CCACs Moving to the interRAI HC:
Optimizing Care Coordination using New Evidence-Informed Decision Support Algorithms

Janet McMullan, RN, BScN, MN, OACCAC
Chi-Ling Joanna Sinn, BSc, PhD(c), University of Waterloo
Aaron Jones, BSc, MSc, OACCAC
Nancy Ackerman, RN, BScN, OACCAC

May 29, 2015

Outstanding care – every person, every day

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Presenters:

- Janet McMullan, RN, BScN, MN, Clinical Program Lead, OACCAC
- Chi-Ling Joanna Sinn, BSc, PhD(c), School of Public Health and Health Systems, University of Waterloo
- Aaron Jones, BSc, MSc, Health Data Analyst, Information Management, OACCAC
- Nancy Ackerman, RN, BScN, Education Specialist, OACCAC

Contributors:

- Gail Riihimaki, OT, MBA, Director, Client Services, HNHB CCAC
- Dr. John Hirdes, Professor and Home Care Research and Knowledge Exchange Chair, School of Public Health and Health Systems, University of Waterloo
- Nancy Curtin-Telegdi, MA, Clinical Educator, School of Public Health and Health Systems, University of Waterloo

Outline

Objective: Learn about the progress of new evidence-informed clinical decision support algorithms for Personal Support and Long-term Care.

Outline:

1) Roll out of the Provincial Assessment Solution
2) Personal Support Algorithm
3) Determining Appropriateness of Care Algorithm
4) **CR**isis **I**dentification and **S**ituational **I**mprovement **S**trategies (CRISIS) Algorithm

Background

Janet McMullan, OACCAC
Nancy Ackerman, OACCAC

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Transitioning to the interRAI HC

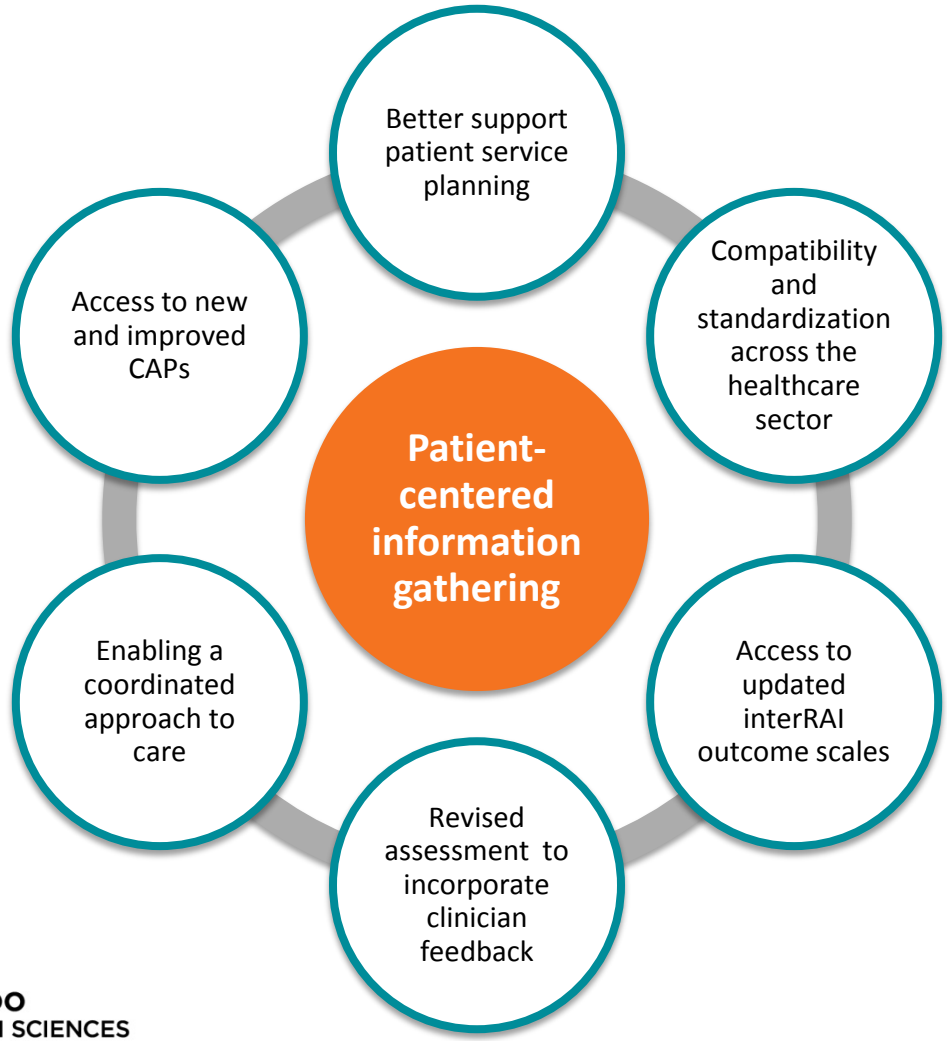
An evolution of assessment tools

2002
RAI HC was first introduced in Ontario

2010
interRAI CA and interRAI PC are introduced

2017
interRAI HC will replace the RAI-HC

Transitioning to the interRAI HC



Moving Away from the RAI Aggregate Score

- RAI Aggregate Score was developed by CCACs to support Care Coordinators with decisions related to patient care planning.

RAI Aggregate Score will not be available in the interRAI HC.

New decision support algorithms have been developed to promote provincial consistency by supporting decisions related to:

- allocation of personal support hours
- appropriateness of care needs for placement
- patient level of risk for immediate placement, and opportunities to modify risk through interventions.

RAI Aggregate Score

Every CCAC uses the RAI Aggregate Score differently

- Some CCACs use exact cut-offs by RAI Aggregate Score
- Service allocation amount by RAI Aggregate Score differ
- Service maximum amounts by RAI Aggregate Score differ

Table 1. Personal Support Guidelines CCAC A			
RAI Score	Priority	Allocation if new referral	Allocation if on service
0-10	Low or moderate	Admit to waitlist	Up to 2 hours/week
11-16	High	Up to 5 hours/week	Up to 5 hours/week
17+	Very high	Up to 7 hours/week	Up to 14 hours/week

Table 2. Personal Support Guidelines CCAC B			
RAI Score	Priority	Waitlist	Allocation
1-6	Low	Yes	Up to 1 hour/week
7-10	Moderate	Yes	Up to 2.5 hours/week
11-13	High	No	Up to 7 hours/week
14-16	High	No	Up to 12 hours/week
17+	Very high	No	Up to 16 hours/week

Task Group Developed

Collaborative effort across researchers, CCACs, and OACCAC – Education, Information Management, Technology, and Client Services Team to address the need for new evidence-informed decision support algorithms.

Members	
Gail Riihimaki, HNHB CCAC (Chair)	Dr. John Hirdes, University of Waterloo
Ian Ritchie, NW CCAC	Chi-Ling Joanna Sinn, University of Waterloo
Laszlo Cifra, CE CCAC	Nancy Curtin-Telegdi, University of Waterloo
Jennifer Wright, Central CCAC	Leslie Eckel, University of Waterloo
Valerie Armstrong, NSM CCAC	Jenn Bucek University of Waterloo
Gayle Seddon, TC CCAC	Heather Binkle, OACCAC
Amy Mangone, NE CCAC	Nancy Ackerman, OACCAC
Aaron Jones, OACCAC	Shelly Anne Hall, OACCAC
Janet McMullan, OACCAC	

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Development Principles

- Patient needs for the purpose of resource allocation are clearly distinguishable
- Clinical decision-making is equitable and consistent
- Decisions are fiscally responsible
- Decisions are evidence-informed and use the full range of tools available
- Practical and simple to provide guidance for Care Coordinators

Decision-making and Role of the Care Coordinator

Develop a patient-centered care plan based on:

Personal Support Algorithm

Chi-Ling Joanna Sinn, University of Waterloo

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Overview

- The Personal Support algorithm provides a framework for allocating personal support
- Ranges from 1 to 6, where a higher group indicates greater need for personal support
- Developed using RAI-HC/interRAI HC and interRAI CHA assessments in Ontario
  - To support standard assessment and consistent service levels across home and community care

Approach to Algorithm Development

- Grounded in:
  - Clinical knowledge → incorporate working group feedback from conception to implementation
  - Existing practice → use completed RAI-HC assessments
  - Evidence → apply rigorous statistical procedures and pursue face, convergent, and predictive validity

- Achieve balance between structure and flexibility in decision-making

Data Sources (RAI-HC)

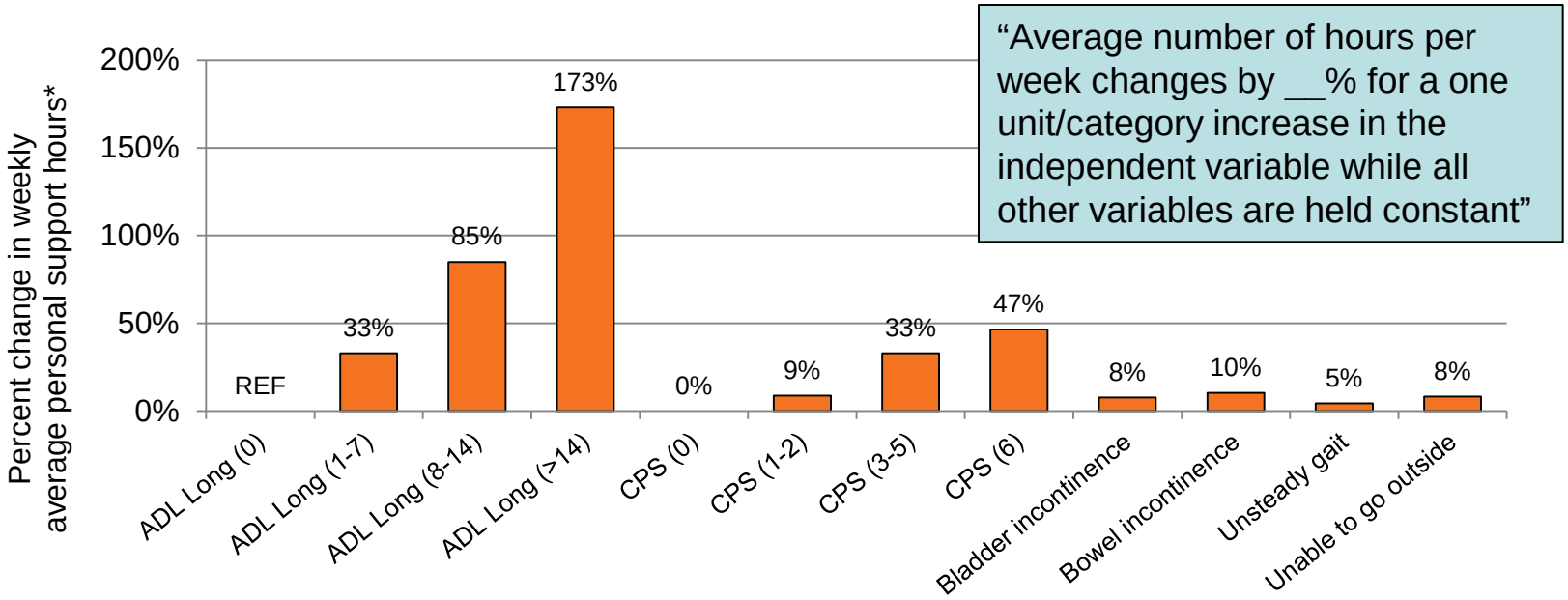
- Unique RAI-HC assessments from 14 home care agencies in Ontario (Jan-Dec 2013)
  - Excluded: hospital versions, received case management or placement services only, fewer than three weeks of active service*, top 1% of personal support users (i.e., service maximums)
- Linked to actual services data
  - Calculated weekly average of hours received within 12 weeks of RAI-HC assessment
- N=128,169

*Services include Nursing (visit/shift), Nutrition, PT, OT, SLP, Social Work, PSW, Other

Data Sources (interRAI CHA)

- Unique interRAI CHA assessments from three community support agencies in Ontario (Jan-Dec 2013)
- N=1,985

Patient Attributes Associated with Hours of Personal Support Received



- ADL and cognition scales were most strongly associated with more hours of personal support

*Adjusted for CCAC

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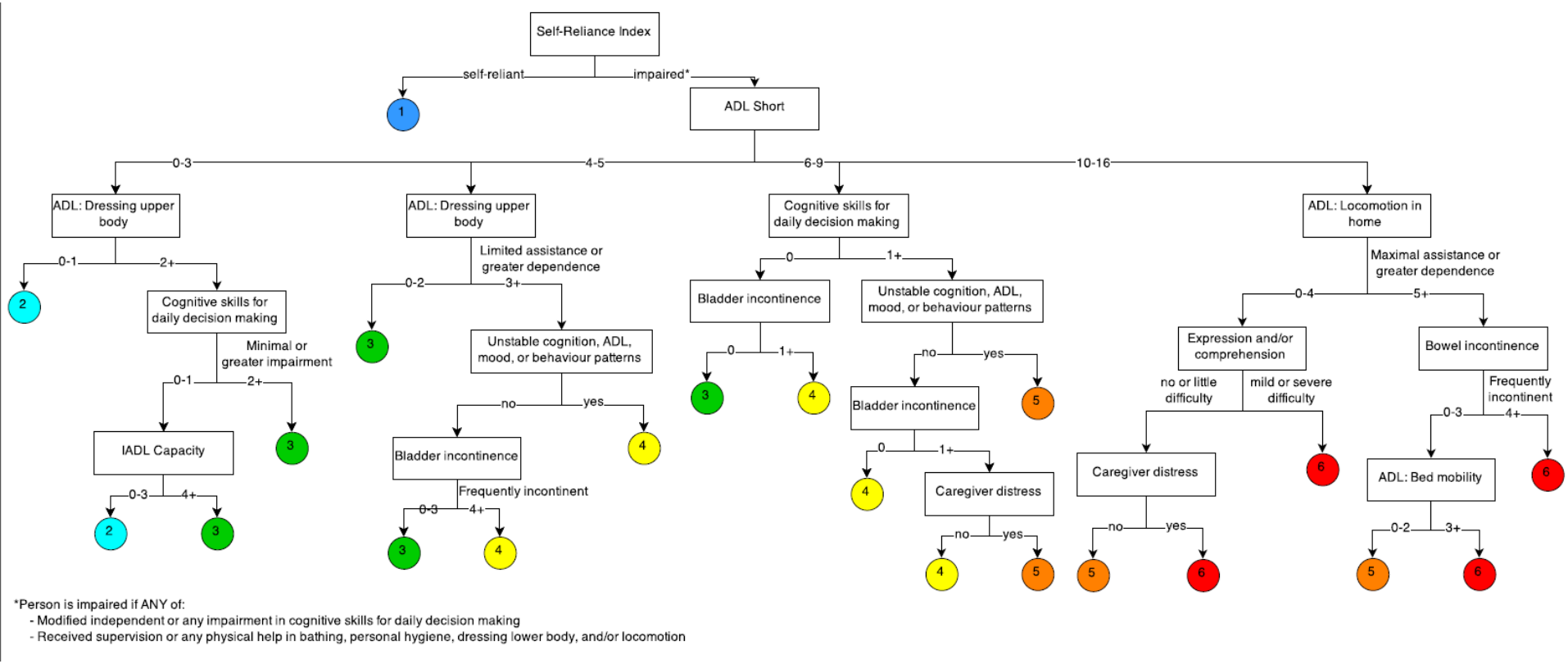
Developing Decision Trees

- Patient attributes were examined in decision trees
  - Decision trees can identify attributes that contribute to personal support received for one group of patients, but not for another group
    - E.g., IADL may only be a relevant factor for patients with low ADL needs, not high ADL needs
  - This increases sensitivity to unique patient needs

