DONALD BERMAN MAIMONIDES
*Centre for Research in Aging*
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# Which Technology Interventions Reduce Emergency Department Visits and Hospital Admissions From Long-Term Care Facilities?

## Findings From a Systematic Review


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McGill

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# Outline

- Background
- Knowledge gap
- Review questions
- Methods
- Results
- Conclusions

# Background

- Long-term care facility (LTCF) residents are at high risk of being transferred to acute care (Grabowski et al, 2008)
- More than **1/3** of the residents visiting emergency departments (ED) are eventually admitted to a hospital (Ackerman et al, 1998)
- About **2/3** of hospital admissions (HA) are avoidable (Ouslander et al, 2010)
- Significant adverse outcomes associated with avoidable ED transfers and hospitalizations (Dwyer et al, 2014)

# Interventions Aimed At Reducing Potentially Avoidable Acute Care Transfers

- Wilchesky M, Cetin-Sahin D, Gore G, et al. PROSPERO 2016:CRD42016048128
  http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42016048128
- Complex because they address multi-dimentional reasons for transfers
- Multi-component
  - Training, human resources, tools, technology

# Definition of "Technology"

- Information and communication technology used by healthcare organizations for management or delivery of healthcare

- Adapted from Effective Practice and Organization of Care (EPOC). EPOC taxonomy; 2015.

# Knowledge gap

- Evidence exists regarding feasibility and stakeholder satisfaction (Edirippulige et al, 2013)
- Lack of evidence for their effectiveness (Edirippulige et al, 2013)
- Limited number of technologies studied
- Reduction in acute care transfers has not been studied
- Most studies are observational and qualitative (Edirippulige et al, 2013)

# Review Questions

1. What types of technology interventions exist for LTCF stakeholders in order to reduce acute care transfers in the event of an acute or complex changes in resident health status?

2. What is the effectiveness of these interventions in reducing acute care transfers as compared to usual care?

# METHODS

# Design:

Systematic mixed studies review (Souto et al, 2015)

# Main inclusion criteria:

| | |
|---|---|
| **Interventions** | Technology-centered or aided programs, models of care, innovations, or tools |
| **Comparison** | Usual care |
| **Outcome measures** | ED visits or hospital admissions |
| **Setting** | Facility-based long-term care (Canadian Healthcare Association) |
| **Study methods** | Quantitative and mixed studies |
| **Language** | English or French |

# Three-Phase Search Strategy

**Database search from inception to July 2016**

- Embase
- MEDLINE
- CINAHL
- Social Work Abstracts
- PsycINFO
- The Cochrane Library
- Ovid Textwords
- AMED
- Global Health
- Health and Psychosocial Instruments
- Joanna Briggs Institute EBP Database
- Ovid Healthstar
- Web of Science

1

Backward and forward citation tracking techniques

2

Grey literature search

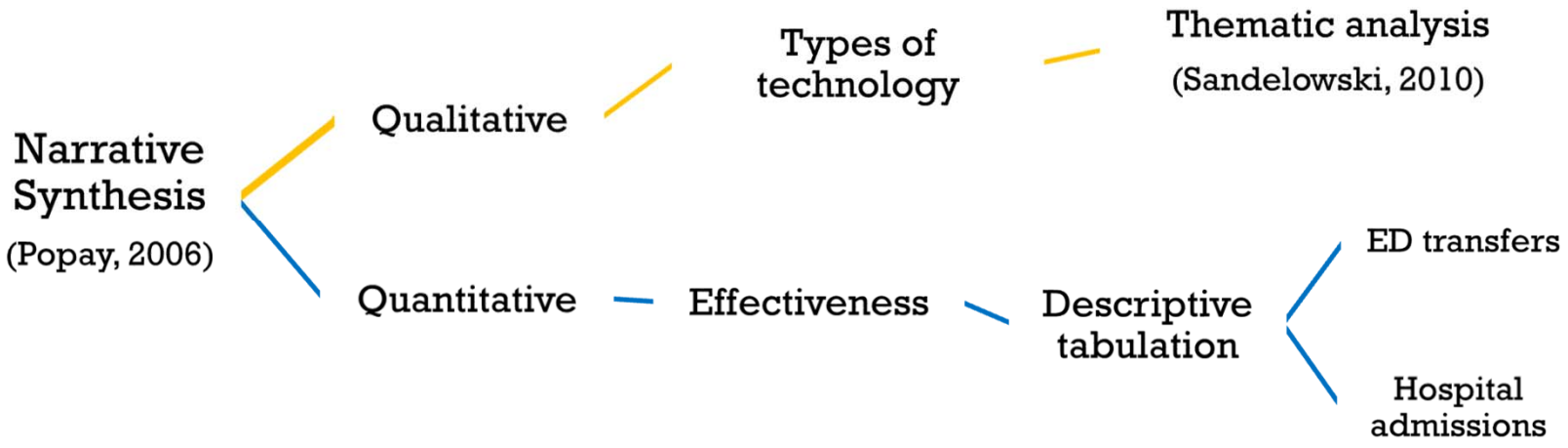
3

# Two Independent Reviewers

- Identification and Selection Process
- Quality appraisal of selected studies:
  - Mixed Methods Appraisal Tool (MMAT) (Souto et al, 2015)
  - Scored from 0 to 4
- Data extraction:
  - Characteristics of studies
  - Descriptions of interventions
  - Evidence of effectiveness

