

Nutrition & Frailty: new approaches to prevent and treat frailty

April 20, 2018

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RESEARCH

EDUCATION

PRACTICE

Enhancing the quality of life and care of older adults through partnerships in *research*, *education* and *practice*.

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Enhancing Life

Faculty/Presenter Disclosure

- **Faculty:** Heather Keller
- **Relationships with commercial interests:**
 - **Grants/Research Support:** Abbott Nutrition, Nestlé Health Sciences; Weston Foundation, OMAFRA
 - **Speakers Bureau/Honoraria:** Abbott Nutrition, Nestlé Health Sciences

Mitigating Potential Bias

- Use of oral nutritional supplements in general may be discussed as a means for mitigating nutrition risk and frailty but discussion of specific products will be avoided

Outline

- Nutrition risk and malnutrition in Canadian older adults
- Overlap among malnutrition, frailty and sarcopenia
- Key diet treatments
- Nutrition screening to promote diet resilience
 - Key tools → treatment/services

Some Definitions

Malnutrition

- Inadequate intake of energy, macro or micronutrients
- Inadequate intake → **functional change**
e.g. muscle loss, weakness, immune function, capacity for recovery, cognition
- **Responds to re-feeding**

(CMTF website adapted from: AW McKinlay: Malnutrition: the spectre at the feast. *J R Coll Physicians Edinb* 2008:38317–21.)

Nutrition Risk

- Risk factors → impaired food intake or nutrient utilization
- Low or poor food intake
- Occurs before physical or overt signs of malnutrition
e.g. significant weight loss
- Easier to improve than malnutrition

Why Poor Food Intake Occurs

- Food apathy
 - Reduced physical ability
 - Restricted income
 - Depression, social isolation, neglect
 - Medication use
 - Cognitive impairment
 - Dentition
 - Multi-morbidity
 - Other priorities
- Older Adults in Canada (CCHS, 2008)
 - 42% in lowest income
 - 49% living alone
 - 49% with low social support
 - 43% infrequent social participation
 - 42% don't drive
 - 62% report depression
 - 44% report disability
 - 54% 5+ medications
 - 46% poor oral health

German et al., 2011; Nykanen et al., 2013; Romero-Ortuno et al., 2011; Schilp et al., 2011; Ramage-Morin & Garriguet, 2013

Prevalence of Nutrition Problems In Canada (based on SCREENII)

Stats Canada

Ramage-Morin & Garriguet 2013

- 34% at high risk
- In those at risk
 - 47% wt change > 5lbs
 - 27% poor appetite
 - 26% swallowing problems
 - 24% skip meals
 - 37% low F & V
 - 42% eat alone
 - 52% cooking difficulty

Vulnerable Older Adults

Keller & McKenzie 2003

- 44% high risk
- 22% weight loss
- 45% limits food/difficult
- 48% low F & V
- 20% low Milk products
- 35% chewing
- 23% swallowing
- 28% poor appetite
- 43% cooking difficulty
- 29% shopping