- A number of decision tree options were explored

Selected Decision Tree

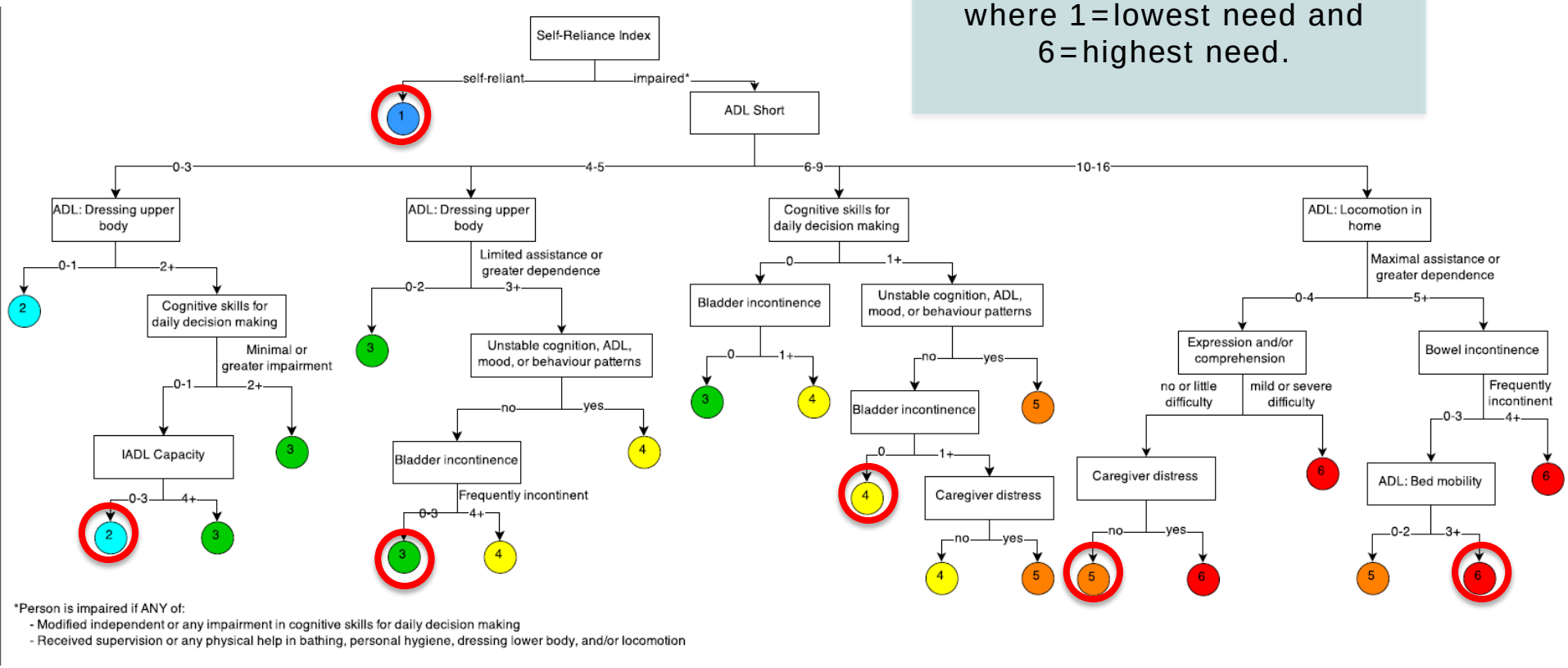


*Person is impaired if ANY of:
- Modified independent or any impairment in cognitive skills for daily decision making
- Received supervision or any physical help in bathing, personal hygiene, dressing lower body, and/or locomotion

*Note: The group will be calculated by software.

Selected Decision Tree

There are six levels, where 1=lowest need and 6=highest need.



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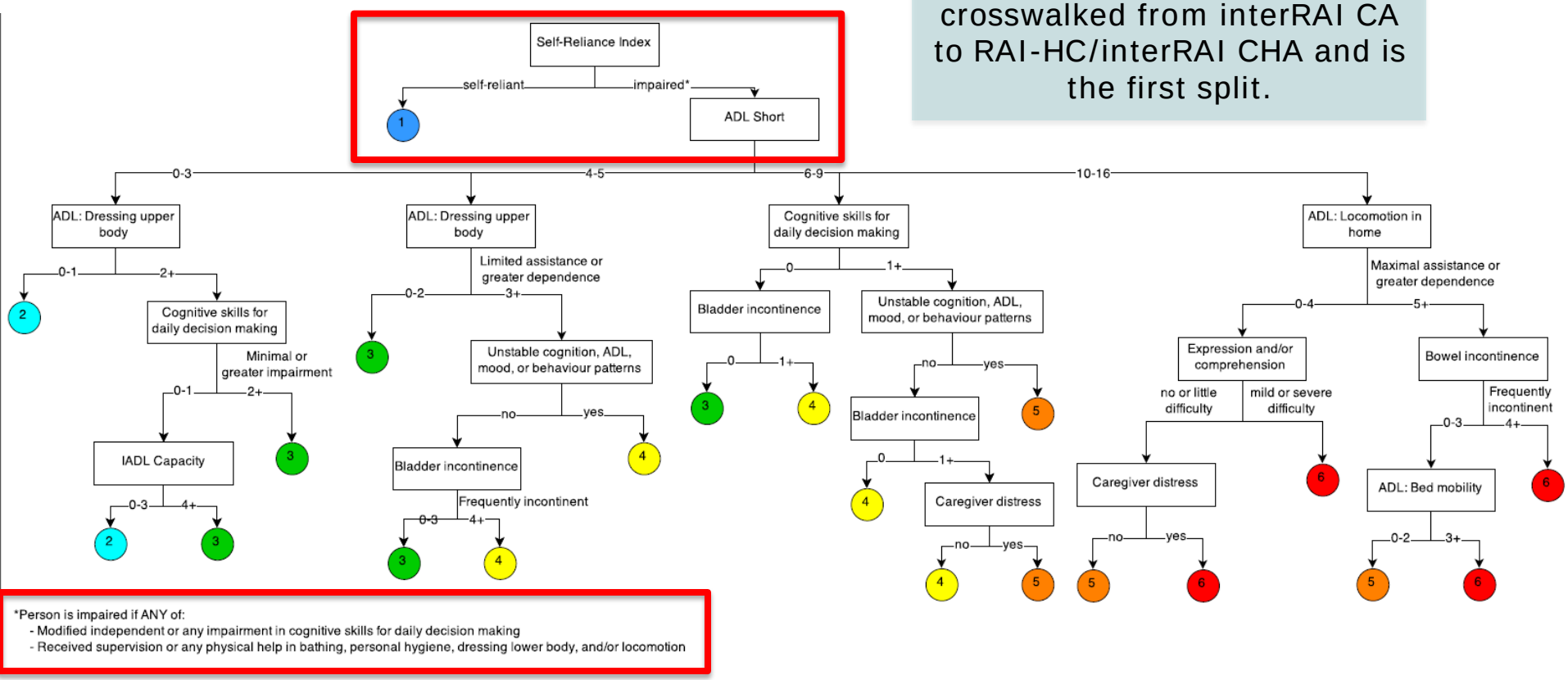
Selected Decision Tree

Self-Reliance Index is crosswalked from interRAI CA to RAI-HC/interRAI CHA and is the first split.



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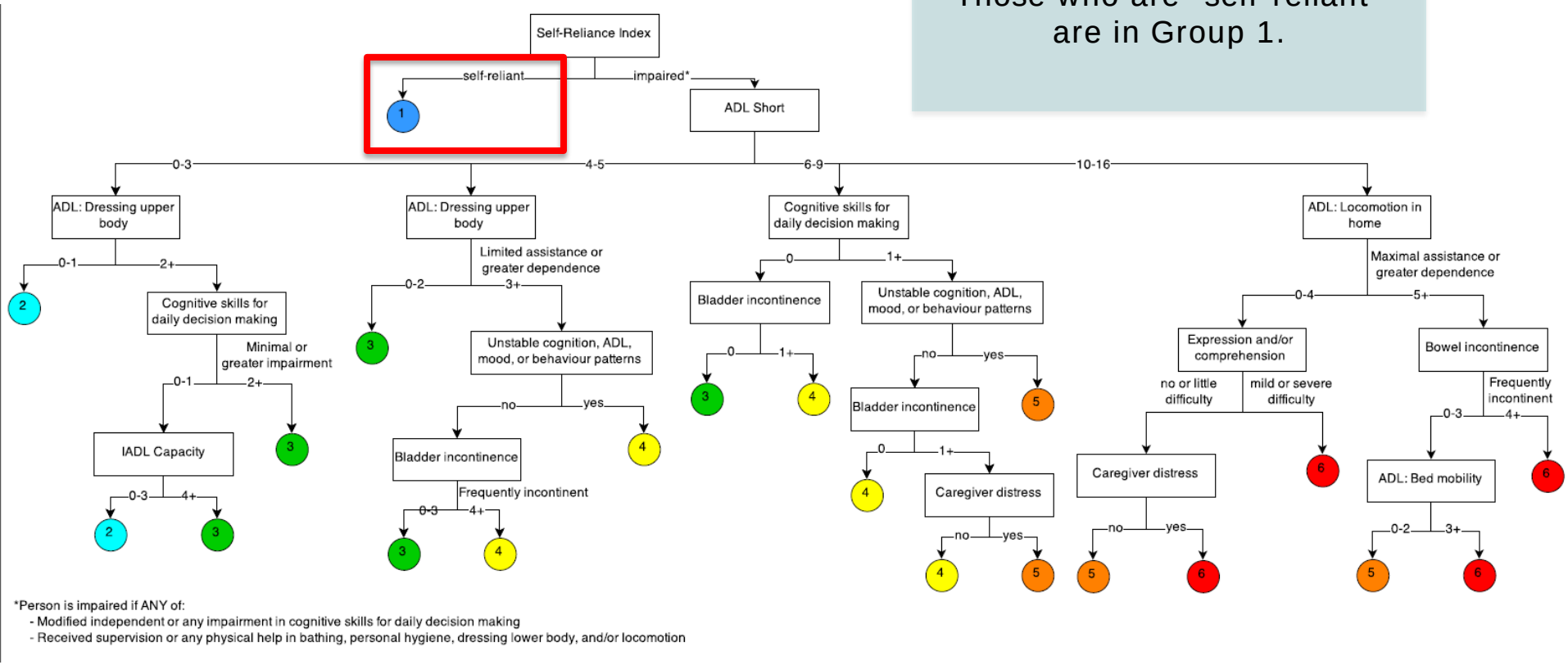
Selected Decision Tree

Those who are “self-reliant” are in Group 1.



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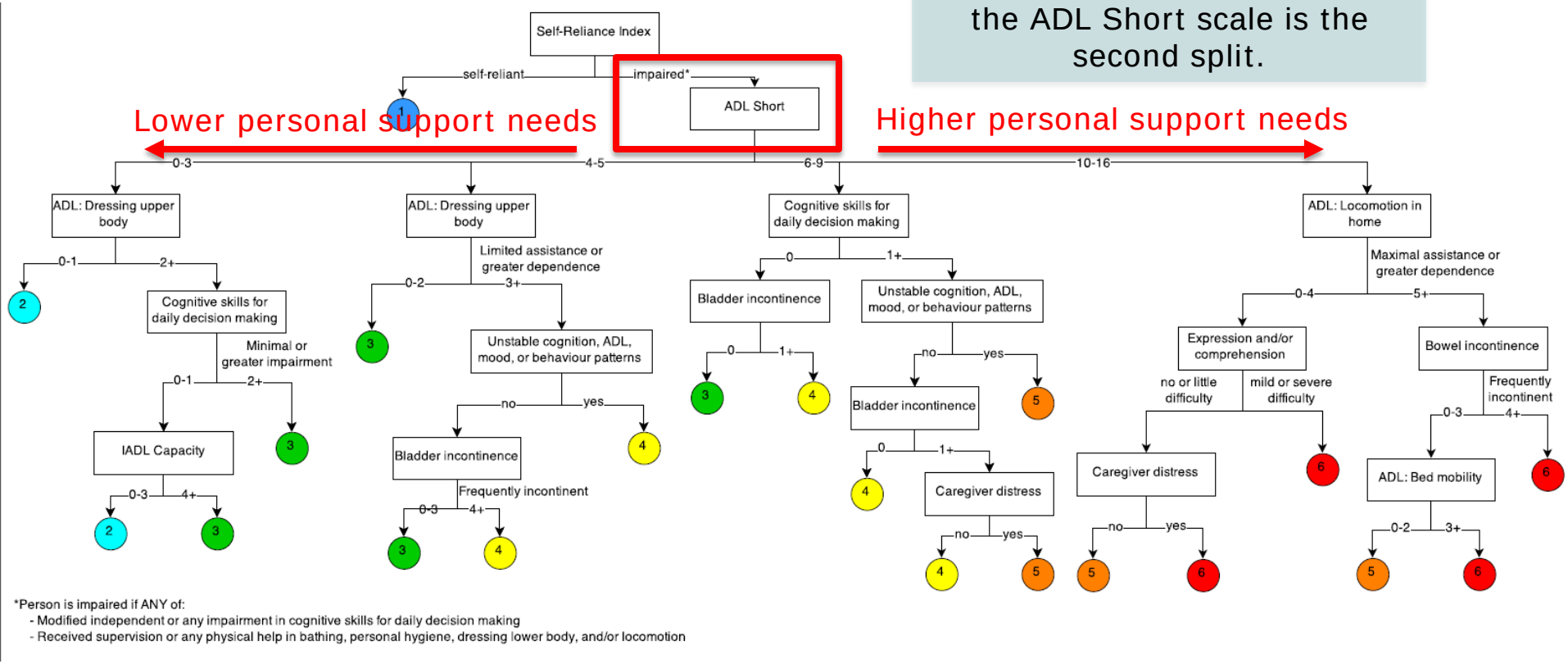
Selected Decision Tree

For those who are “impaired”, the ADL Short scale is the second split.



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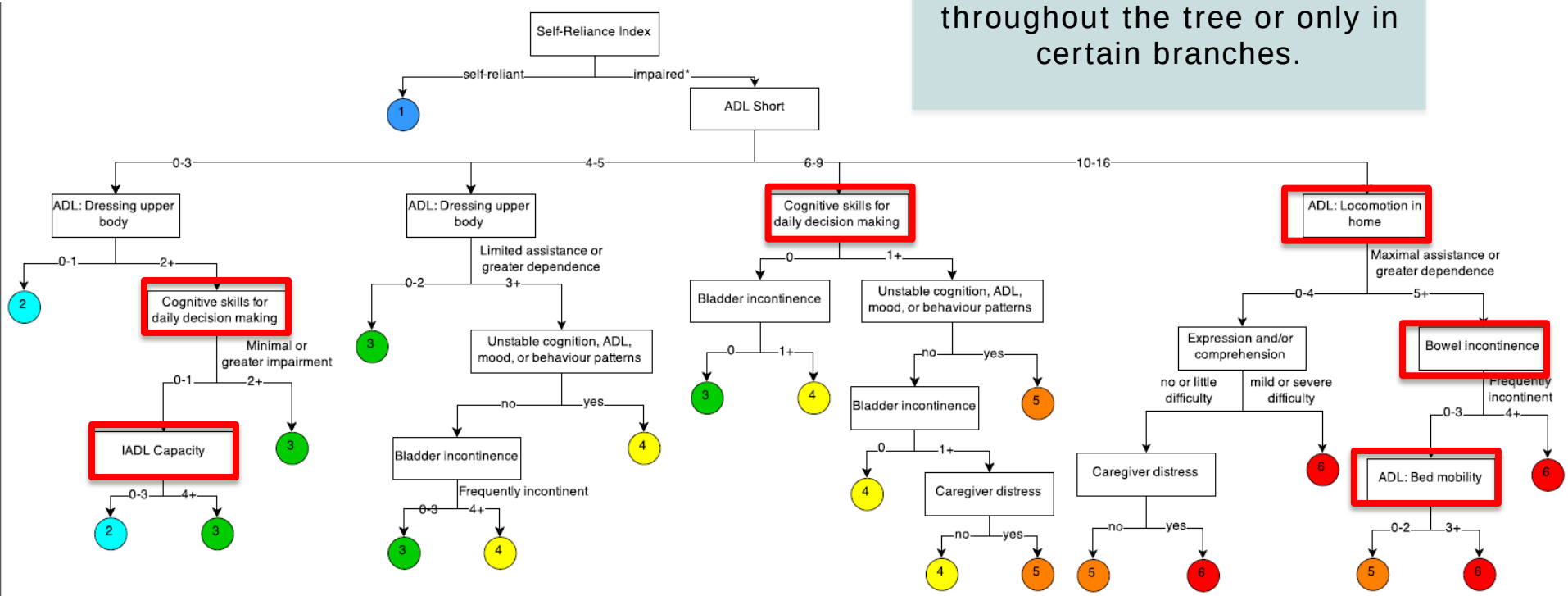
Selected Decision Tree

Attributes can appear throughout the tree or only in certain branches.