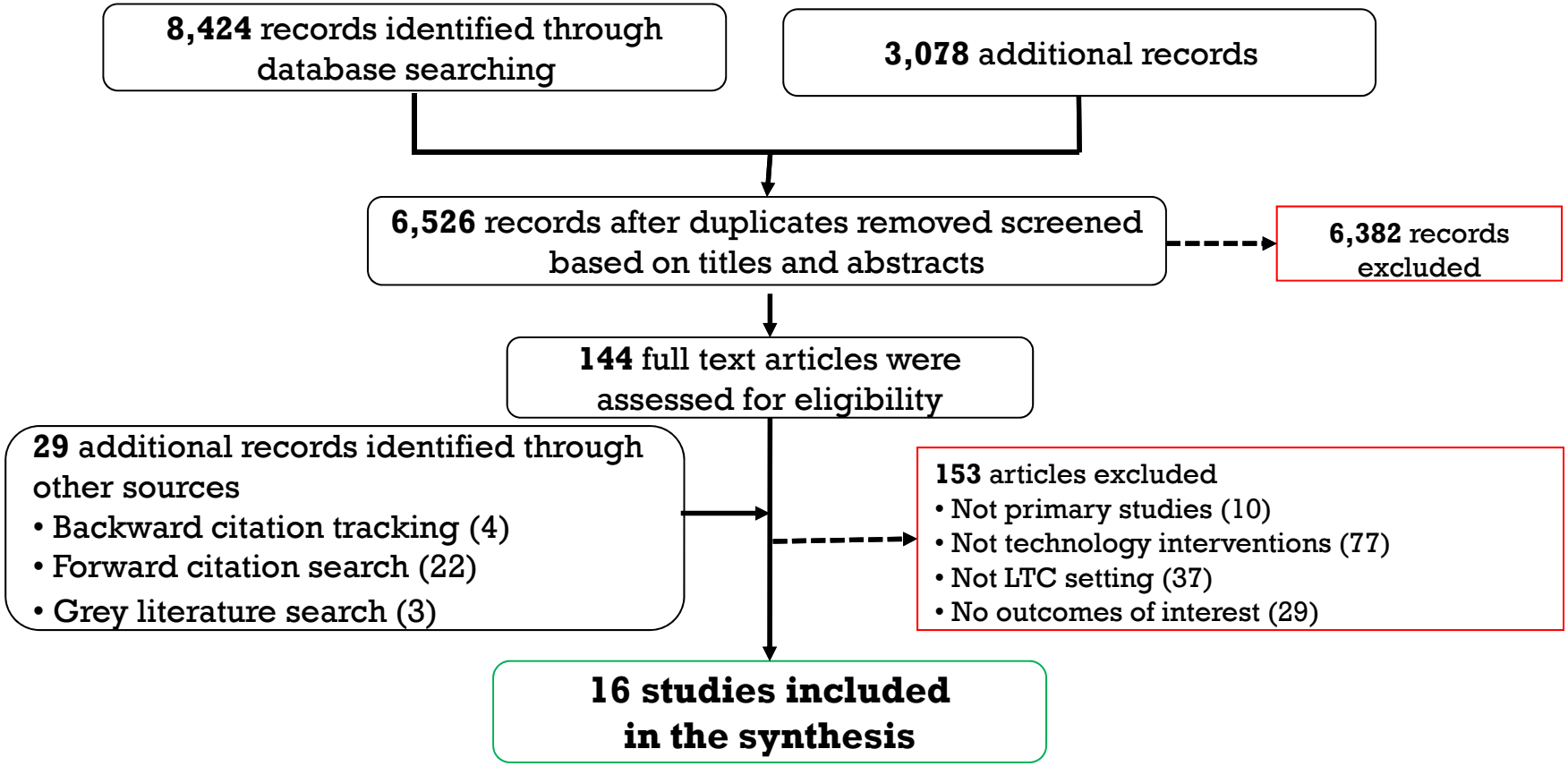
# Knowledge synthesis

- High heterogeneity
- Most studies reported insufficient quantitative data for inclusion in a random-effects model meta-analysis



# RESULTS

# Identification and selection results




PRISMA-P 2015 statement (Moher et al, 2015)

