include both members who would agree and members who would not agree to participate.

- The eligible participants who declined will be evaluated separately in the study.

- Question- Does the very act of agreeing to participate in a trial change the likelihood that a person will need long-term placement thus artificially inflating the potential benefit of the intervention?
Upcoming Data Analysis

We await evaluation of full claims data for:

- ER Visits,
- Acute Utilization Hospitalization,
- Pharmacy Expenses
- Total Medical Expenses

Compare the Active and Control groups.
Early Intervention Opportunities
Real-World Case - Intestinal Issues

**ADL Category Changes:**
Member had a significant increase in daytime bed occupancy over 15 days.

**Assessment:**
Note sent to clinician; Identified that Clarice has been having diarrhea which makes her wake up at night. She has not been asking spouse for help and is going to bathroom by herself, putting her at higher risk for falls. Was given antibiotic for diarrhea but it is not helping. Sleeping more during day because of fatigue. Also discovered that she is having difficulty with her husband.

**Outcome:**
Social worker notified of family issues. Referral to MD resulted in work up for c. difficile, ova and parasites. All negative. Antibiotic as empiric treatment for diarrhea was stopped.

**Name:** Clarice

**Age:** 73

**Health:** CHF, Depression, Diabetes, Falls, CKD

**Dates of Note:** 6/8/2015
ADL Category Changes:
Significant decrease in movement of 30 days and significant increase in nutrition over 15 days

Assessment:
Note sent to clinician; David was experiencing recurring knee pain and CM offered rehab visit.

 Outcome:
David accepted rehab visit and was provided a new knee brace. Meals on wheels was also instituted, accounting for increase in nutrition.
Real-World Case – Shortness of Breath

**ADL Category Changes:**
Significant decrease in sleep quality over 15 days

**Assessment:**
Note sent to clinician; Member reports that for the past two weeks she has been afraid to sleep at night because she awakens with shortness of breath and is getting anxious. Also discovered that member stopped taking her nighttime blood pressure med because she was convinced it was keeping her awake at night.

**Intervention/Outcome:**
Member was seen by spiritual leader and an MD. Member reports greatly improved sleep after giving her anxieties to God and after her blood pressure medication was changed to an extended release formula, which eliminated the nighttime dose of the medication.

**Name:** Emma
**Age:** 87
**Health:** COPD, Anxiety, Chronic Pain
**Dates of Note:** 4/2/2015
Real-World Case – Need for basic essentials

ADL Category Changes:
Significant decrease in kitchen activity over 15 days.

Assessment:
Note sent to clinician; Member reports that his PCA has not been at the house lately.

Intervention/Outcome:
PCA contacted. PCA took member grocery shopping and his house is now stocked with food.

Name: Ben
Age: 76
Health: COPD, Falls, Cognitive Impairment
Dates of Note: 5/4/2015
Real-World Case – Illness and essentials

ADL Category Changes:
Significant decrease in nutrition over 30 days and increase in bed occupancy over 15 days

Assessment:
Note sent to clinician; Esther was suffering from prolonged upper respiratory infection, was sleeping more and unable to buy groceries.

Outcome:
Clinician offered homemaking/grocery shopping services. Esther agreed to receive services.

Name: Esther
Age: 81
Health: CHF, Dementia
Dates of Notes: 2/2/2015 and 2/10/2015
Real-World Case – Increased fatigue

**Name:** Hank
**Age:** 91
**Health:** CHF, CKD, Hemiplegia, abnormal weight loss, unsteady gait

**Dates of Note:** 3/2/2015

**ADL Category Changes:**
Significant decrease in movement over 15 days.

**Assessment:**
Note sent to clinician; Clinician called Hank and found that he has been more tired lately. Referred Hank to PCP for evaluation.

**Outcome:**
Hank saw his cardiologist as well as his PCP and Physical Therapy was ordered to keep up his strength.
Real-World Case – Urinary tract infection

**Name:** Betty  
**Age:** 61  
**Health:** Depression, Incontinence  
**Dates of Note:** 6/11/2015

**ADL Category Changes:**  
Significant decrease in Toileting over 15 days, Kitchen Activity over 15 days.

**Assessment:**  
Note sent to clinician; Clinician referred Betty to PCP for evaluation.

**Outcome:**  
Betty was diagnosed with a urinary tract infection. Medications prescribed.
Real-World Case – Balance issues

Name: Annie
Age: 83
Health: Poliomyelitis, CKD, Diabetes, Neuropathy
Dates of Note: 2/2/2015

**ADL Category Changes:**
Significant decrease in chair occupancy over 15 days.

**Assessment:**
Note sent to clinician; Annie had received a new pair of shoes and as a result, felt that she had better balance, given her neuropathy and poliomyelitis.

**Outcome:**
Annie felt more comfortable being mobile around her home because of the new shoes and was spending less time sitting in her chair.
Real-World Case – Nutritional deficit

**ADL Category Changes:**
Significant decrease in nutrition activity over 15 days.

**Assessment:**
Note sent to clinician; Noted that Elliot had lost weight.

**Outcome:**
Case Manager discussed issue with Elliot’s family. Son and wife moved in with Elliot to have more direct input into his diet and nutrition.

**Name:** Elliot  
**Age:** 95  
**Health:** Arthritis  
**Dates of Note:** 1/26/2015