Consequences of nutrition risk in Canadian community living seniors

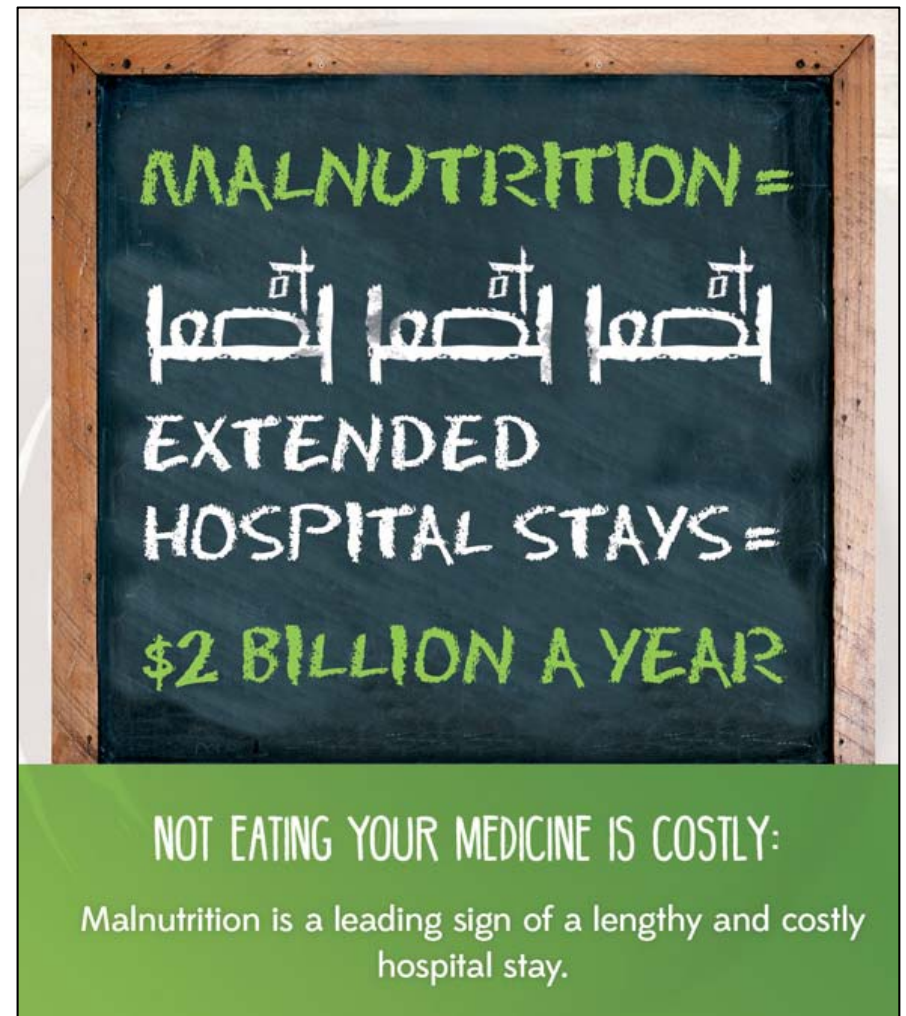
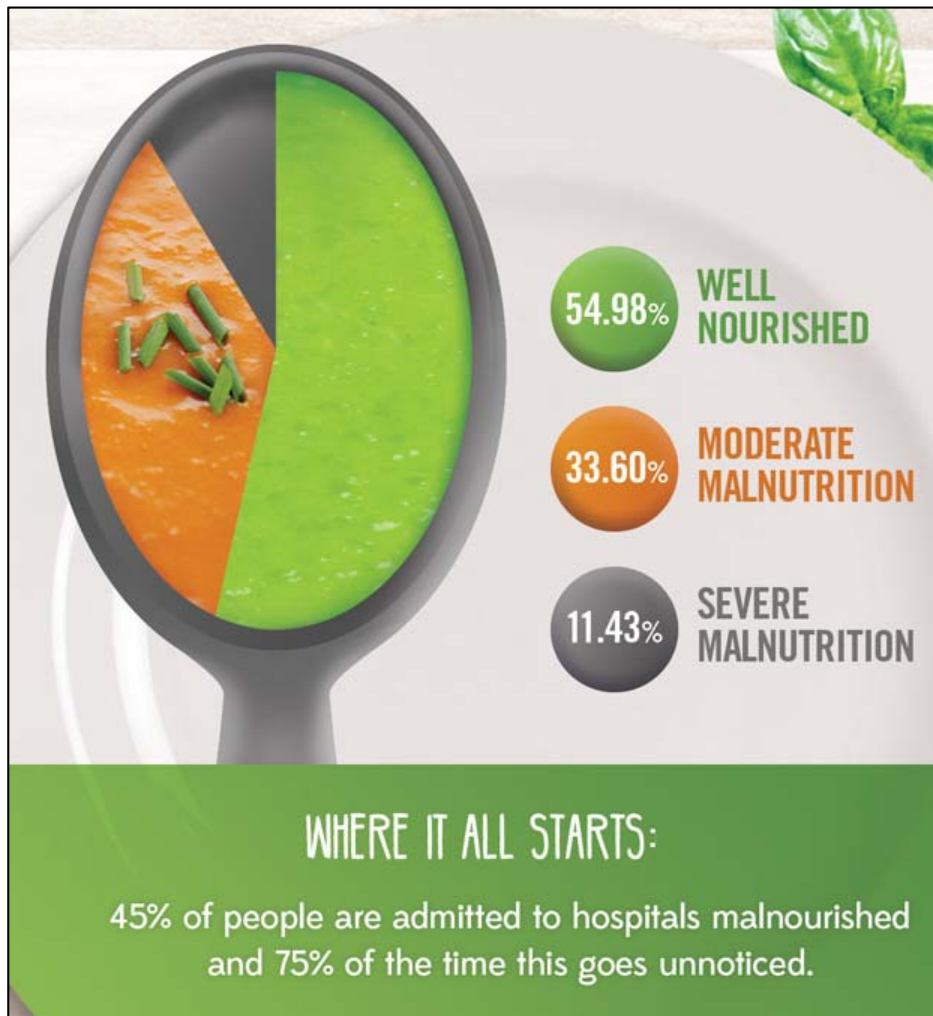
Independently associated with

- **mortality** (Broeska et al., 2013; Keller & Østbye, 2003; Ramage-Morin et al., 2017)
- **hospitalization** (Ramage-Morin et al., 2017)
- **health related quality of life in older adults who receive home care services** (Keller & Østbye, 2004)
- **institutionalization and poor emotional health and social functioning** (Payette, 2005)

Hospital Malnutrition

Canadian Malnutrition Task Force

www.nutritioncareincanada.ca



Who is malnourished at admission to hospital?

