

Modeling changes in assessments to predict needs and guide care planning in a home care setting

TVN Mindmerge Victoria

Jeff Poss



UNIVERSITY OF WATERLOO
FACULTY OF APPLIED HEALTH SCIENCES
School of Public Health and Health Systems

Debra Sheets

Stuart MacDonald

Cheryl Beach



Purpose of Study

- Develop a *predictive frailty measure* for seniors receiving home care by applying advanced analytic methods to data from the RAI-HC
- Specifically:
 - 1) using available data, **develop** predictive models of frailty that can inform decision-making
 - 2) **implement** the frailty measure with healthcare professionals working with home care clients
 - 3) **demonstrate** the impact of the frailty intervention on decision-making, services utilization and health outcomes

Some residential care seniors could be living independently, says B.C. Seniors Advocate Isobel Mackenzie

Report says seniors in residential care are overusing medications and lack adequate exercise

By On the Coast, CBC News | Posted: Apr 08, 2015 5:18 PM PT | Last Updated: Apr 08, 2015 5:18 PM PT



B.C. Seniors Advocate Isobel Mackenzie released her report, Placement, Drugs and Therapy... We Can Do Better, on Tuesday. (CBC)

Resident Assessment Instrument (RAI)

Overview

- Standardized, comprehensive assessment and care planning system
 - Minimum Data Set (MDS)
 - Origins:
 - US Nursing Homes
 - Medicare/Medicaid (1987 Omnibus Budget Reconciliation Act)
 - Public domain in U.S.
 - Elsewhere copyright held by 
- Versions for other settings later developed:
 - **home care**, inpatient psychiatry, acute care, post-acute care, community mental health, palliative care, intellectual disability, etc.

Example items (from RAI-Home Care)



~300 items

- Trained assessors
- Use all available sources of information
 - Client
 - Informal caregivers
 - Referral source, medical record, etc.

1	BLADDER CONTINENCE	<p>a. In LAST 7 DAYS (or since last assessment if less than 7 days) control of urinary bladder function (with appliances such as catheters or incontinence program employed) (Note—if dribbles, volume insufficient to soak through underpants)</p> <p>0. <i>CONTINENT</i>—Complete control; DOES NOT USE any type of catheter or other urinary collection device</p> <p>1. <i>CONTINENT WITH CATHETER</i>—Complete control with f catheter or urinary collection device < urine</p> <p>2. <i>CONTINENT</i>—Incontinent episodes once</p> <p>3. <i>CONTINENT</i>—Incontinent episodes 2 week but not daily</p> <p>4. <i>CONTINENT</i>—Tends to be incontinent control present</p> <p>5. <i>INCONTINENT</i>—Inadequate control, multiple daily episodes</p> <p>8. <i>DID NOT OCCUR</i>—No urine output from bladder</p>	<input type="checkbox"/>
		<p>b. Worsening of bladder incontinence as compared to status 90 days ago (or since last assessment if less than 90 days)</p> <p style="text-align: right;">0. No 1. Yes</p>	<input type="checkbox"/>

RAI-Home Care

- Long-stay (~60 days or longer), adult, non-palliative
- At intake, then re-assessed **every 6-12 months** or sooner if significant change
- Individual level:
 - Care planning
 - Track outcomes over time
- Aggregate level:
 - Understanding served populations
 - Outcomes related to service quality
 - Expected resource intensity (case mix)
 - Program evaluation/research

RAI-HC in Canada



- National reporting standard, adopted by the **Canadian Institute for Health Information (CIHI)** in 2001, part of the Home Care Reporting System
- CIHI provides training, reporting, data standards, and a national data repository
- Mandated in 8 provinces/territories:
 - BC, AB, SK, MB (WRHA), ON, NS, NL, YT
 - At least **3 million assessments** done in Canada to date
 - ~400,000 assessments/year

RAI-HC informed snapshot

(HCRS Quickstats, CIHI)