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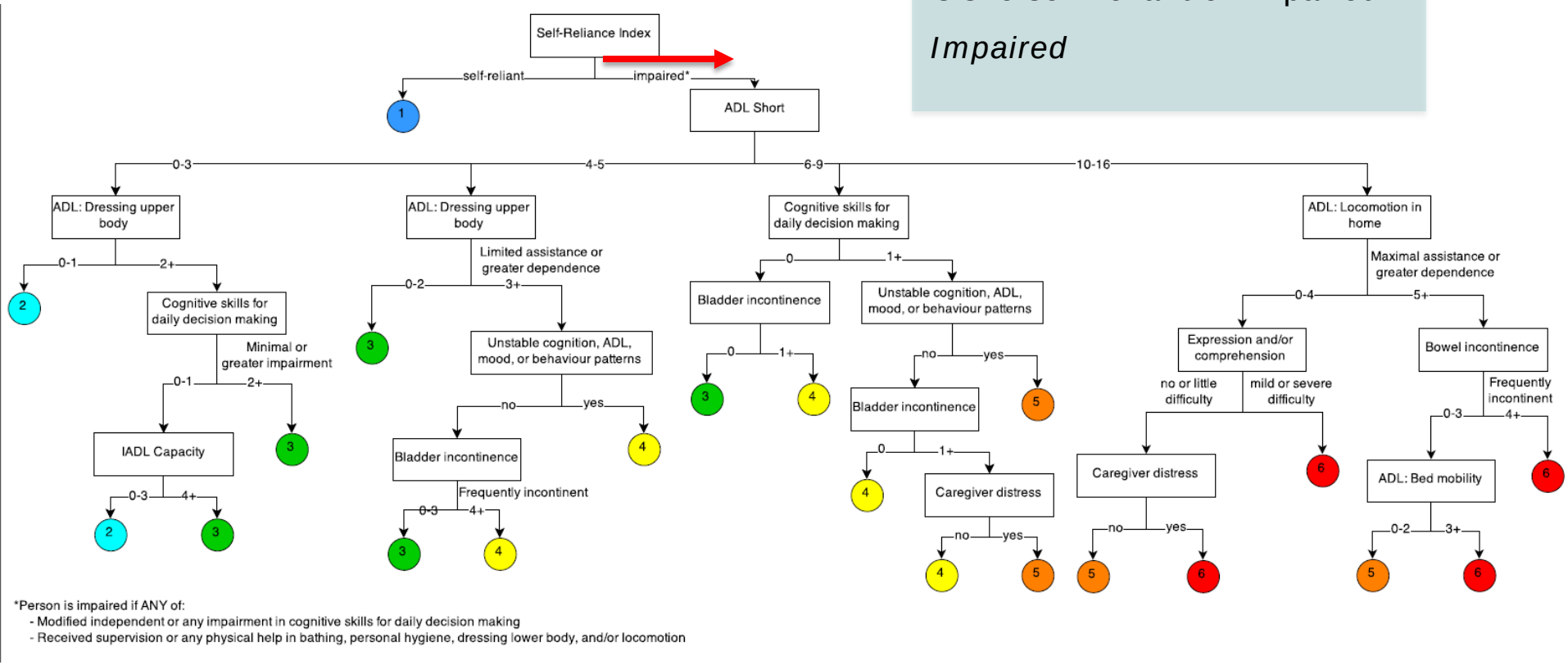
EXAMPLE: Mrs. Smith

Is she self-reliant or impaired?

Impaired



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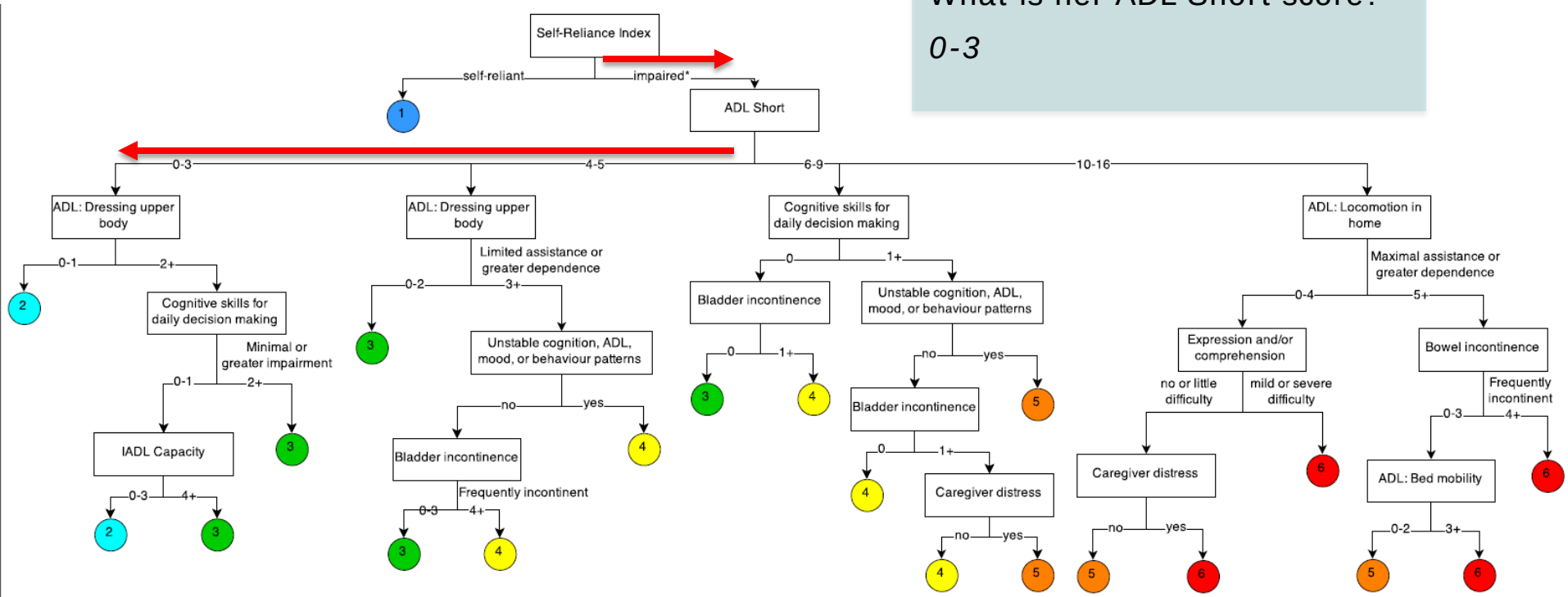
*Note: The patient level will be calculated by soft ware. This walkthrough is for illustration purposes only.

EXAMPLE: Mrs. Smith

What is her ADL Short score?

0-3



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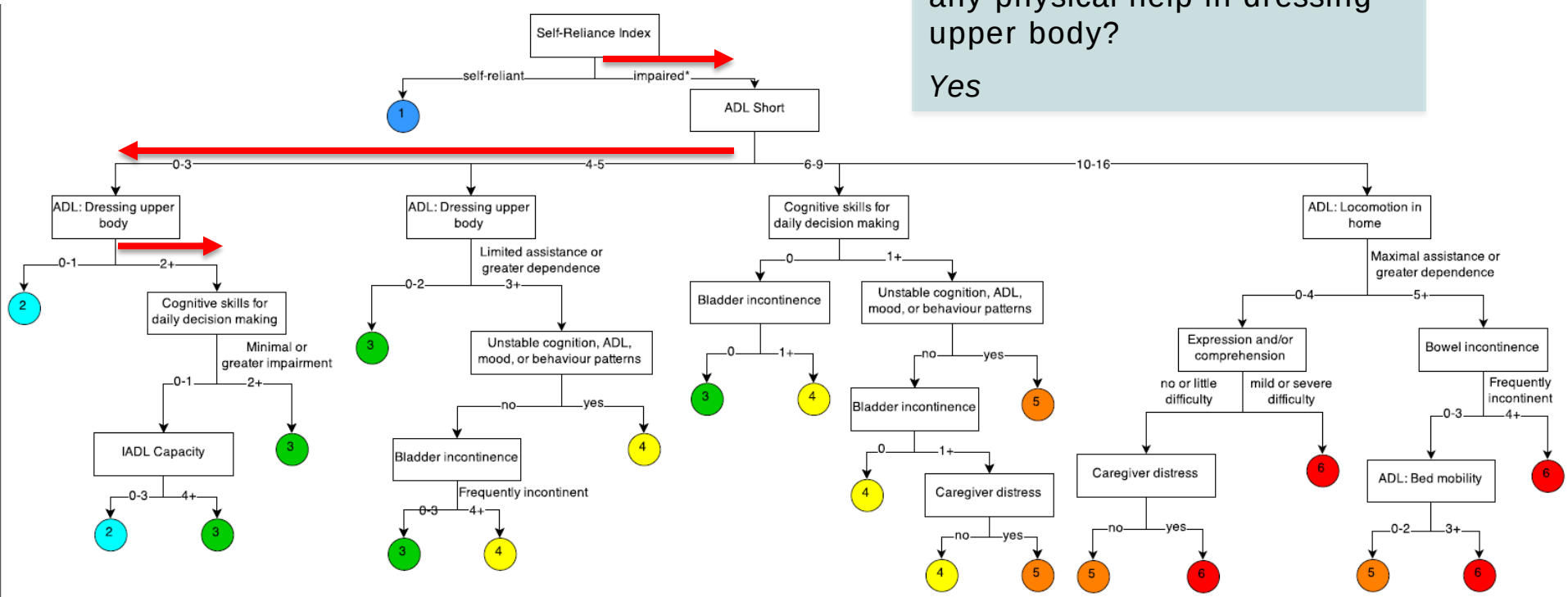
EXAMPLE: Mrs. Smith

Does she need supervision or any physical help in dressing upper body?

Yes



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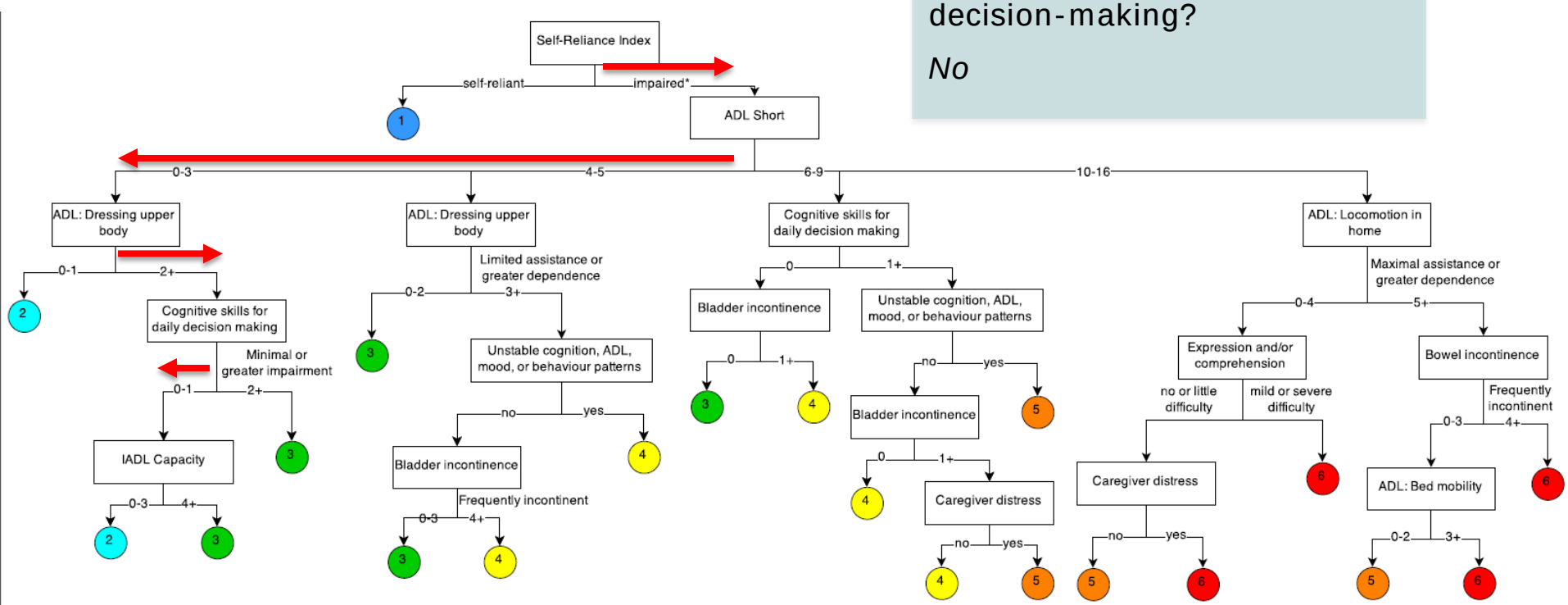
EXAMPLE: Mrs. Smith

Is she impaired in daily decision-making?

No



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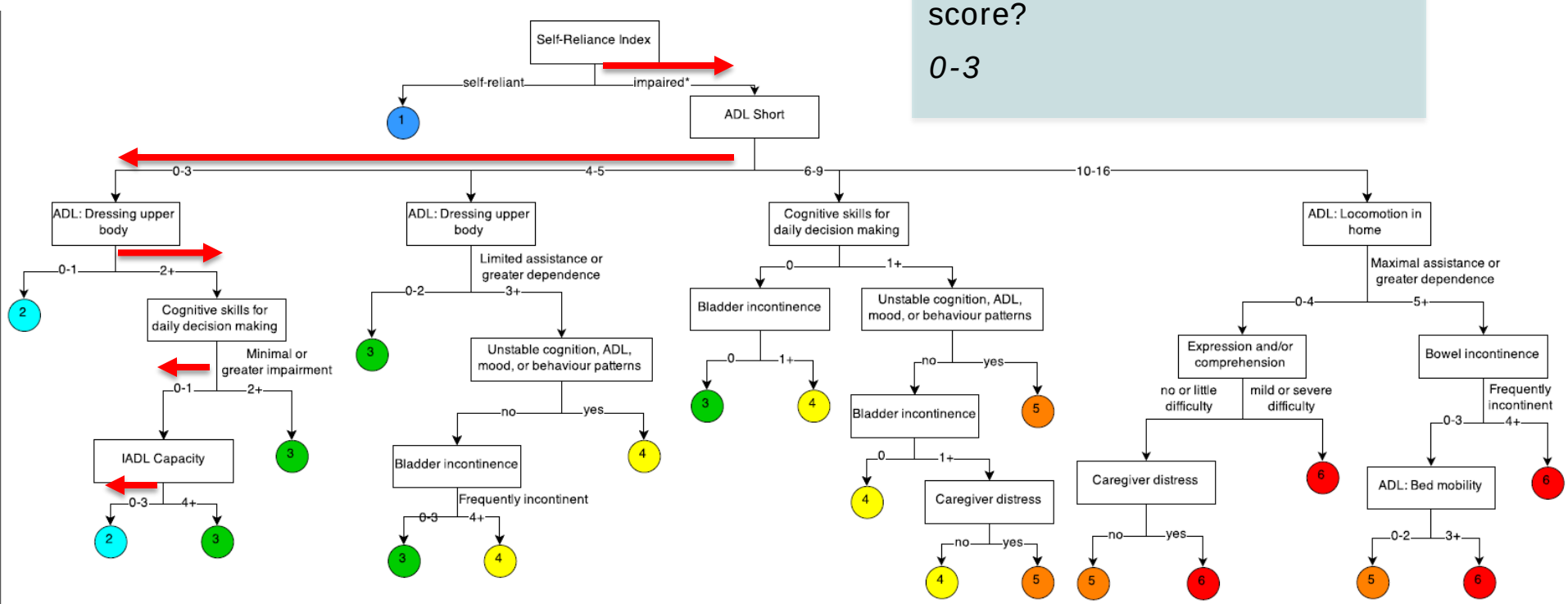
EXAMPLE: Mrs. Smith

What is her IADL Capacity score?