# Characteristics of the studies

**Year:** Between 1998 and 2016

**Country:** USA (4), Australia (3), Canada (2),UK (2), Taiwan (2), China (2), New Zealand (2)

**Quality MMAT total score:**

- Low scores (0-1) n=4
- Other scores (2-4) n=12

# Clinical heterogeneity

## Design

- Randomized pre-post intervention study
- Retrospective quasi-experimental study
- Feasibility pilot study
- Cluster randomized stepped-wedge trial
- 2 group matched pre-post prospective cohort study
- Retrospective pre-post study …

## Intervention

- Mono vs multi-component
- Various components other than technology
- Different stakeholders involved

## Usual care, population under study:

- Not consistently defined

# Statistical heterogeneity

**ED visits**

- # of visits
- # of annual visits
- # of return visits
- Proportion of 30 day return visits without hospital admission

**Hospital Admissions**

- Rate/1,000 resident days
- # of monthly hospital visit
- Proportion of 30 day hospital readmissions
- # of avoidable admissions
- # of annual admissions following ED visits
- # of discharge from the ED without admission

# Three types of technology

1. Web-based visual system for telemedicine (n=5)*
2. Non-visual tele-coaching (n=7)
3. Health information systems (n=6)

* 2 studies also included more than 1 technology type

# 1. Web-based visual system for telemedicine

**Definition:** Direct provision of a clinical service (diagnosis or management)

Videoconferencing
Telemedicine carts
Exam cameras
Digital otoscopes
Electronic stethoscopes
Dermatoscopes
Ophthalmoscopes

# 1. Web-based visual system for telemedicine

| Author year | INTERVENTION | N (setting) | Effectiveness | |
|---|---|---|---|---|
| | | | ED visits | Hospital admissions |
| Grabowski 2014 | **Telemedicine for wound care** | 11 (6-C; 5-I) | -- | 4.4% ↓ |
| Hex 2015 | **Telemedicine for long-term chronic conditions** and people thought to be in the last 12 months of life | 48 (21-C; 27-I) | 14% ↓ | 5% ↓ |
| Hsu 2010 | **Taiwan's Telehealth Pilot Project:** a tele-consultation infrastructure to link the LTCF to tertiary hospitals | 3-I | -- | 25% ↓ |
| Hui 2001 | **Telemedicine to provide geriatric services** | 1-I | 8.8% ↓ | 10.6% ↓ |
| Stern 2014 🇨🇦 | **Enhanced multidisciplinary teams via telemedicine** (advanced practice nurses) | 12 (exposed to both I and C) | 30% ↑ | 20% ↑ |