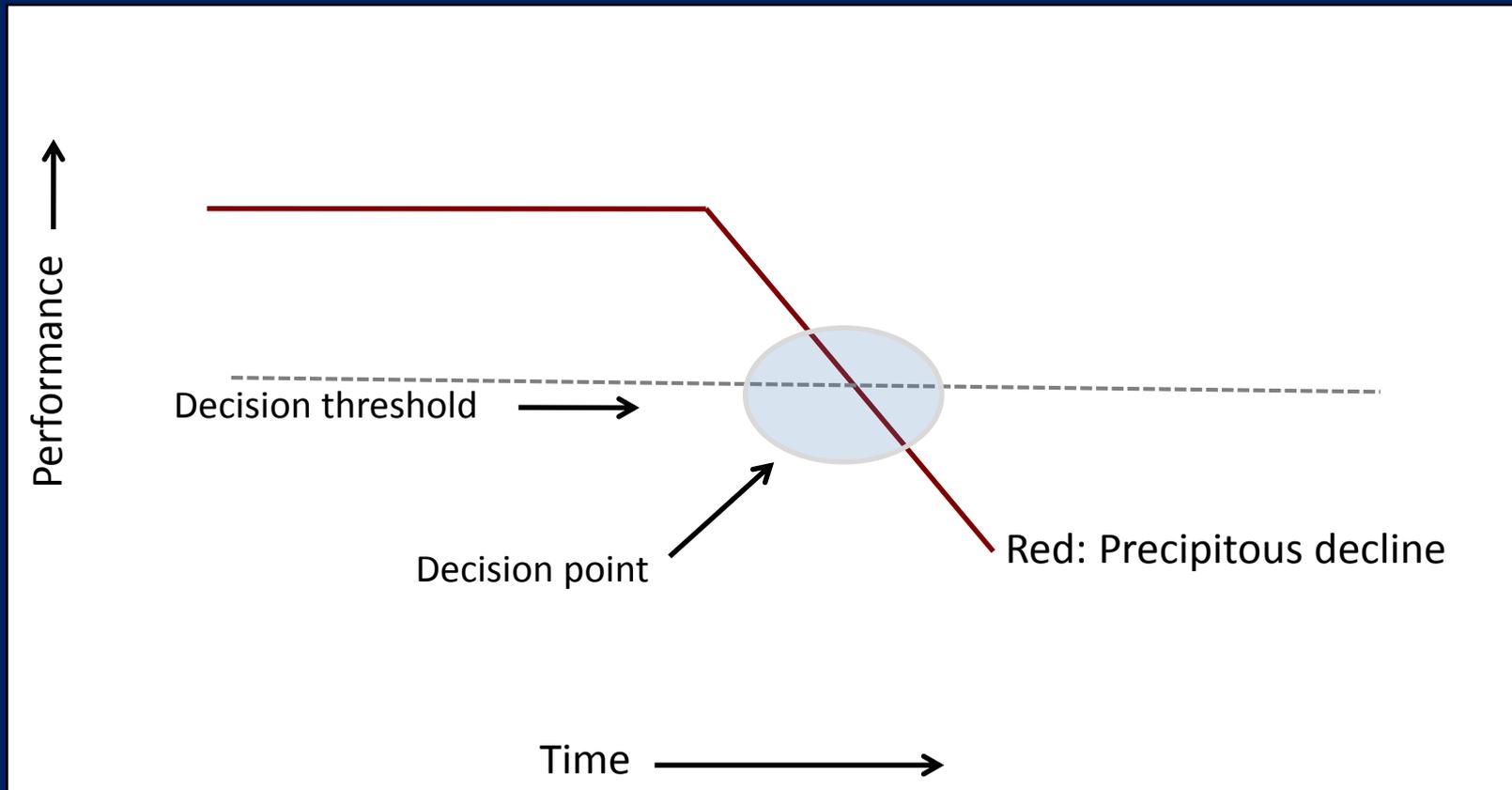
2014/15	BC	ON	NL	YT
Average age	81	78	79	75
Female	64%	64%	64%	63%
Alzheimer's/dementia	36%	25%	16%	14%
Have informal caregiver	96%	97%	90%	92%
Informal care hours/week	21	20	26	14
Receive extensive help with ADL	19%	20%	12%	3%
Mild or greater cognitive impairment	61%	58%	27%	37%
Signs of depression	21%	23%	17%	26%
Antipsychotic medication	11%	15%	8%	7%
CHESS* 2 or greater	32%	46%	27%	29%