0-3



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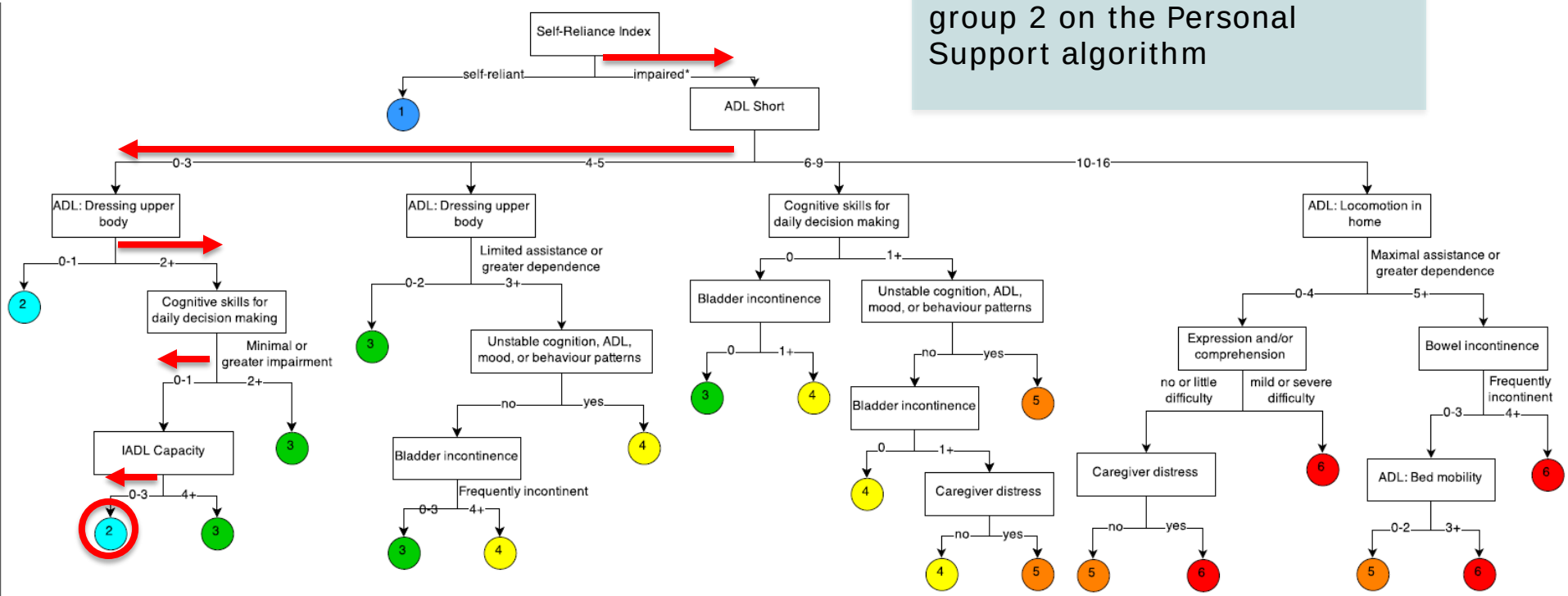
EXAMPLE: Mrs. Smith

Mrs. Smith falls in patient group 2 on the Personal Support algorithm



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Do I Look at the Group or the Branch?

- Each group is a collection of branches that are MOST similar to each other and MOST different from other groups
- Regardless of the exact attributes used, all patients who fall in group 2 have similar need for personal support
- The group is the key piece of information

Distribution of Patients

Group	N	N (%)
1	8154	6.4%
2	58307	45.5%
3	36130	28.2%
4	9800	7.6%
5	8451	6.6%
6	7327	5.7%

- The majority of patients belong to Groups 2 and 3

Distribution of Personal Support Hours

Group	N (%)	Hours per week+					
		Mean*	10th Percentile	25th Percentile	50th Percentile (Median)	75th Percentile	90th Percentile
1	6.4%	0.4	0.0	0.0	0.0	0.0	1.0
2	45.5%	2.3	0.0	0.9	1.7	2.8	5.2
3	28.2%	4.8	0.7	1.9	3.4	6.7	11.0
4	7.6%	6.9	0.9	2.7	5.7	10.2	14.0
5	6.6%	8.4	1.1	3.5	7.0	13.1	16.3
6	5.7%	11.3	1.9	6.3	12.0	14.8	20.6

- Personal support hours increase within and between groups

*All group means are significantly different from each other

+Hours are based on historical averages and do not necessarily reflect future allocation practices

Why This Model?

- Patient descriptions make sense
- This algorithm performs well in explaining variability in personal support allocation and differentiating between groups
- Explained variance (or R^2)
  - Keep in mind that the current RUG-III/HC algorithm explains 33.7% variance in total home care resource use (including informal hours)

Performance Over Time in Ontario

	Personal Support Algorithm		ADL Hierarchy	
Sample	**R^2**	**Range (highest divided by lowest group means)**	**R^2**	**Range (highest divided by lowest group means)**
Ontario 2013	30.8%	32x	26.2%	6x
Ontario 2012	32.2%	39x	26.7%	6x
Ontario 2011	31.4%	36x	25.5%	5x

- Algorithm performs consistently over time
- Algorithm outperforms ADL Hierarchy in being able to identify patients with the highest and lowest needs for personal support

Performance across Ontario CCACs

CCAC	R^2
A	41.8%
B	36.3%
C	35.9%
D	34.7%
E	33.1%
F	33.0%
G	31.6%

CCAC	R^2
H	31.1%
I	28.2%
J	28.0%
K	27.3%
L	26.8%
M	26.3%
N	25.7%

- Algorithm performs well across all CCACs → expected variation given different organizational practices

Use in Clinical Practice: For Care Coordinators

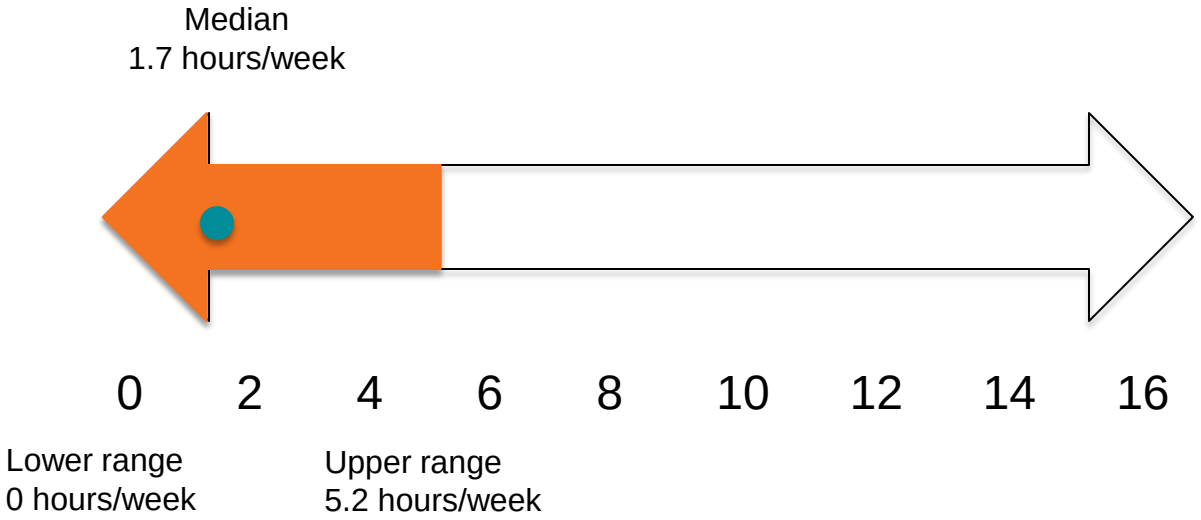
- After completing the RAI-HC/interRAI HC assessment, the software will electronically generate a **group** and **range of hours per week**
- These numbers may be used as anchors to assist in assigning actual hours of personal support

Group	Hours per week+		
	10th Percentile (Lower range)	**50th Percentile (Median)**	**90th Percentile (Upper range)**
1	0.0	0.0	1.0
2	0.0	1.7	5.2
3	0.7	3.4	11.0
4	0.9	5.7	14.0
5	1.1	7.0	16.3
6	1.9	12.0	20.6

+Hours are based on historical averages and do not necessarily reflect future allocation practices

Use in Clinical Practice: For Care Coordinators

- If your patient falls in group 2 on the algorithm:
  - Decide whether the range is clinically reasonable
  - Decide actual number of hours to allocate based on all sources of information



Use in Clinical Practice: For CCACs

- CCACs can use the groups as a benchmarking tool for evaluating caseloads and comparing to other CCACs

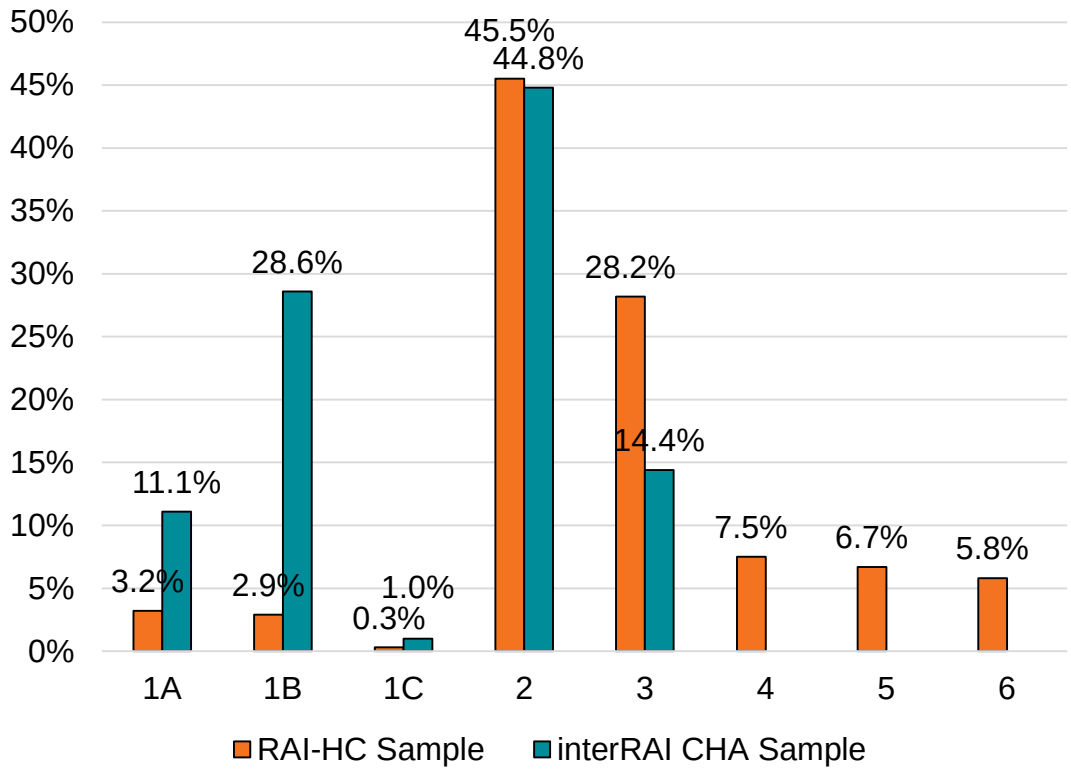
Group	Hours per week+		
	10th Percentile (Lower range)	50th Percentile (Median)	90th Percentile (Upper range)
1	0.0	0.0	1.0
2	0.0	1.7	5.2
3	0.7	3.4	11.0
4	0.9	5.7	14.0
5	1.1	7.0	16.3
6	1.9	12.0	20.6

+Hours are based on historical averages and do not necessarily reflect future allocation practices

Use in Clinical Practice: For Home and Community Care

- A shared algorithm may be used to support *Home and Community-Based Care Coordination* through:
  - Coordinated access and intake
  - On-going care coordination

Distribution of Home and Community Care Patients



- Expected distribution of both samples
  - CCAC patients have generally higher personal support needs
  - CSS patients have generally lower personal support needs
- Group 2 is the largest group for both CCAC and CSS samples

Acknowledgments

- This work was supported by funding from Hamilton Niagara Haldimand Brant CCAC and the Ontario Home Care Research and Knowledge Exchange Chair

Long-Term Care Home Eligibility and Priority Category

Aaron Jones, OACCAC

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Overview

Appropriateness of Care Needs Algorithm

- Development
- Performance
- Implications

CRISIS Algorithm

- Development
- Performance
- Uses

Ontario Long Term Care Homes Act 79/10

Criteria for eligibility, long-stay

(a) the person is at least 18 years of age.

(b) the person is an insured person under the *Health Insurance Act*

(i) requires that nursing care be available on site 24 hours a day,

(ii) requires, at frequent intervals throughout the day, assistance with activities of daily living, or

(iii) requires, at frequent intervals throughout the day, on –site supervision or on –site monitoring to ensure his or her safety or well being;

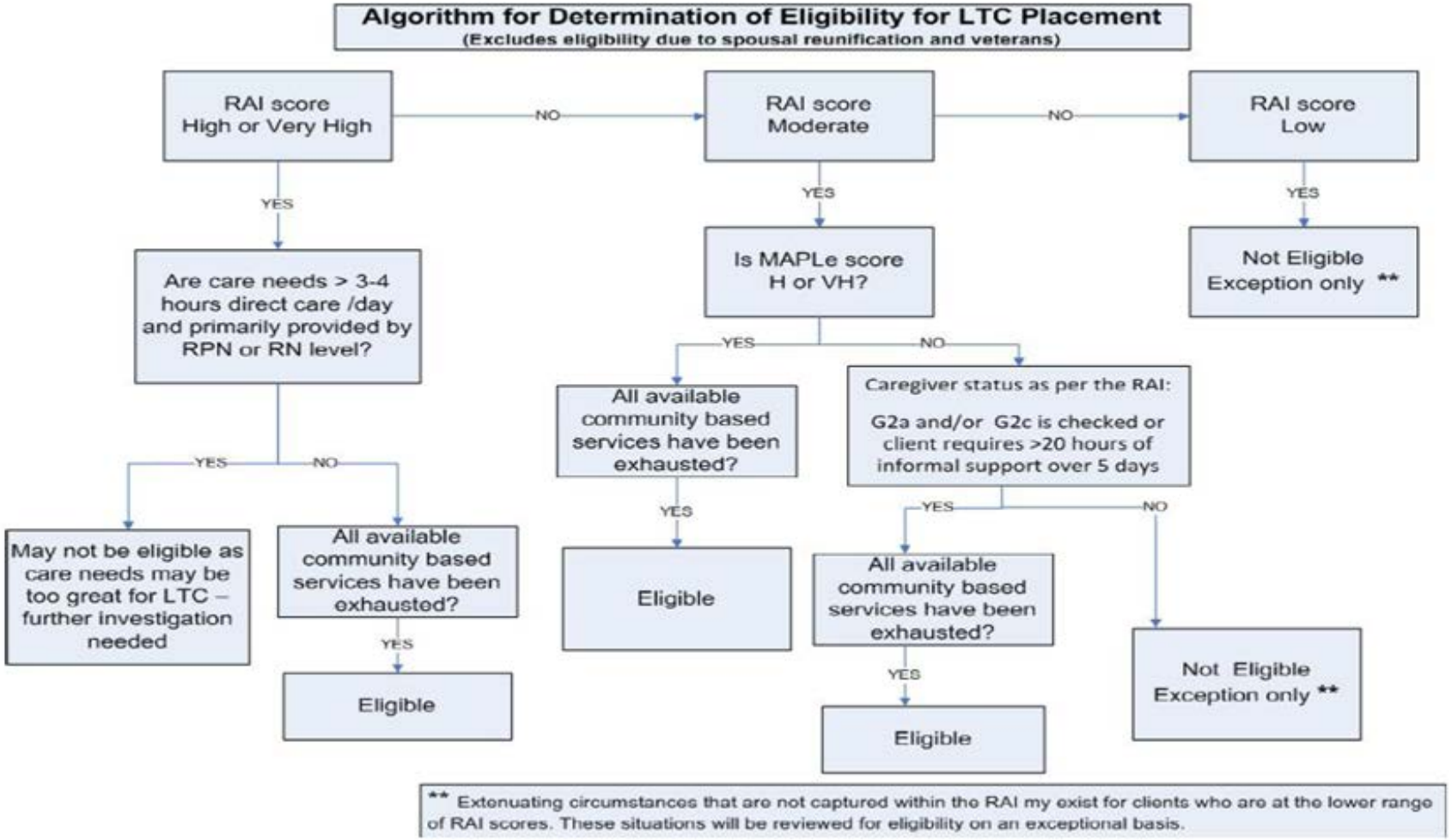
the publicly-funded community -based services available to the person and the other caregiving, support or companionship arrangements available to the person are not sufficient, in any combination, to meet the person's requirements; and

(e) the person's care requirements can be met in a long term care home.

How can we determine which patients have eligible care needs?