(Allard et al JPEN 2015)

Characteristic (%)	Well nourished	Mild/Mod malnutrition	Severe malnutrition
Groceries- adult child	4	8.7	10.5*
Cooking- adult child	2.2	4.2	6.3
Pre-adm ONS	11.7	27.9	47.4*
Surgical Adm	33.7	29.4	21.5*
Charlson Comorbidity > 2	36	46.9	54.5*
2 + hospital adm 5 yrs	49.5	59.9	70.3*
Infection	16.9	22.6	14.7*
# meds (median)	10	10	10.5
Length of stay	6	7	9*

* P<0.05

Weight change post discharge

(Keller et al., 2017)

- CMTF data n=747 with post discharge telephone follow up
- 26% reported 5+ pounds of weight loss
- 16.7% reported 5+ pounds weight gain

Characteristic	Weight Loss OR (95% CI)	Weight Gain OR (95%CI)
Age		0.77 (0.69,0.85)
Male		1.71 (1.12, 2.61)
SGA B		2.13 (1.36, 3.33)
SGA C		2.76 (1.19, 6.62)
Appetite (poor)	2.67 (1.76, 4.07)	0.28 (0.11, 0.66)
Special diet	1.45 (1.07, 1.96)	

Malnutrition/weight loss

- Increases risk of
 - Delirium (Ahmed et al., 2014)
 - Falls (Mazur et al., 2016; Neyens et al, 2013)
 - Impaired activity/function (Neyens et al., 2013; Singh et al., 2012)
 - Depression (Singh et al., 2012)
 - Poor surgical outcome (Ho et al., 2014)
 - LOS (Allard et al., 2015; Almeida et al., 2012; Ho et al., 2014; Lim et al., 2011)
 - Readmission (Lim et al., 2011)
 - Mortality (Lim et al., 2011; Soderstrom et al., 2013)