* Changes in Health, End-stage, Signs and Symptoms: marker for health instability

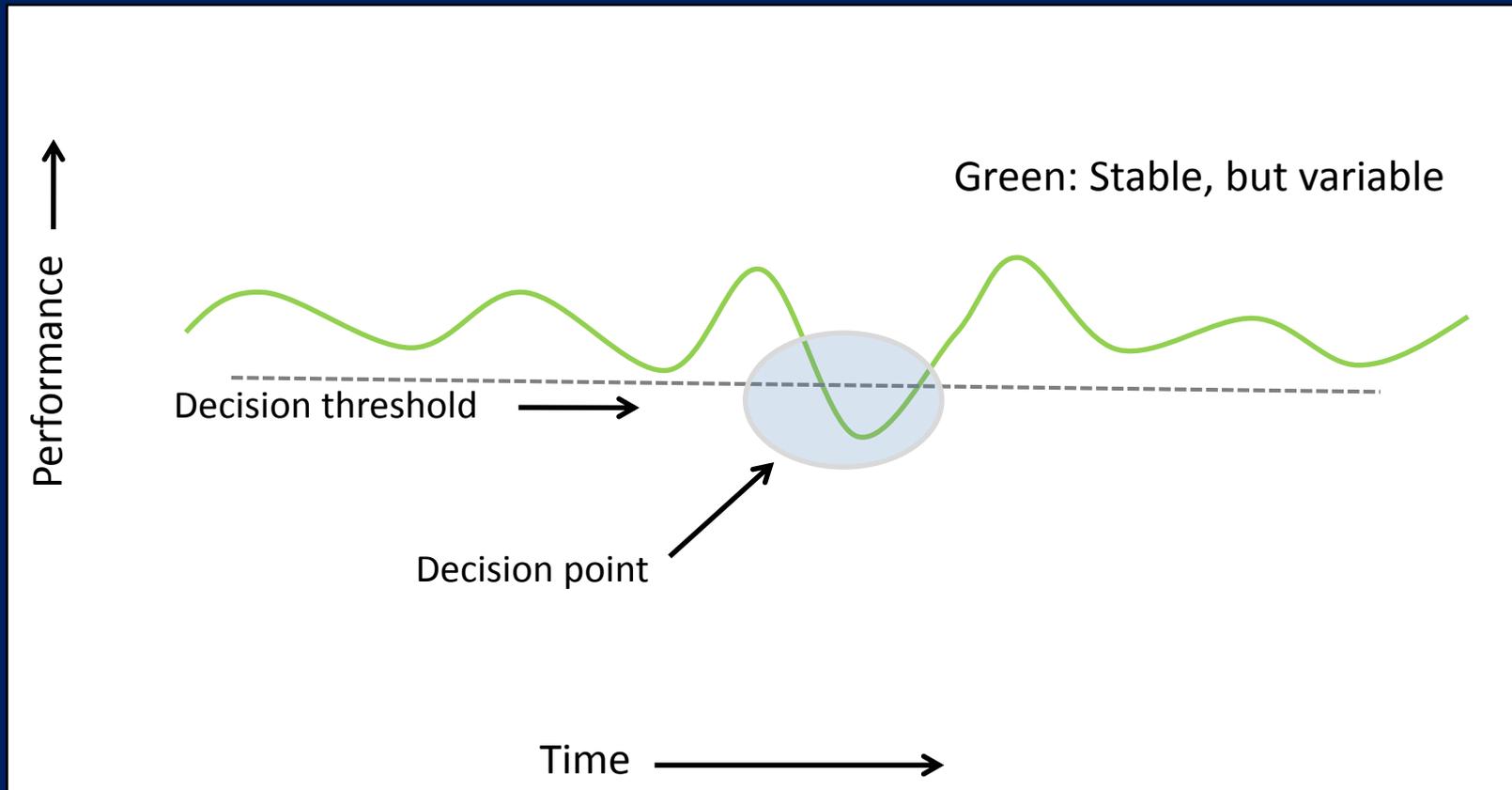
Conceptual Overview

- RAI-HC data for tracking change in status over time, but the predictive value has been largely untapped
- RAI-HC outputs have generally been limited to