Current Placement Eligibility Tree

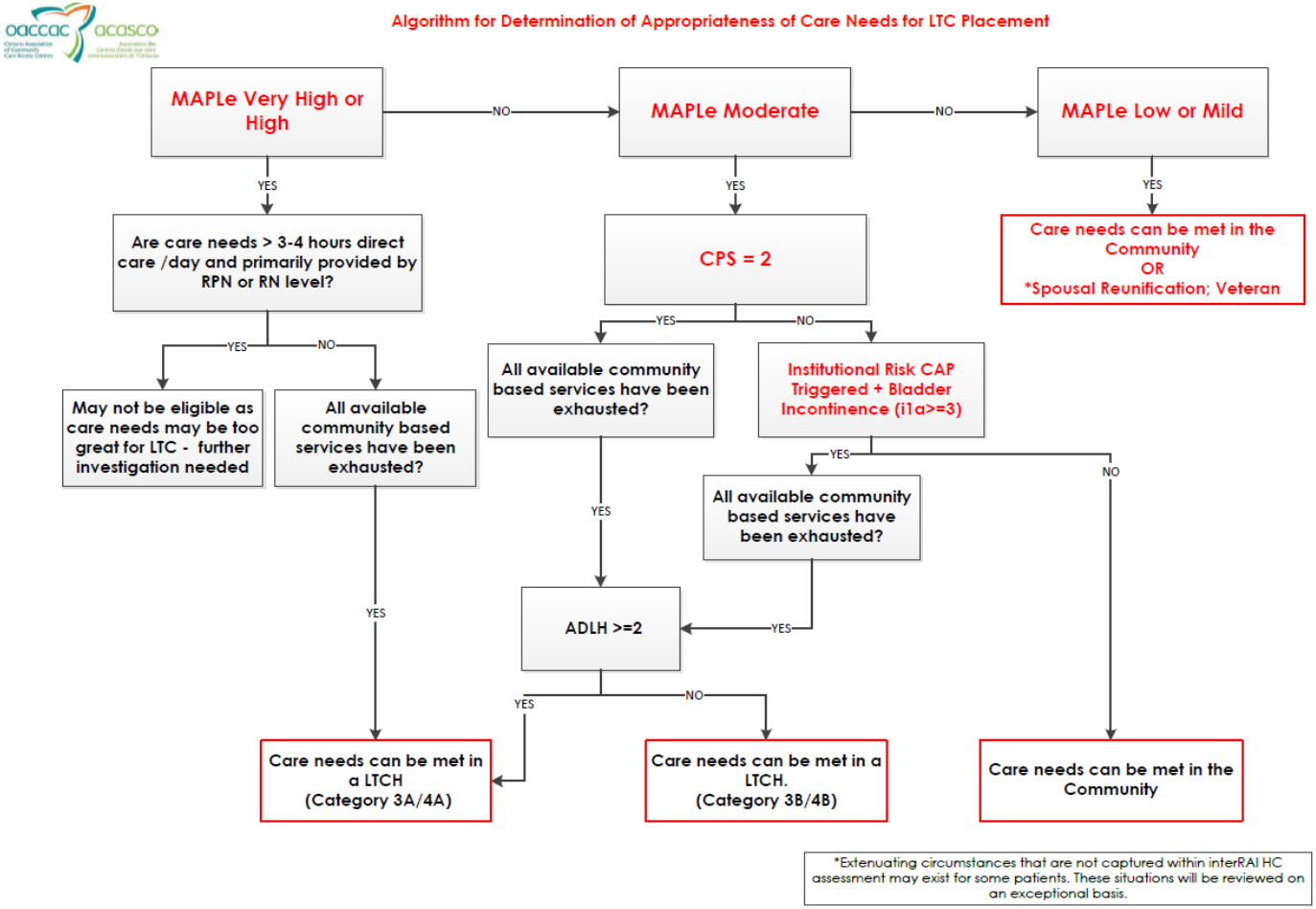
oaccac acasco
Ontario Association of Community Care Access Centres
Association des Centres d'accès aux soins communautaires de l'Ontario



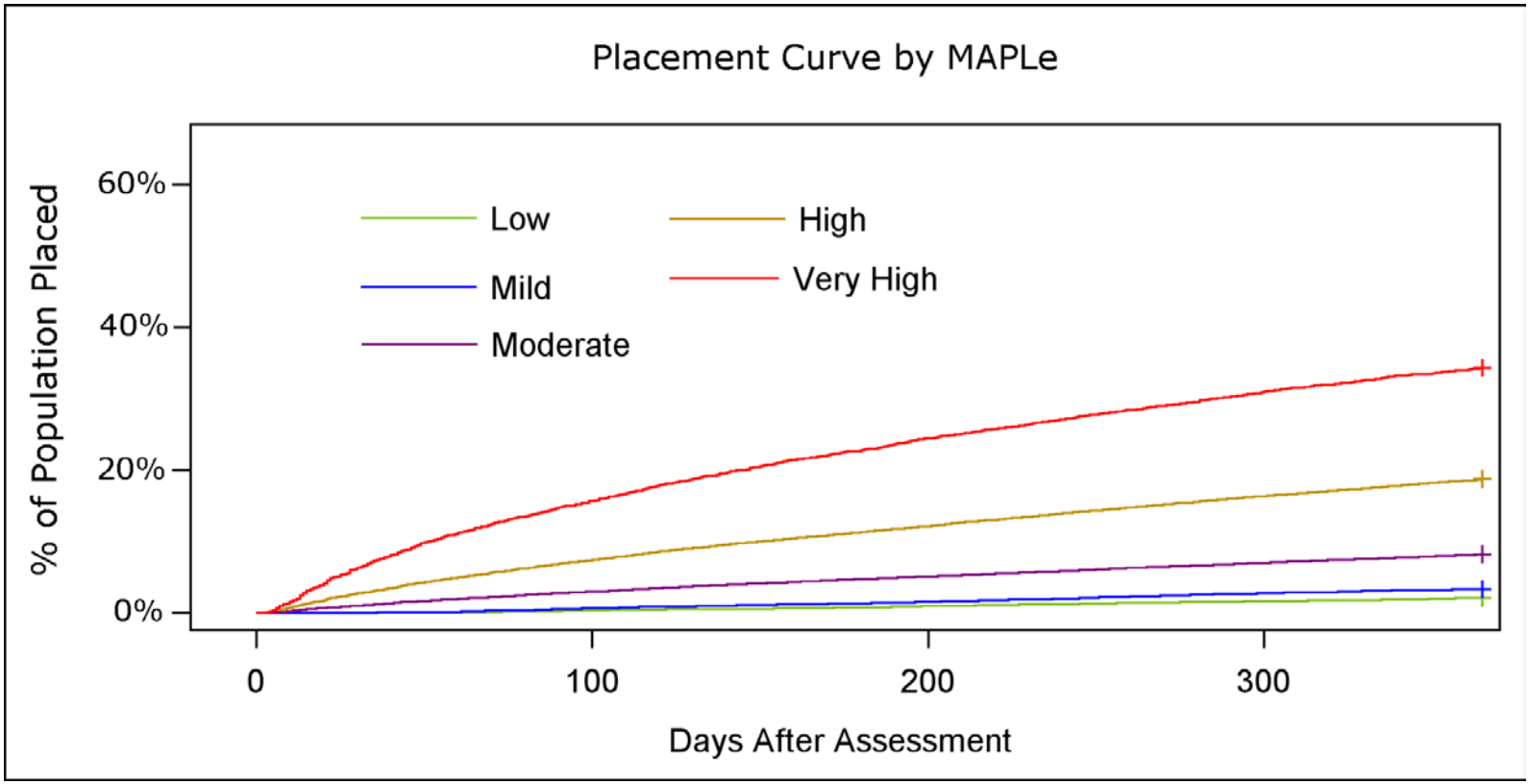
Data Selection and Model Development

- Long-Stay Home Care referrals from August 2010 – July 2012
  - RAI-HC assessment within 45 days
  - No previous LTCH referrals
  - No hospital assessments
  - N= 88,492
- Two-year follow-up for placement in a LTCH
- Modelled factors most predictive of placement
- A vs. B priority category also examined

New Placement Eligibility Tree

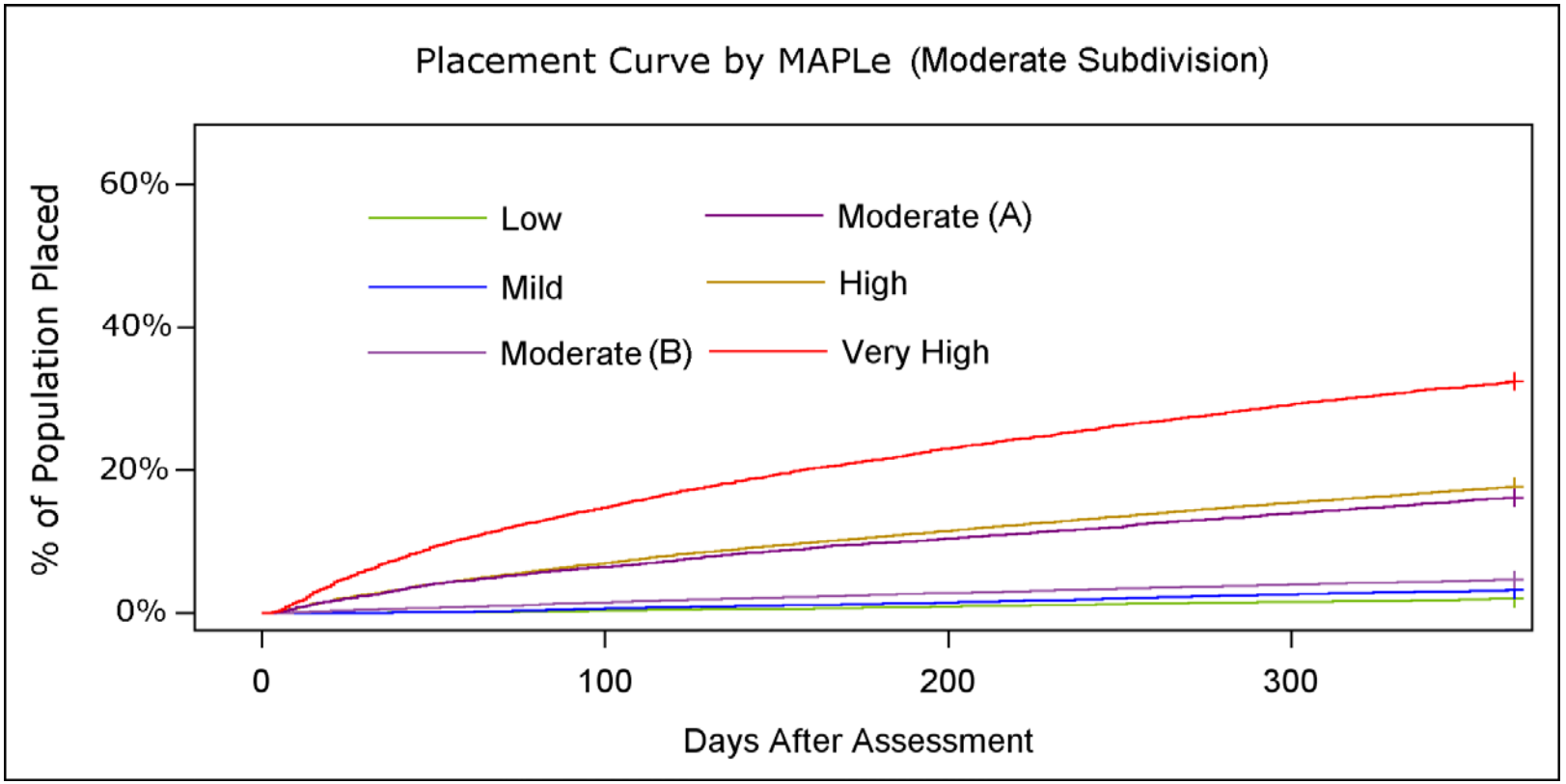


Predictive Validity - MAPLe Levels



- Line separation indicates differentiation in risk of placement

Predictive Validity - MAPLe Levels
Moderate Subdivision



- The Moderate subdivisions are close to the High and Mild levels

Implications

Probable Change	RAI-score	New Algorithm
% of Long-Stay Home Care Population with care needs appropriate for placement	80.25%	70.83%
% of MAPLe Moderate Population with care needs appropriate for placement	77.17%	53.97%
% of patients found Eligible for LTCH Placement in last year that do not have care needs appropriate for placement	0%*	5.34%*

*Other than Exceptional Cases

- Reduction in % of patients appropriate for placement.
- 5% of eligible LTCH referrals in the last year would not have been eligible on the basis of their care needs within the new definition.

Long Term Care CRISIS Algorithm

Aaron Jones, OACCAC

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Background

Crisis Priority Category

- Intended to identify requiring immediate placement on the basis of their needs and circumstances

- Dramatic variation assignment to crisis priority category across CCACs

Goals

- Improve provincial consistency

- Improve use of Crisis Priority Category to prioritize patients based on patient need and appropriateness

CRISIS Algorithm

CRisis **I**dentification and **S**ituation **I**mprovement **S**trategies

- Identifies patient's level of risk for immediate placement through the crisis priority category

- Identifies risk areas and identifies clinical assessment protocols (CAPs) that may be used to modify the situation through interventions to reduce patient risk and prevent crisis placements

Is a patient at risk for immediate placement?

What are the risks?

What can be done about it?

Uses of the CRISIS Algorithm

- Guide care planning to avoid preventable crisis placements
- Support decision-making around the crisis priority category
- Rank patients within the crisis category
- Benchmarking and comparative reporting

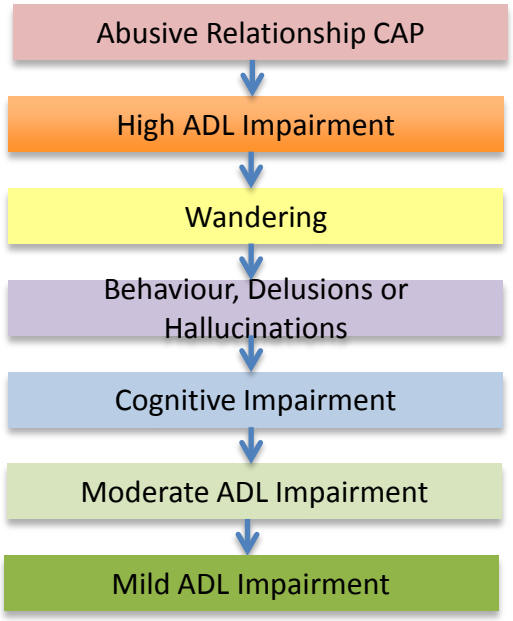
Data and Development

- Placement patients from April 2011 though December 2014
  - RAI-HC asessments closely linked to a priority
  - No hospital assessments
  - No previous LTCH placement
  - N = 18,375
- 90-day follow-up for crisis placement
- Modelled factors most predictive of crisis placement

Two-Stage Process

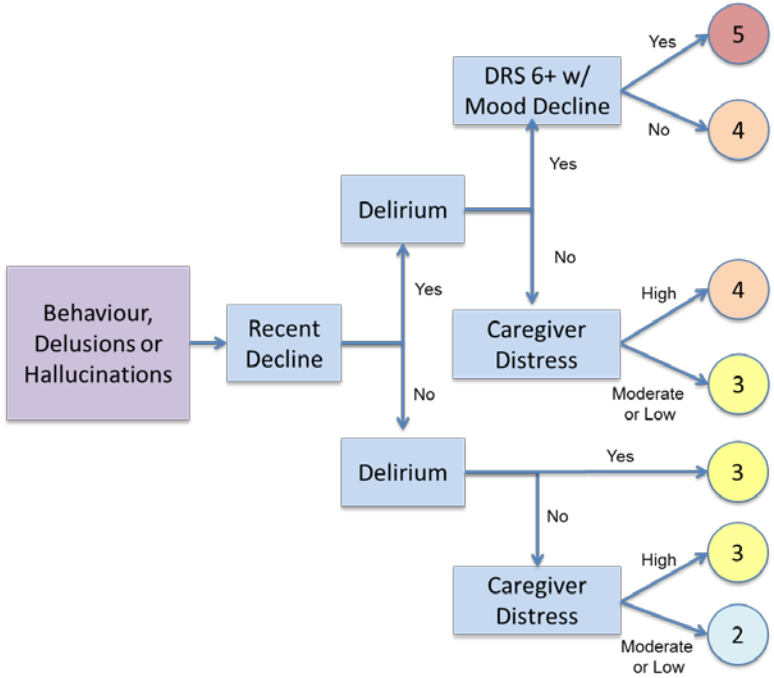
Step 1:

Patients categorized into 7 distinct clinical groups



Step 2:

Patient attributes from interRAI HC guide classification into 1 of 5 levels of risk