Frailty ↔ Malnutrition

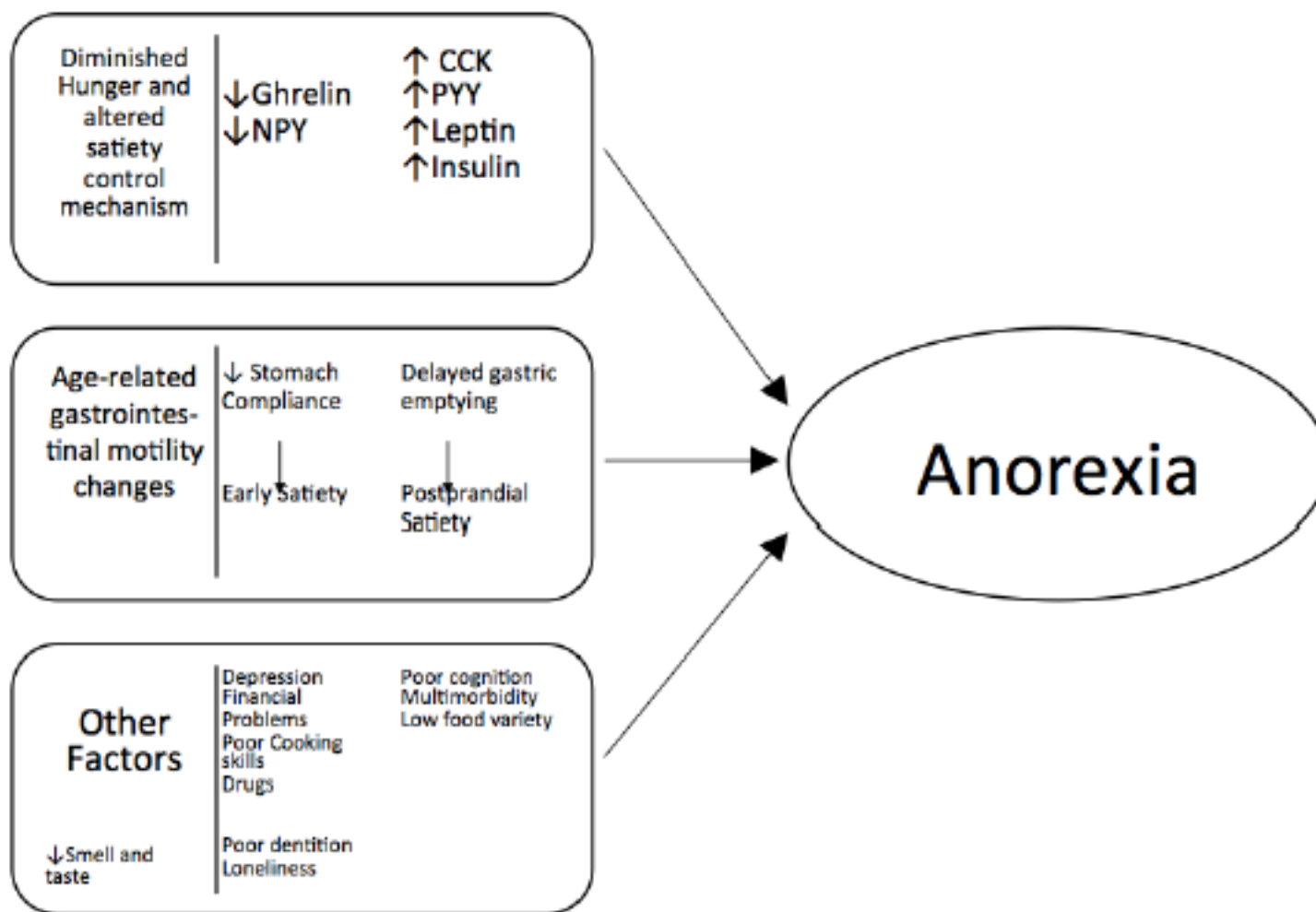


Figure 1. Major mechanisms involved in the development of anorexia of aging.
Landi et al., 2016

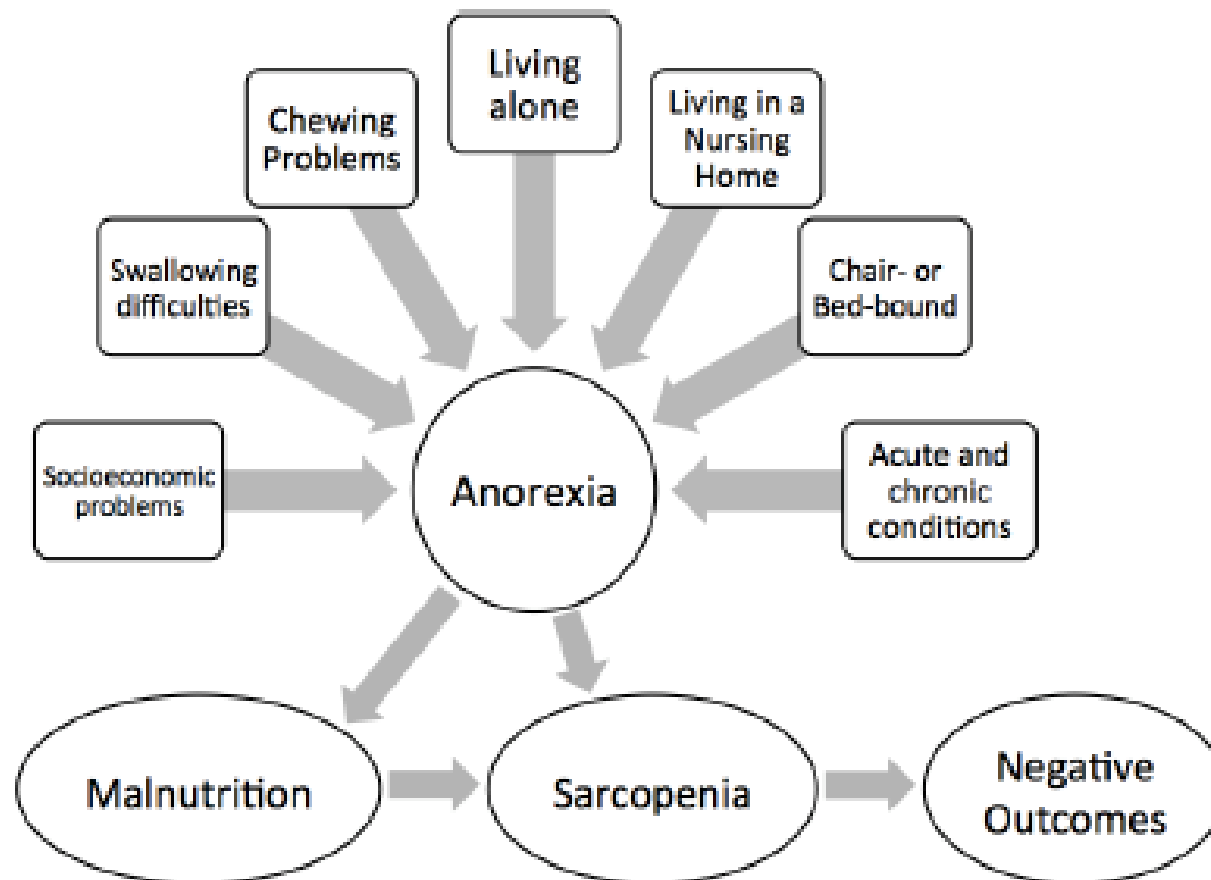


Figure 3. Risk factors for anorexia of aging and negative outcomes.