evaluating outcomes for a single point in time
- We will mathematically model **an individual's change** in RAI-HC measures to predict likely changes in the level of care required for an individual

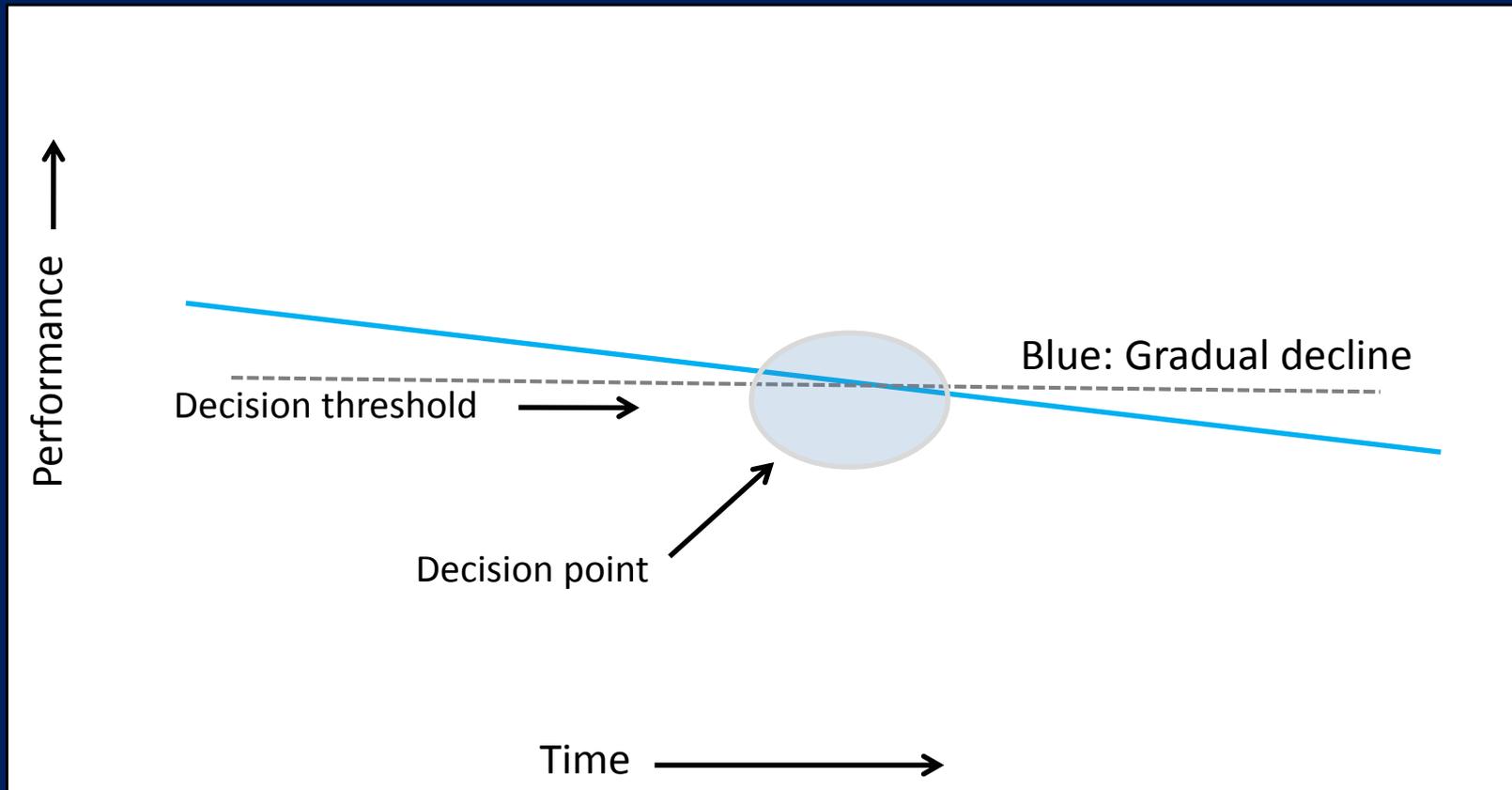
Clinical Decision Making: The Central Importance of Change