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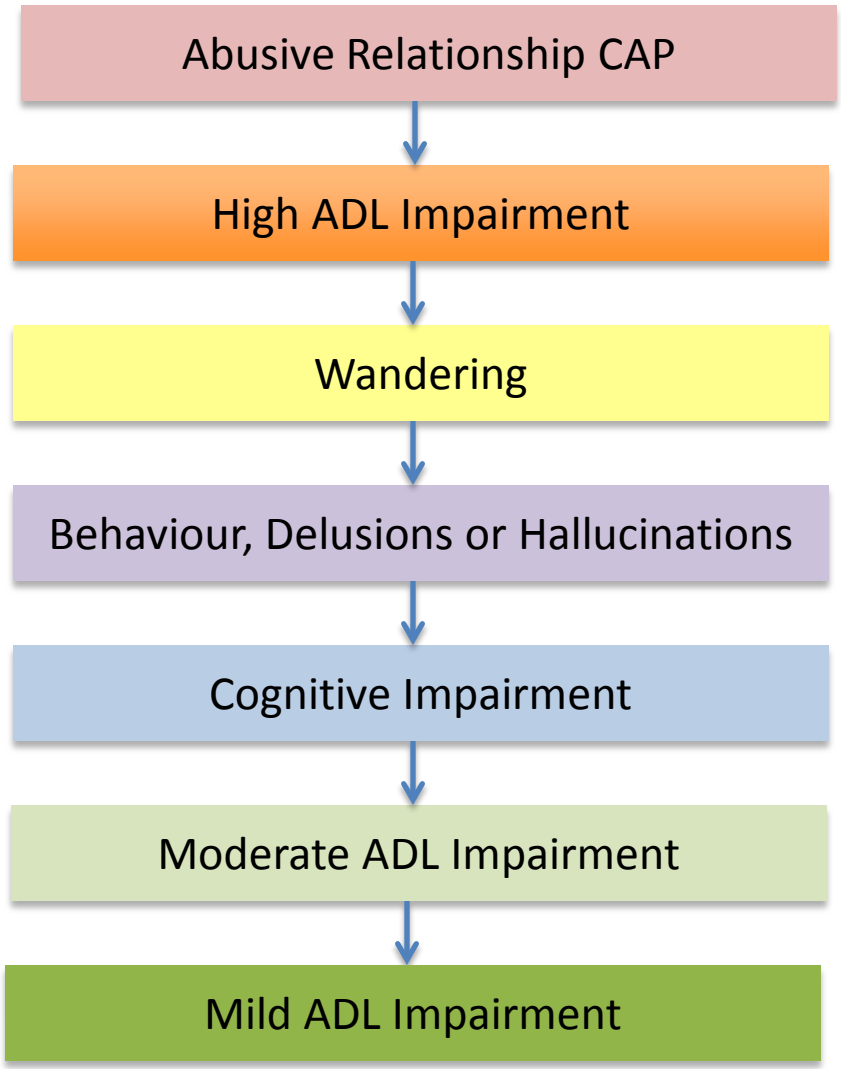
Step 1: Clinical Categories

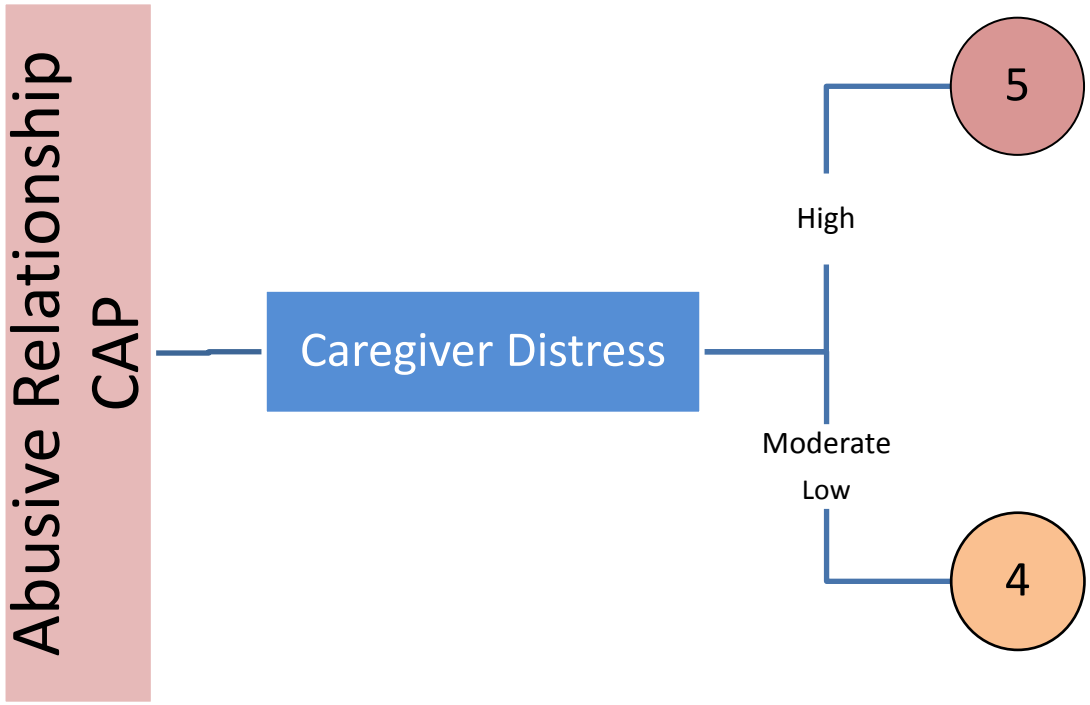


- Patients fall into the first category for which they meet criteria.
- Lower categories represent generally decreasing risk.
- Risk still varies dramatically within categories.

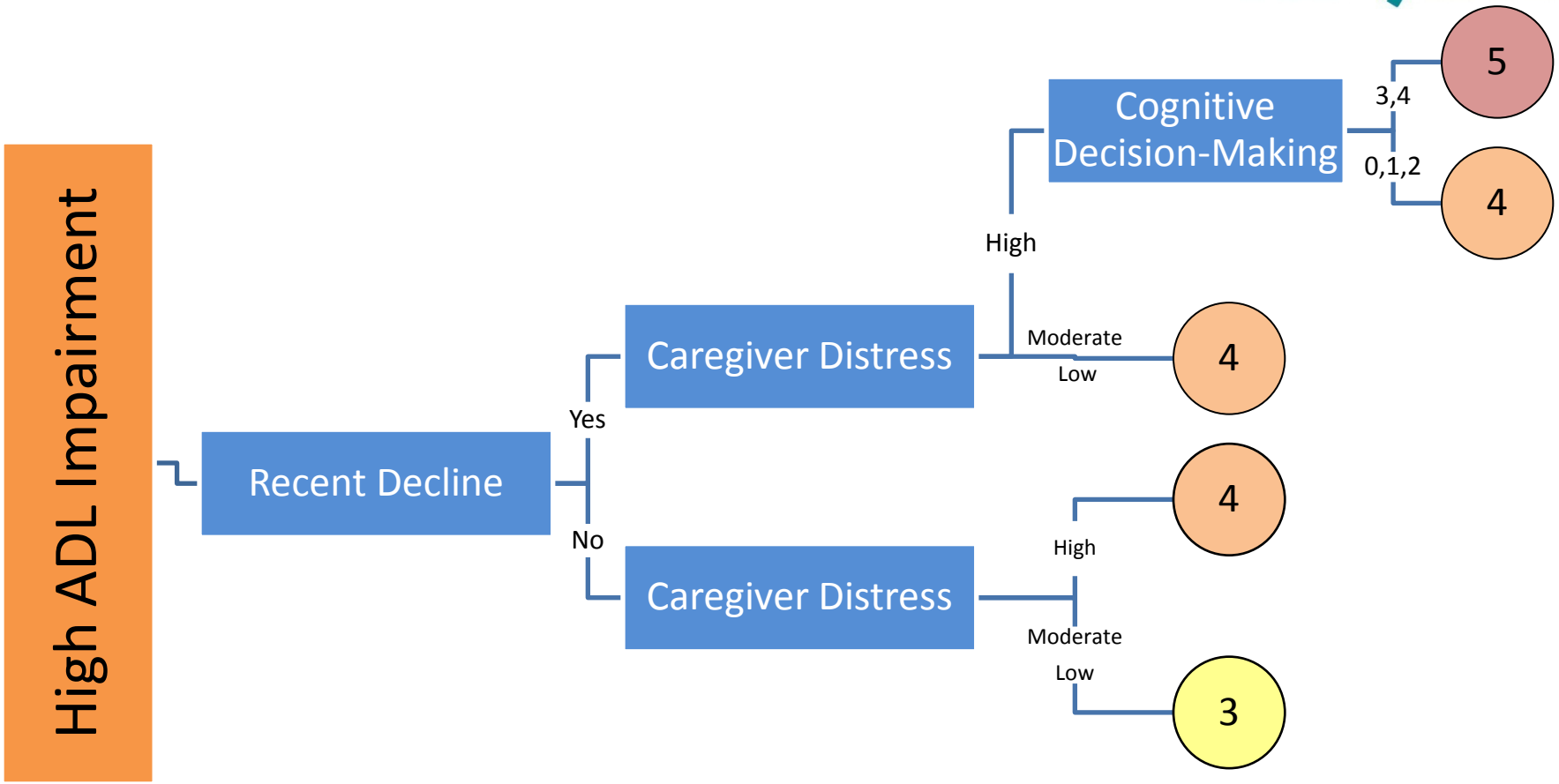
Clinical Categories Definitions

Clinical Category	Criteria
Abusive Relationship CAP	Any of K9a, K9b, K9d = 1
High ADL Impairment	ADL Hierarchy 4-6
Wandering	E3a = 1 or 2
Behaviour, Delusions or Hallucinations	Any of E3b – E3e = 1 or 2, or K3f = 1 or K3g = 1
Cognitive Impairment	B2a = 3 or 4
Moderate ADL Impairment	ADL Hierarchy 2-3
Mild ADL Impairment	ADL Hierarchy 0-1

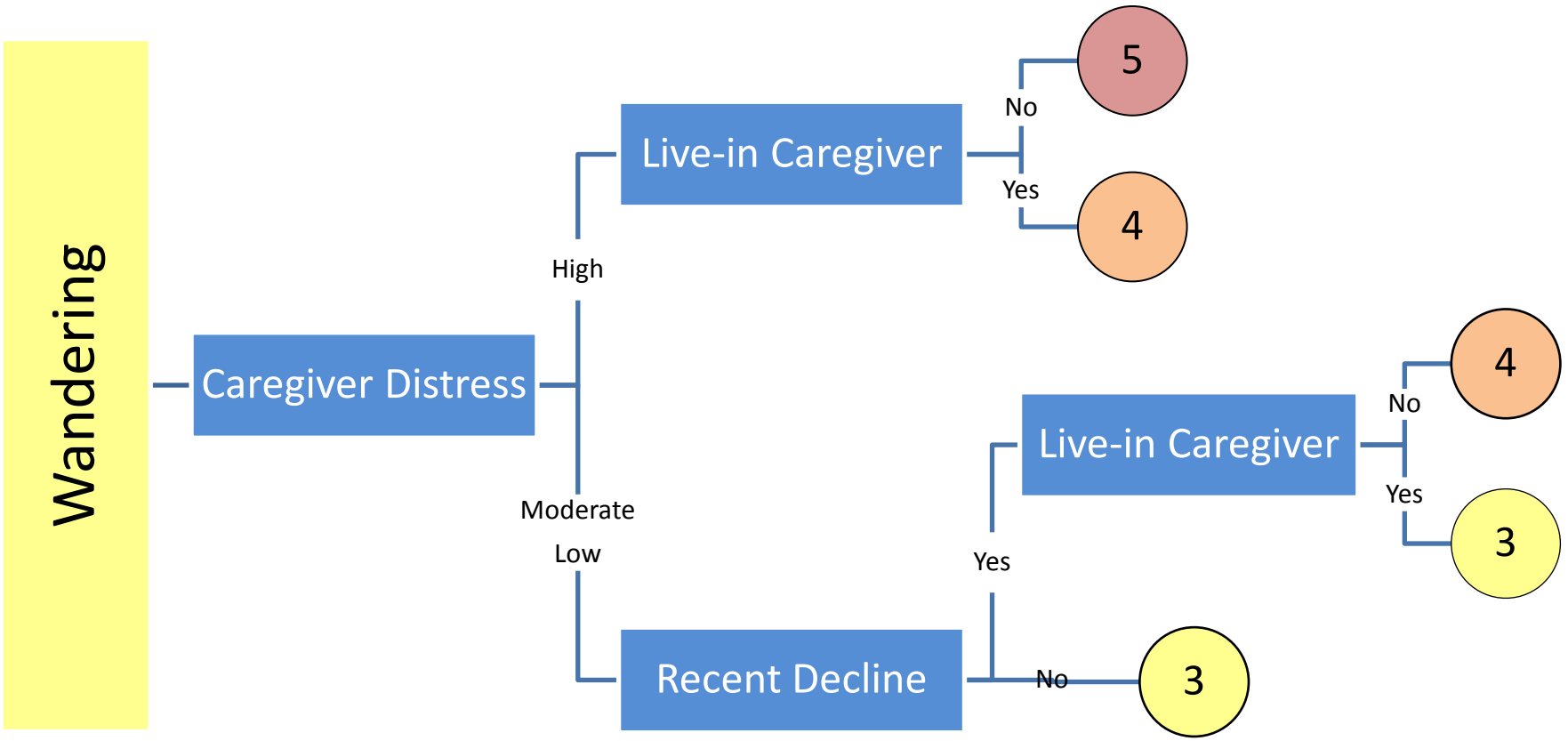
Step 2: Level-of-Risk Classification Abusive Relationship CAP