Landi et al., 2016

Overlap between Malnutrition and Frailty

- Common symptoms: weight loss, exhaustion, weakness, and slowness (Fried et al. 2001)
- Common risk factors: socio-demographic, physical, and cognitive (Boulos et al. 2016)
- Overlap in prevalence
 - ~98% non-frail = well-nourished
 - ~50% frail = malnourished (Bollwein et al. 2013)
 - 75% of malnourished hospital patients are frail (McNicholl et al. unpublished)
- **Malnutrition/risk of malnutrition = 4x increase in risk of frailty** (Boulos et al. 2016)

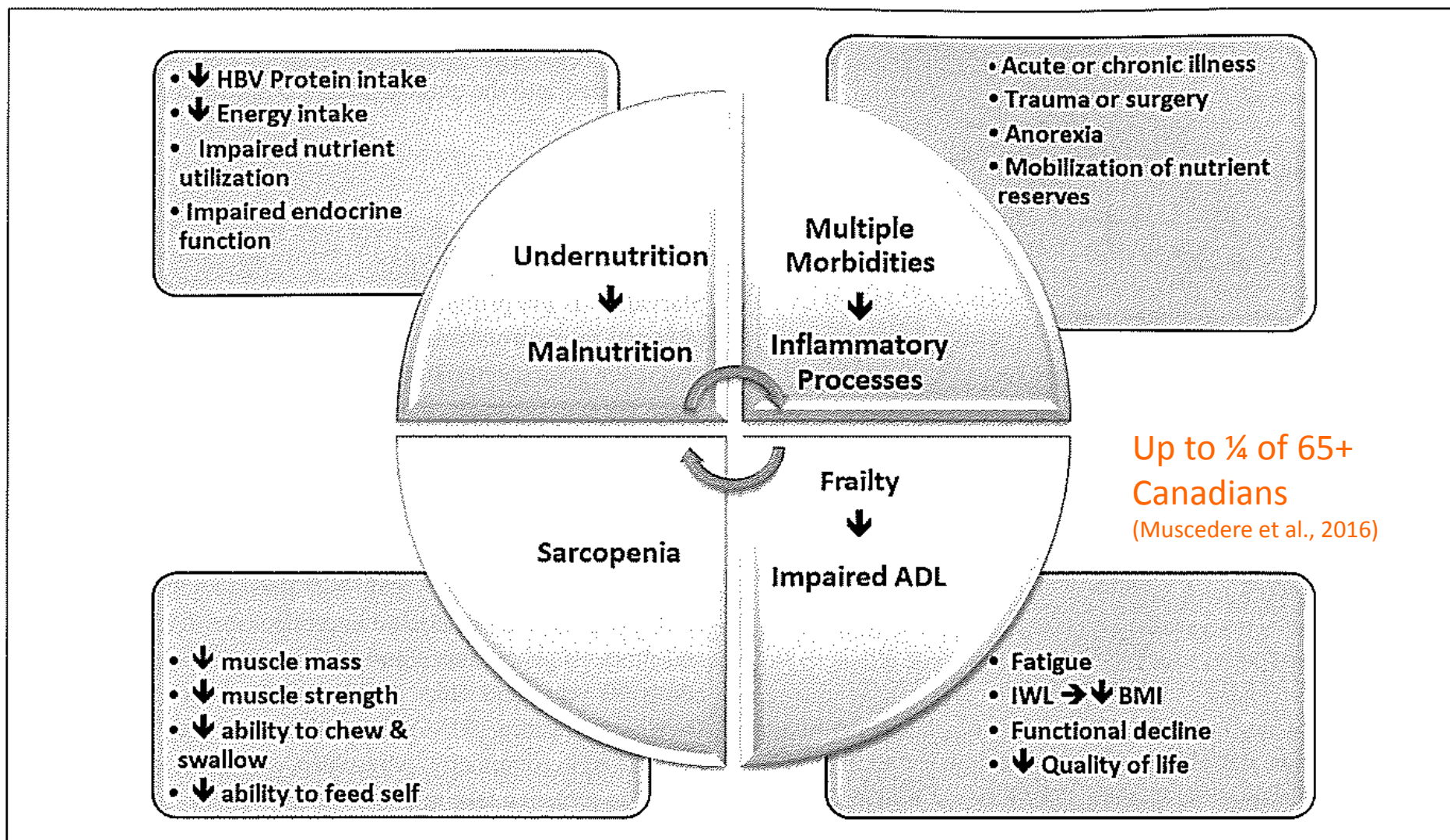
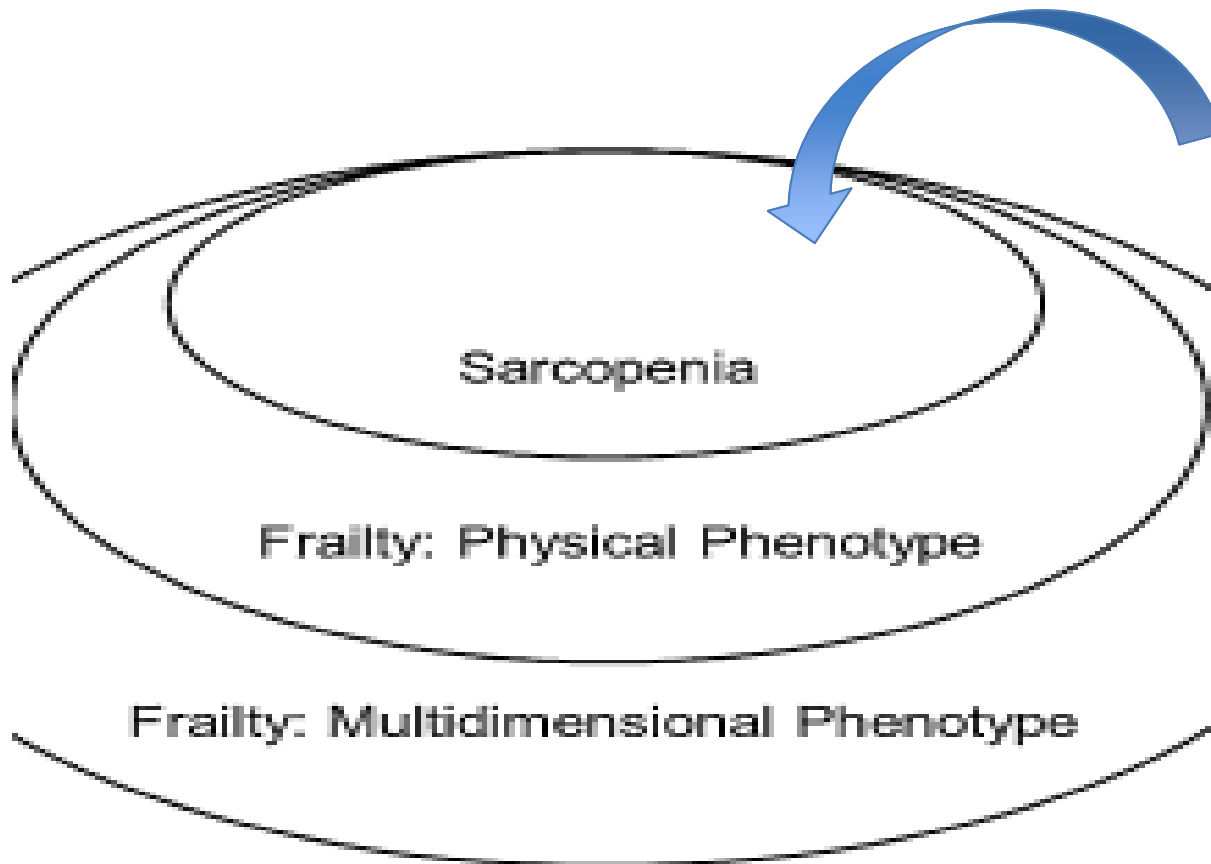