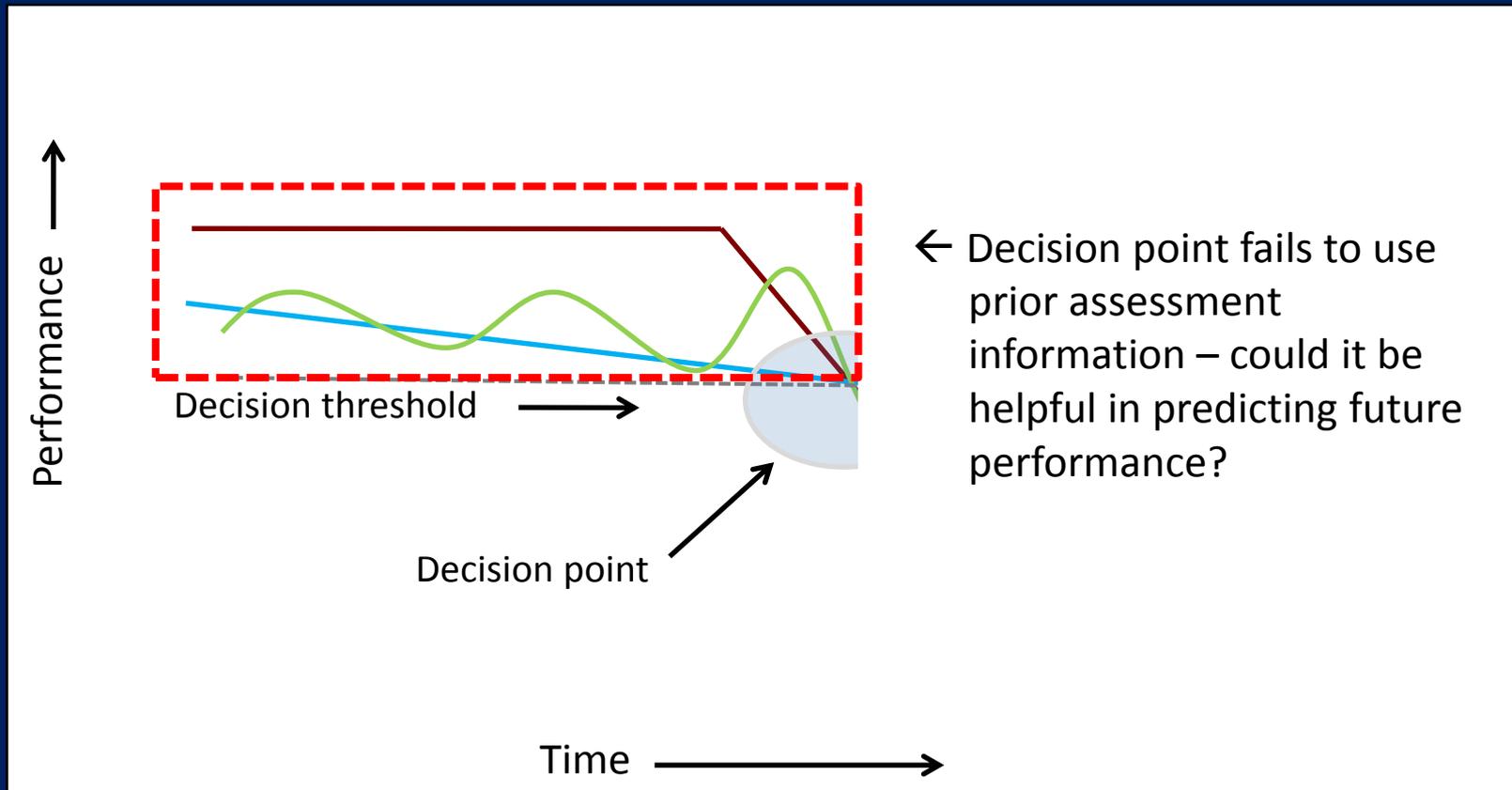
Clinical Decision Making: The Central Importance of Change