# 2. Non-visual tele-coaching

**Definition:** Clinical consultation or transfer approval process with experts from outside LTCF

Telephone calls

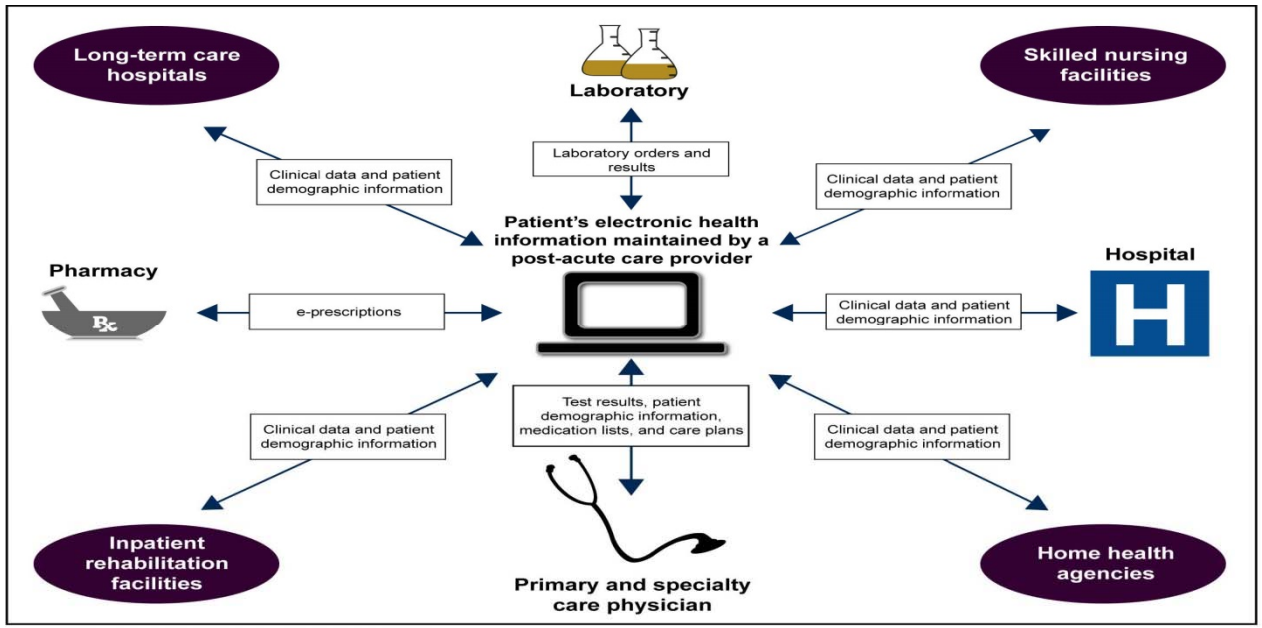
e-mails

# 2. Non-visual tele-coaching

| Author year | INTERVENTION | N (setting) | Effectiveness | |
|---|---|---|---|---|
| | | | Effectiveness | Effectiveness |
| Boyd 2014 | **Residential Aged Care Integration Program** (gerontology nurse specialist) | 54 (25-C; 29-I) | -- | 43% ↓ |
| Codde 2010 | **An enhanced primary care service** (ED-based nurses) | 1-I | **15%** ↓ | -- |
| Hullick 2016 | **The Aged Care Emergency service** (ED-based nurses) | 12 (8-C; 4-I) | No significant change ~ | ~35 % ↑ |
| Lee 2002 | **Care protocol** (community nurse) | 45 (assigned) | No significant change ~ | No significant change ~ |
| Sankaran 2010 | **A complex multidisciplinary intervention** (Clinical Nurse Specialists and geriatrician) | 1-I | -- | No significant change ~ |
| Street 2015 | **Residential Care In-Reach** (specialist practice nurses) | All LTCFs in a region | **11%** ↓ | **23.2%** ↓ |
| Stern 2014 | **Enhanced multidisciplinary teams via telemedicine** | 12 (exposed to both I and C) | 30% ↑ | 20% ↑ |

# 3. Health information systems

**Definition:** Electronic transfer of clinical information, documents, or secure messaging to either facilitate transfer of clinical data or to alert clinicians regarding resident health status changes




Sources: GAO analysis (data); Art Explosion (clip art). | GAO-17-184

# 3. Health information systems

| Author year | INTERVENTION | N (setting) | Effectiveness | |
|---|---|---|---|---|
| | | | ED visits | Hospital admissions |
| Hsu 2010 | **Taiwan's Telehealth Pilot Project** (tests results were uploaded into computerized physician order entry system) | 3-I | -- | 25% |
| Rantz 2015 | **Missouri Quality Initiative intervention** (health information exchange system) | 1-I | -- | 85% |
| Yeaman 2015 | **Health Information Technology** (electronic point of care documentation tool that is wall-mounted allowing the flow of information from and to acute care) | 5-I | 71% | 21.1% |
| Joseph 1998 | **Nurse practitioner-physician teams** (on-line scheduling services for specialty consultations and diagnostic tests) | 30-I | -- | Compared with other LTCFs, 10.4% lower rates |
| Levy 2008 | **Making Advance Planning a Priority** (fax to the attending physician indicating that the resident was at high risk for mortality) | 1-I | -- | Dying in the hospital **39%** |
| Lisk 2012 | **Regular liaison of consultant geriatricians** (email alert system to inform the geriatrician when a resident was admitted to the hospital) | 3-I (Part1) 6-I (Part 2) | -- | **43%** |

# CONCLUSIONS

# Effectiveness

- Web-based telemedicine and health information systems 

  - Does visual access to resident and their health records facilitate decision making to keep residents in the facility?

  - How can we improve these systems?

- Non-visual tele-coaching 

  - Effect of different kinds of expertise (medical or nursing specialists, allied health professionals) in prompting or preventing decisions for transfers?

  - Qualitative in-depth studies may explore the reasons

# Recommendations

Future intervention studies should collect and report standardized quantitative data (e.g. transfer rates per 100 resident-days) to allow assessment of intervention effectiveness in meta-analyses.

# Types of technology

- Several types of technologies are being be used to reduce ED transfers and HAs from LTCFs
- Potential use of newer technologies (e.g., virtual reality, wearable technology) could be studied

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# Thank you

# "Facility-based long-term care"

| American Medical Directors Association's (AMDA) definition | Canadian Healthcare Association's (CHA) definition |
|---|---|
| Nursing home or skilled nursing facility (NH/SNF) providing care for:<br>• Frail elderly patients and younger adults<br>• Requiring 24-h nursing and rehabilitation for chronic medical conditions or impaired mental capacity<br>• Having significant deficiencies in activities of daily living | NH or facility-based long-term care providing care for:<br>• Frail elderly patients and younger adults<br>• Unable to remain at home or in a supportive living environment (e.g., assisted living facility)<br>• Need health (nursing/medical), social and personal care |