Figure 2. Cycle of functional decline. ADL, activities of daily living; BMI, body mass index; HBV, high biologic value; IWL, involuntary weight loss.

Litchford, 2014

Etiology? Cruz-Jentoft et al., 2017



- Energy
- Protein
- Leucine
- Creatine
- HMB
- Vitamin D
- Antioxidants

Overlap between frailty and sarcopenia

Protein, Sarcopenia & Frailty

HYPOTHESIS

- Need larger dose of protein to stimulate anabolic response
 - More EAA
 - Esp leucine
 - Lower quality pro → need more at a meal
 - ++Non EAA does not additionally stimulate muscle synthesis
 - Milk > soy

WHAT?

- 1.2- 2.0 g/kg/d (Baum et al., 2016)
- Amount > distribution
 - 80% of 1.5g/kg/d bolus (Bouillanne et al., 2013)
 - Excess not good either (Bonney et al., 2015)
 - Stress on kidneys, excess → oxidized
 - Not enough evidence for HMB
- Post **exercise bolus**
- Sufficient energy to spare protein
- Obesity → Ex (PRT and aerobic) + judicious wt loss diet (Goisser et al., 2015)

Systematic Review of RCT (Denison et al., 2015)

- 17 studies in older adults; **Exercise + Diet treatment**
- **Diverse** in terms of nutritional status and degree of sarcopenia or frailty
- Types of nutritional supplementation; dose, frequency etc