Clinical Decision Making: The Central Importance of Change



Clinical Decision Making: The Central Importance of Change



Present Study: Key Research Objectives

- Model individual differences (intercepts) and change (slopes) for **select subscales and indicators** of the RAI-HC
 - computed scales
 - clinically-informed combinations of RAI-HC items (e.g., living alone + cognitive impairment)
 - individual RAI-HC items (e.g., stamina)
- These intercepts and slopes, along with other covariates (e.g., age, caregiver status), will help predict risk of transition to subsequent levels of care (e.g., HC to assisted living)

Present Study: Quantitative Models

- Statistical models that facilitate a joint estimation of **survival** (e.g., time to transition or death) and **change** (growth curves) components of the longitudinal data
- These shared growth-survival parameter models permit the simultaneous estimation of intercepts/slopes of RAI indicators → predict clinical outcomes

McArdle et al., 2005

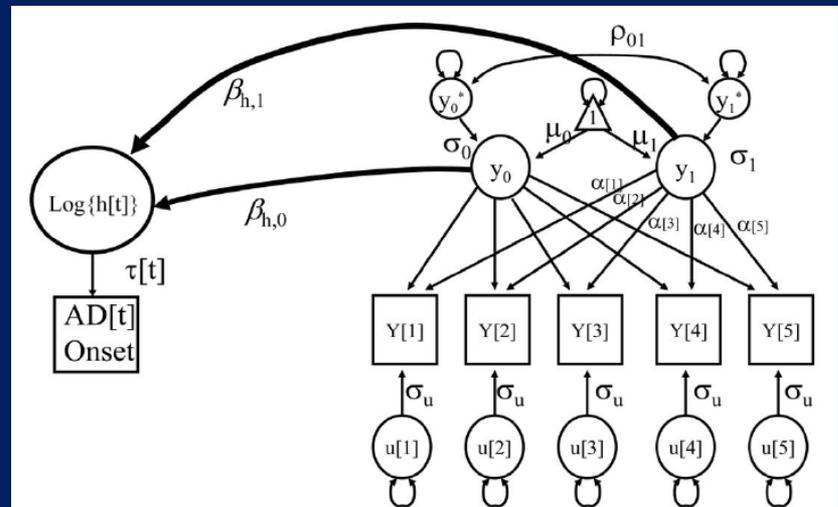


Figure 1. A path diagram of the shared-parameter concept applied to a latent growth-survival model. $Y[t]$ = words recalled; $AD[t]$ = Alzheimer's disease diagnosis at age t .

Project Plan

- Obtain de-identified data
 - Island Health (exploratory)
 - Canada (CIHI)
- Modeling
 - Quantitative & clinical expert guidance
- Test predictive indicator with selected home care case managers and ~30 clients over 3 months, within Island Health

Acknowledgments

*This research was funded by a grant
from the Technology Evaluation in the
Elderly Network*



Questions

Jeff Poss, Ph.D.

University of Waterloo (Adjunct)

jwposs@uwaterloo.ca