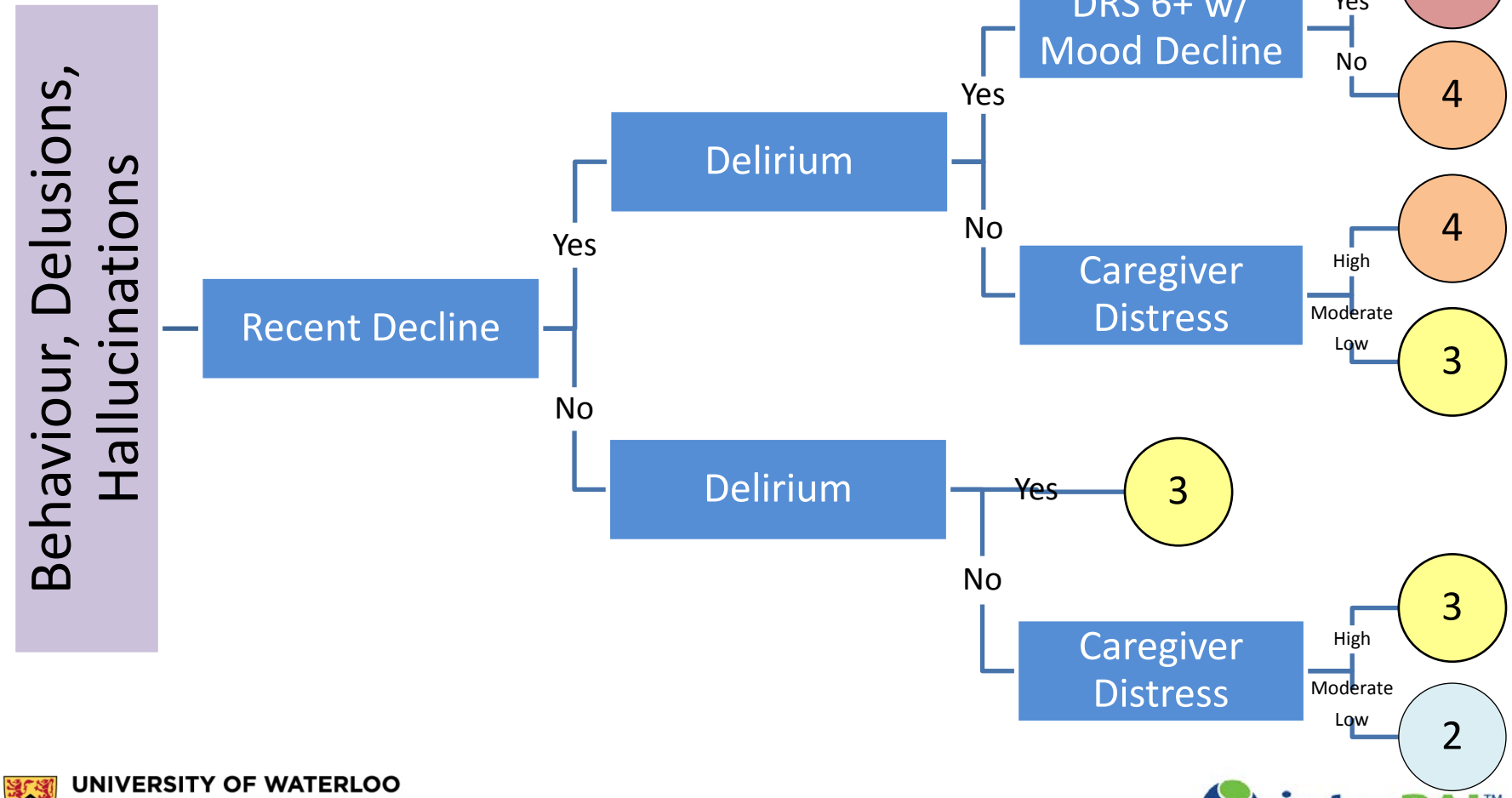
High ADL Impairment



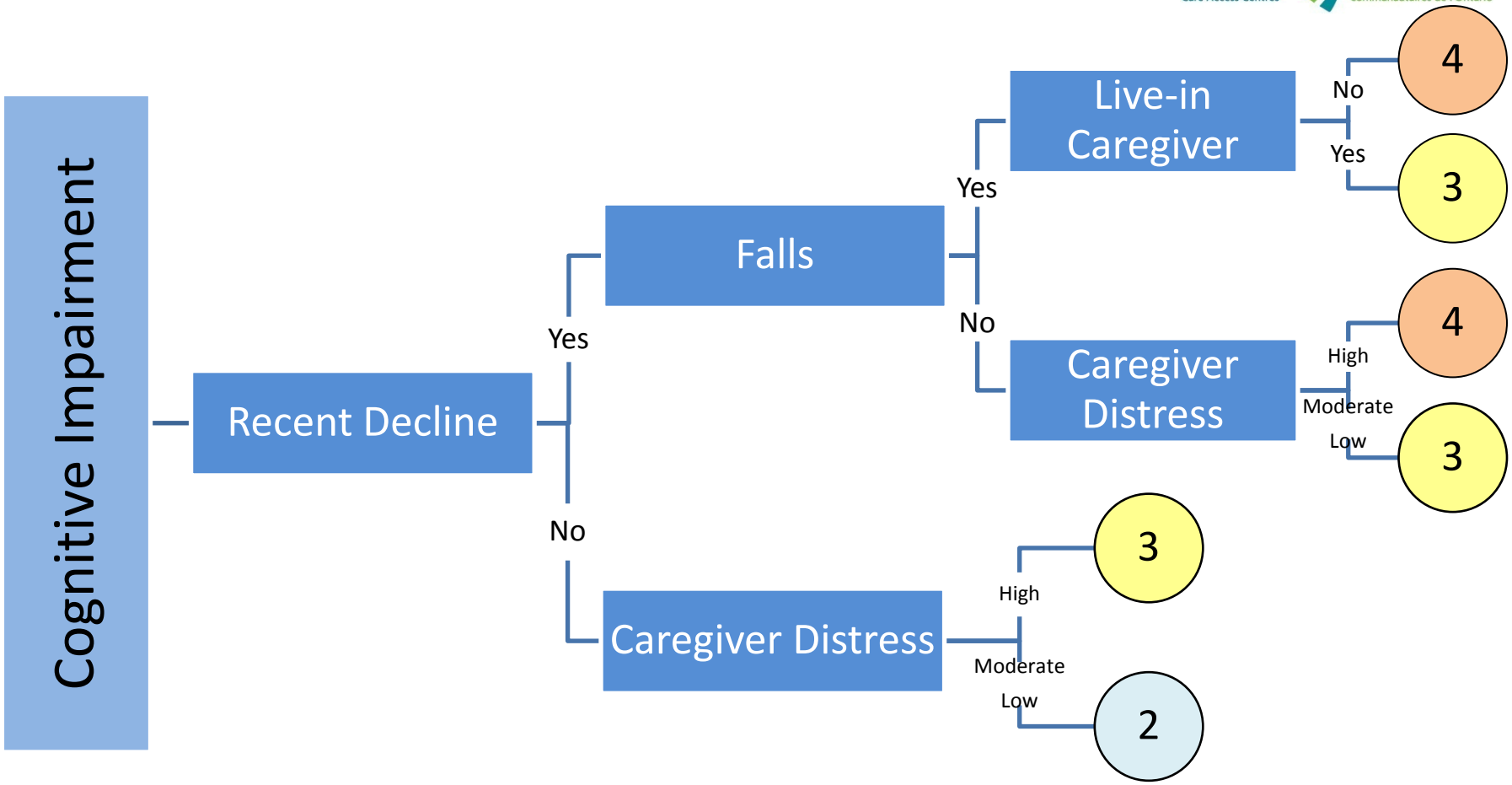
Wandering


Wandering
Caregiver Distress
High
Moderate
Low
Live-in Caregiver
No
Yes
5
4
Live-in Caregiver
No
Yes
4
3
Recent Decline
Yes
No
3