- **Exercise worked**
- **Supplements inconsistent**
 - 7 studies amino acids /HMB/protein
 - Minimal additive effect, especially in healthy
 - 1 study sarcopenic protein improved strength
 - 1 study of frail increased muscle mass; 1 HMB (healthy) almost significant
 - Performance not improved additively with protein
 - 6 multinutrient supplement (e.g. nutritional drinks with energy and protein)
 - Sarcopenic /frail/malnourished
 - Inconsistent benefits on strength; no increase in muscle size
 - limited additive benefit of supplements on performance
 - 2 vitamin D
 - NH population and community living deficient in vitamin D
 - Only improvement in performance in those deficient if also exercised
 - 2 creatine supplementation; community-dwelling
 - Increased strength and FFM
 - No effect on physical performance

Potential gaps

- Not targeting treatment
 - Those not consuming enough protein
 - Addressing malnutrition vs. optimization
- Insufficient dose or type of protein
 - Meat vs. milk
- Food vs. supplement
 - phytochemicals & bioactives



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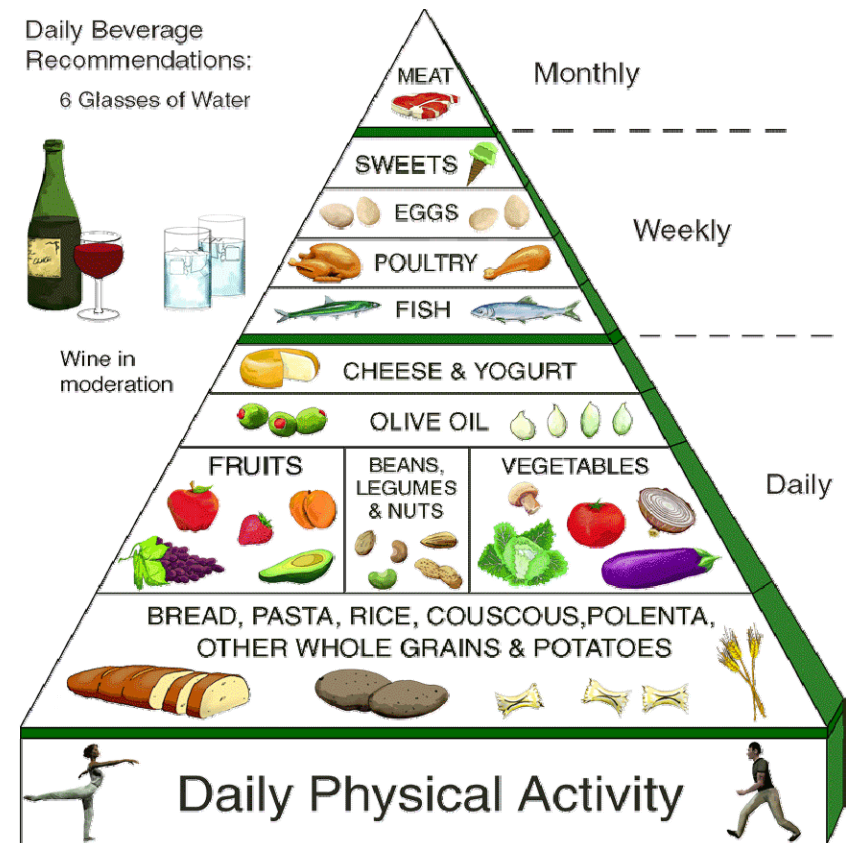
(Landi et al., 2017) www.mysprintt.eu

- Funding: Innovative Medicines Initiative (Joint EU and EFPIA)
- Primary aim: prevent mobility disability (400 m walk) in high risk seniors
- Multicomponent:
 - Exercise: walking 150 min/wk; flexibility/balance exercise; 2X/wk 10 min strength; centre2X/wk and at home
 - Nutrition; 25-30 kcal/kg bw; protein 1-1.2 g/kg bw; diet + supplements as required; vit D suppl recommendation if deficient
 - Technology
- Comparator: health aging lifestyle education series; vit D suppl recommendation if deficient
- 1500 physical frailty & sarcopenic, 70 + yrs
 - Low muscle mass (DEXA), SPPB between 3 and 9, can complete 400 m walk
 - Long list of exclusion: psychiatric, dialysis, residence etc.
- 15 centres, 9 countries
- 36 months
- Finished recruitment

Mediterranean Diet

Systematic Review (Kojima et al., 2018)

- 4 studies
- Greater adherence to MED lower incident frailty OR 0.62
- 9 yr adherence = better mobility (Milaneschi et al., 2011); slower declines in SPPB (Bollwein et al., 2013)
- 4 yr follow-up, weight change & gait speed (Leon-Munoz et al, 2014)