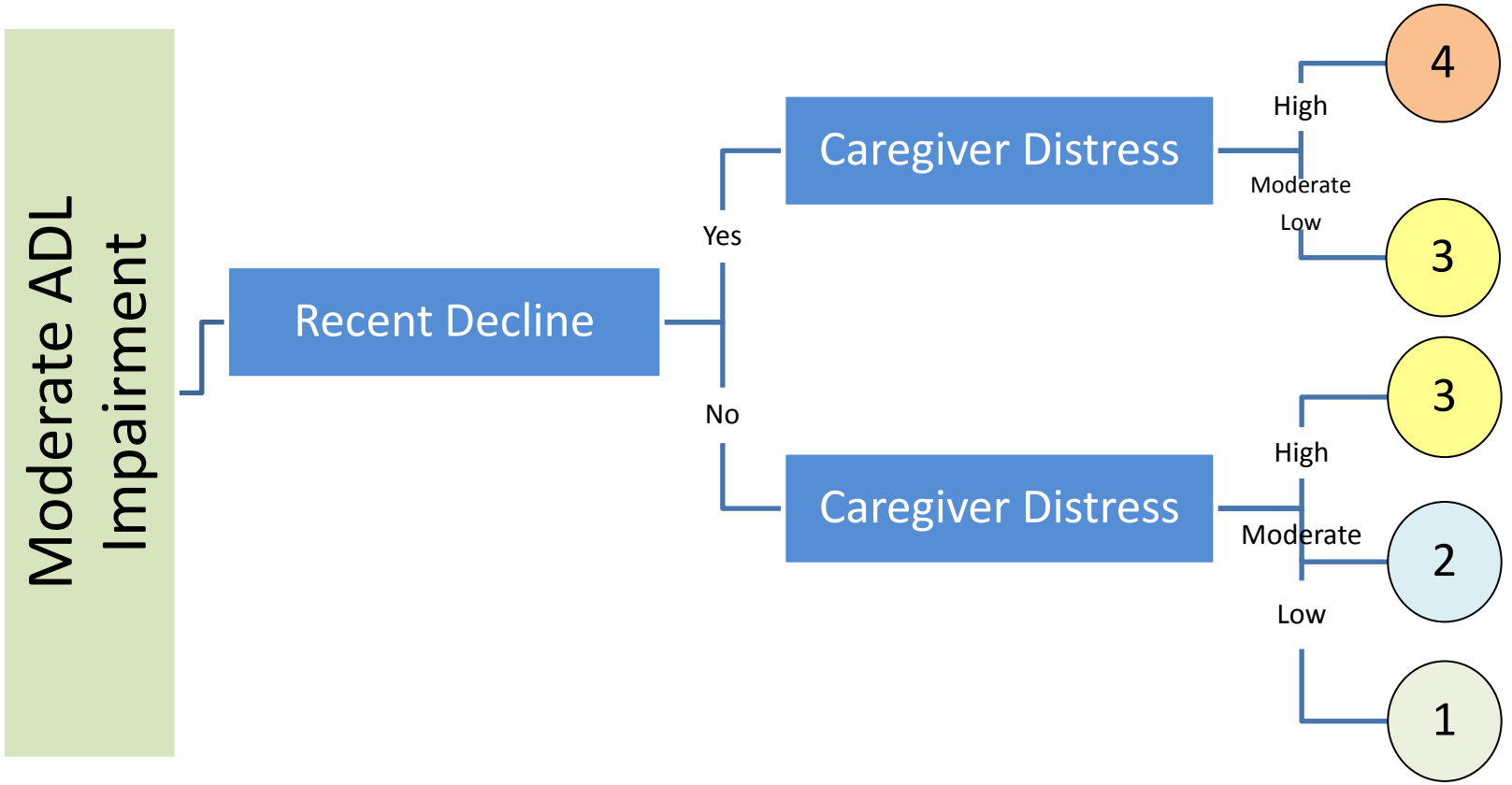
Behaviour, Delusions, Hallucinations



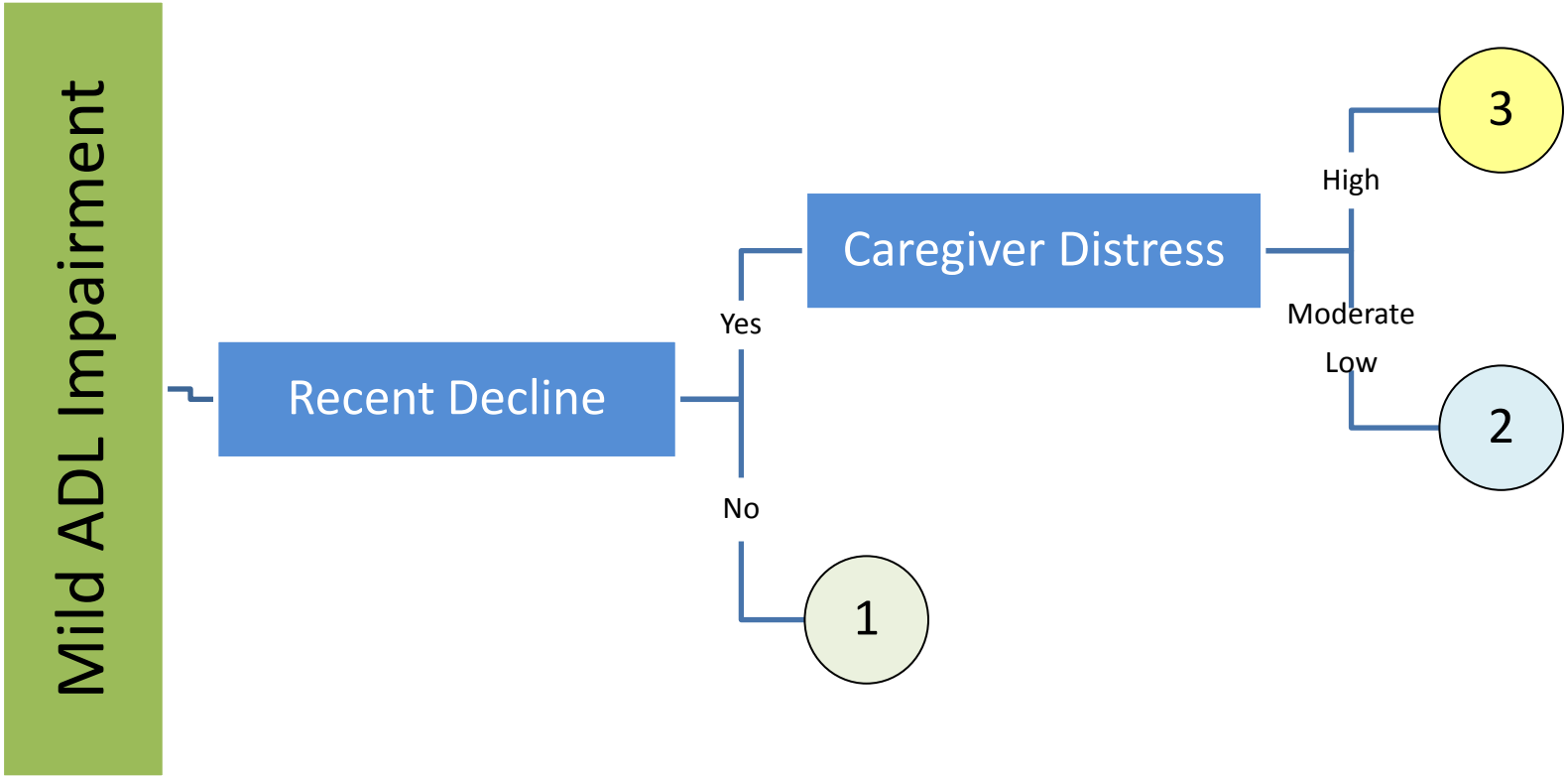
Cognitive Impairment



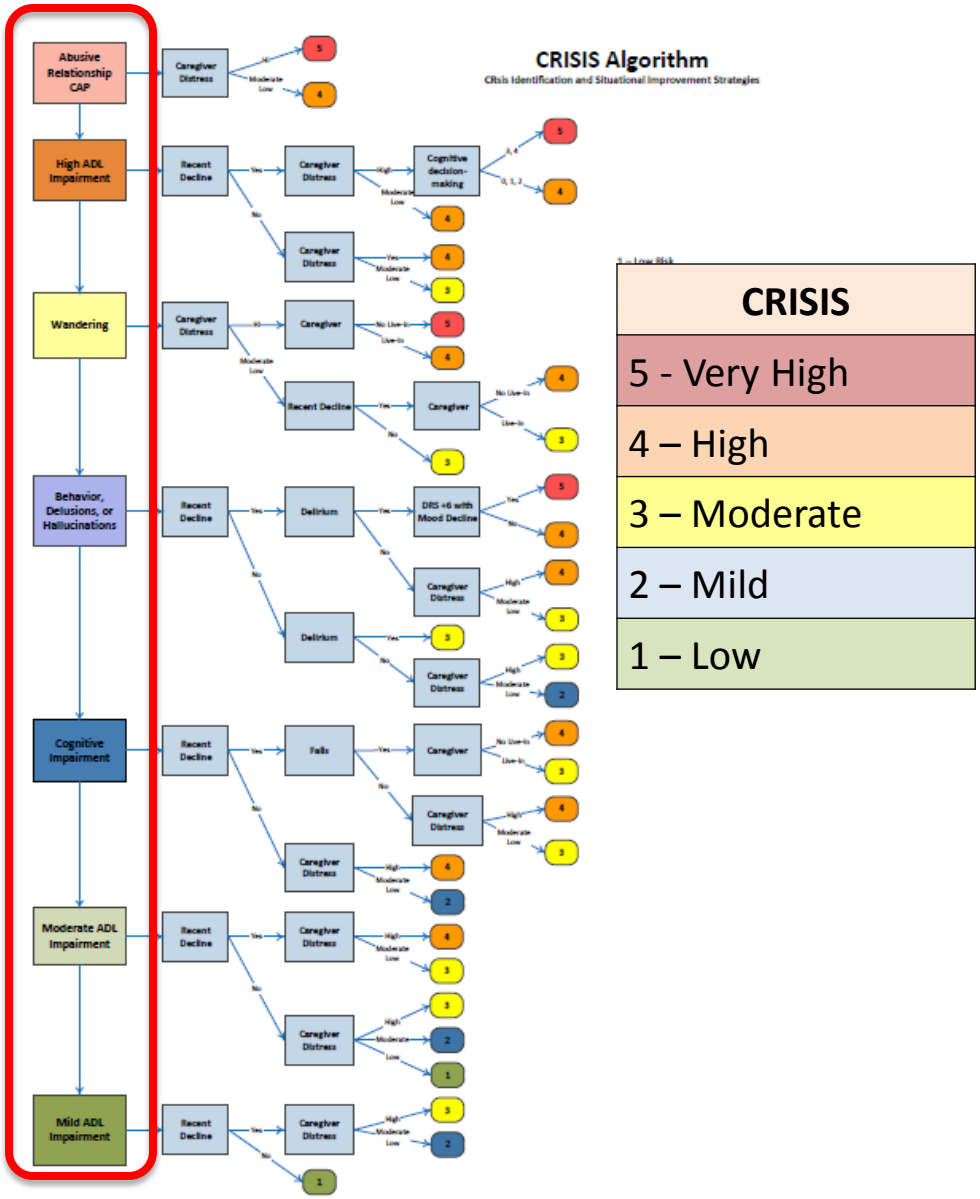
Moderate ADL Impairment



Mild ADL Impairment



CRISIS Algorithm

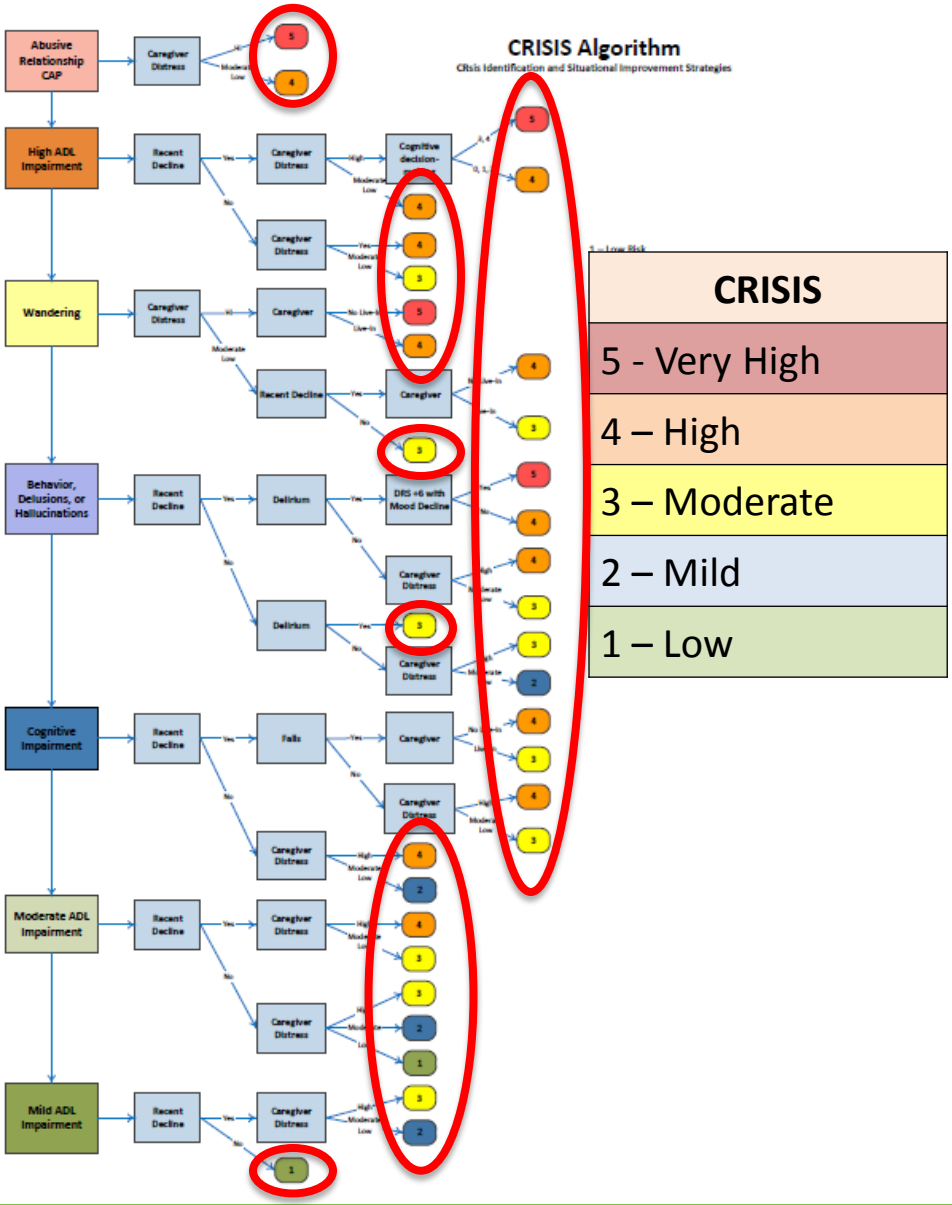


CRISIS
5 - Very High
4 – High
3 – Moderate
2 – Mild
1 – Low

The Numbers

- 7 Clinical Risk Categories
- 33 Terminal Nodes
- 5 Levels of Risk

CRISIS Algorithm

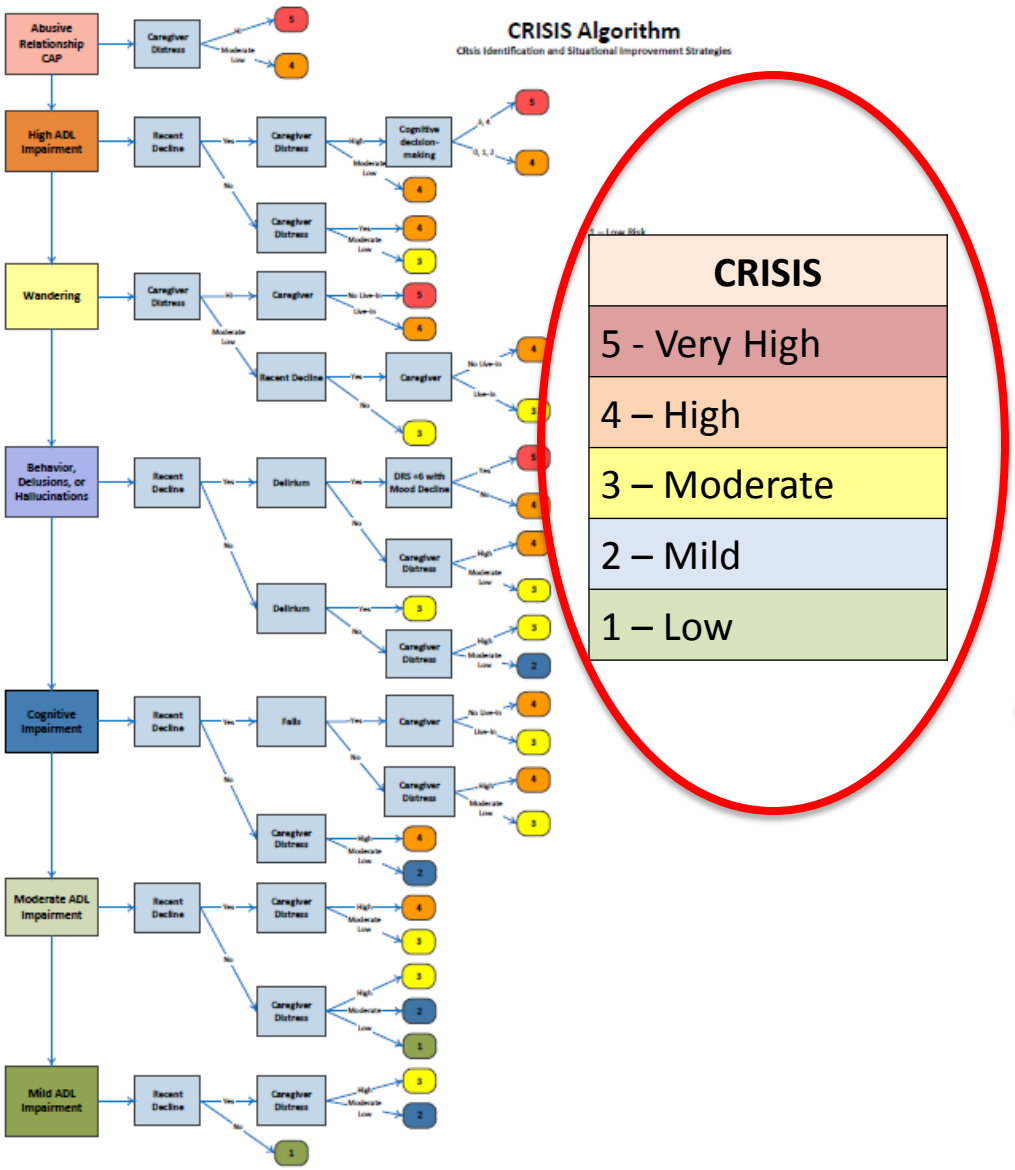


CRISIS
5 - Very High
4 – High
3 – Moderate
2 – Mild
1 – Low

The Numbers

- 7 Clinical Risk Categories
- 33 Terminal Nodes
- 5 Levels of Risk

CRISIS Algorithm



CRISIS
5 - Very High
4 – High
3 – Moderate
2 – Mild
1 – Low

The Numbers

- 7 Clinical Risk Categories
- 33 Terminal Nodes
- 5 Levels-of-Risk

Patient Example

Patient Characteristics

- Aggressive Behaviour
- Declined recently in self-sufficiency
- Delirium
- Caregiver is in high distress

CRISIS Algorithm Outputs

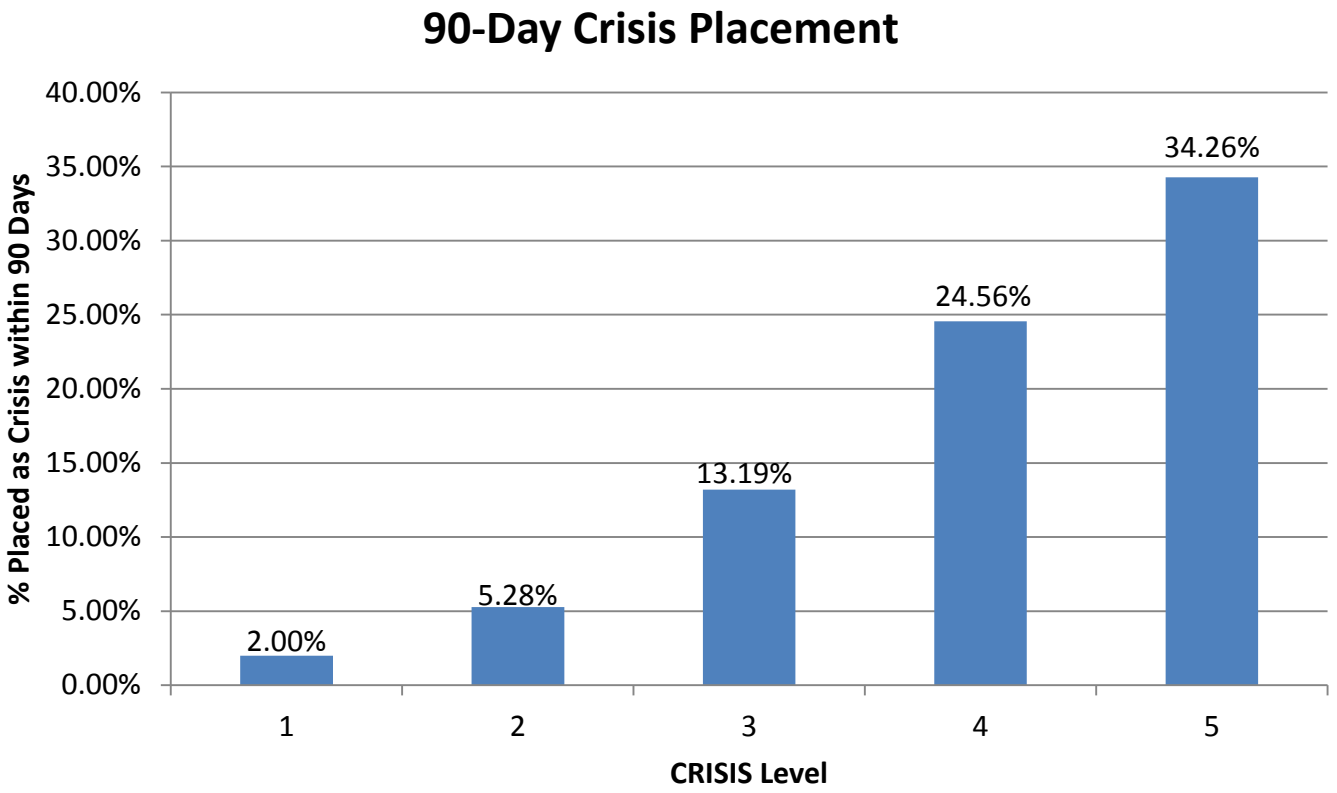
CRISIS Level-of-Risk: 4-High

Clinical Risk Category Behaviour, Delusions, or Hallucinations

Key CAPs to Modify Risk Behaviour, Delirium

Predictive Validity

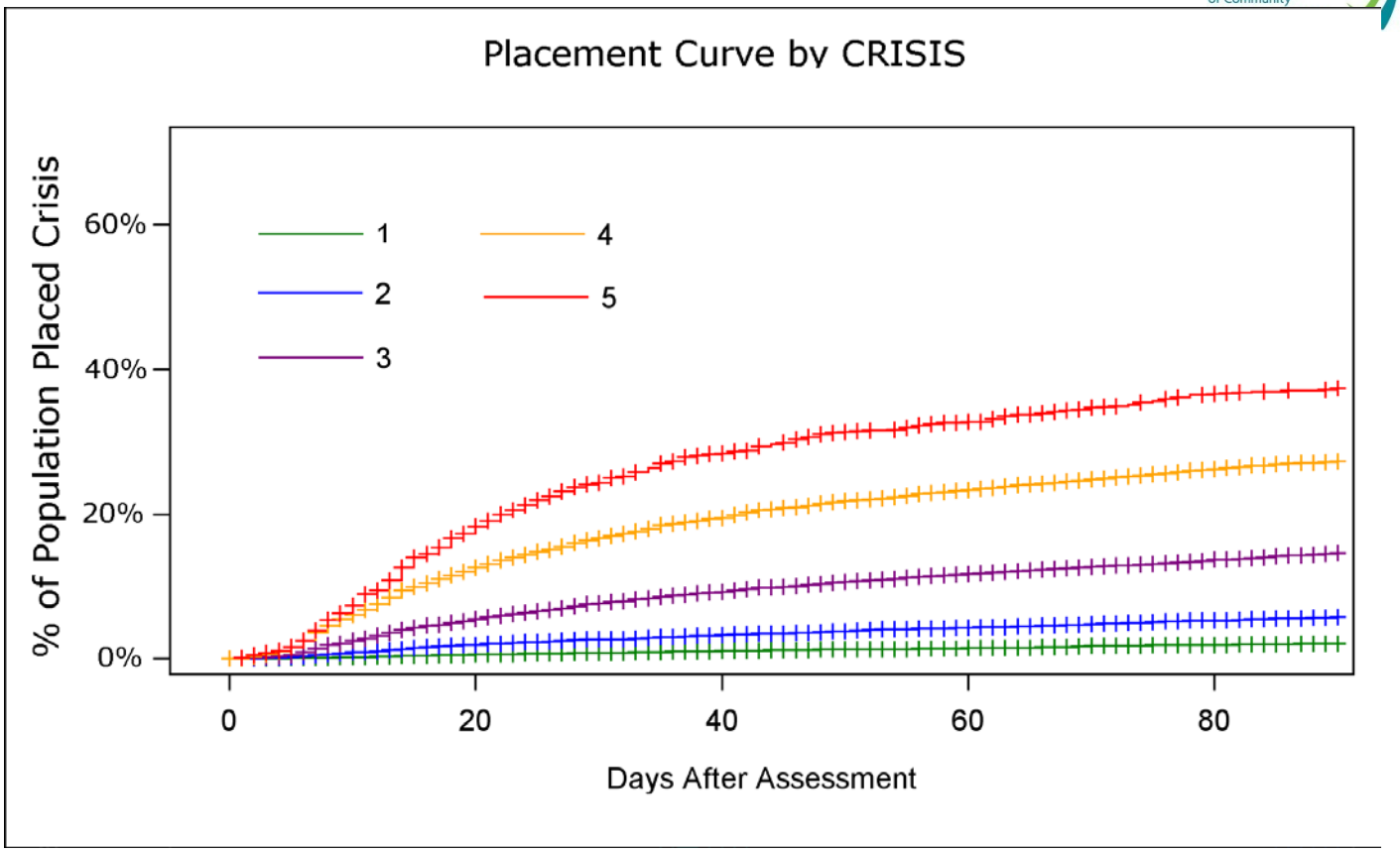
Placement Population (Jan. 1 – Dec. 31 2014)



- The proportion of patients placed as a crisis increases steadily across levels

Predictive Validity

Placement Population (Jan. 1 – Dec. 31 2014)



- AUC (Area Under the Curve)= 0.728 (0.686 – 0.780) by CCAC
- More predictive in CCACs with lower overall rates of placement

Distributions

Placement Population (Jan. 1 – Dec. 31 2014)

Clinical Category	%
Abusive Relationship CAP	**1.29%**
High ADL Impairment	**14.68%**
Wandering	**7.81%**
Behaviour, Delusions, Hallucinations	**17.50%**
Cognitive Impairment	**13.21%**
Moderate ADL Impairment	**16.94%**
Mild ADL Impairment	**28.58%**
Total	**100.00%**

CRISIS	%
5 - Very High	**2.82%**
4 – High	**21.39%**
3 – Moderate	**31.92%**
2 – Mild	**22.98%**
1 – Low	**20.89%**
Total	**100.00%**

Important Points

Crisis placement is not always the best care option for patients with a high CRISIS level. It is important to consider interventions to modify risk of immediate placement, e.g., delirium.

CRISIS Algorithm supports clinical decision-making and does not automate the process.

CRISIS Algorithm is different from the MAPLe.

Next Steps

Janet McMullan, OACCAC

Nancy Ackerman, OACCAC

Next Steps

- Pilot Testing for user acceptance:
  - **Personal Support Algorithm – Early June 2015,**
  - **Long Term Care Algorithms – Late June 2015,**
  - **Final Report to PCSC – November 2015,**
  - **Six CCACs participating – HNHB, MH, Central, Central West, Central East, North West.**
- Review through interRAI processes.
- Consider opportunities for use with the interRAI CHA.
- **Finalize algorithms for use with transition to the interRAI HC.**

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