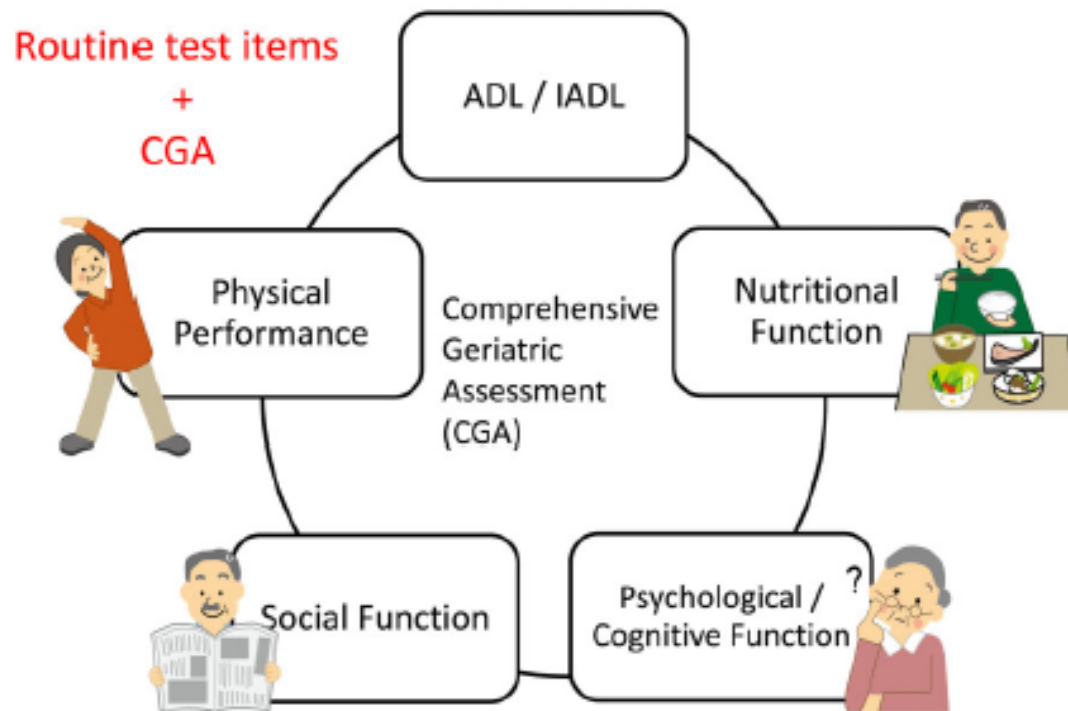
Treating malnutrition and frailty

- Oral Nutritional Supplement (ONS) improves:
 - weight, nutritional status longevity (Manal et al., 2016; Milne et al. 2009)
 - frailty indicators (Artaza-Artabe et al. 2016; Manal et al. 2016)
 - longevity (Milne et al. 2009)
- High Quality Diets
 - Protein promotes skeletal muscle mass (Huang et al., 2016)
 - Mediterranean diet
 - muscle mass, power in women (Kelaiditi et al, 2016)
 - reduced hip fracture, particularly among men (Benetou et al, 2013).
- Multicomponent in pre-frail: nutrition, exercise
 - improves strength and energy (Kwon et al., 2015; Ng et al, 2015)
 - Quality of life (Kwon et al., 2015)

Early intervention supports improved outcomes

Public health level (Shinkai et al., 2016)

- Japan, 10 yr community intervention



- 1) Annual health check-up
- 2) One month later → given results in a community centre
- 3) Education and advice at centre
- 4) Further community services developed to mitigate frailty
 - exercise
 - nutrition
 - social participation
- 5) frail/ pre-frail provided more intensive intervention by LTC services
 - exercise
 - nutrition
 - social participation

Table 1 Brief questionnaire for screening frailty – The Check-List 15

1 Do you usually stay at home all day long?	0. No	1. Yes
2 How often do you usually go outdoors?	0. More than once per 2–3 days	1. Less than once a week
3 Do you have any hobby?	0. Yes	1. No
4 Do you have neighbors who you can talk to in a friendly manner?	0. Yes	1. No
5 Do you have close friends, families or relatives you go to meet?	0. Yes	1. No
6 Did you have an experience of falling in the last year?	0. No	1. Yes
7 Can you walk continuously over 1 km?	0. Able to do without any difficulty	1. No, or able to do but with difficulty
8 Can you see things clearly? (visual impairment)	0. Yes	1. No (have problems)
9 Do you often slip or stumble at home?	0. No	1. Yes
10 Do you ever refrain from going outdoors because of fear of falling?	0. No	1. Yes
11 Have you been hospitalized in the last year?	0. No	1. Yes
12 Do you have appetite these days?	0. Yes	1. No
13 Do you have any difficulty in chewing?	0. have almost no difficulty	1. have difficulty
14 Did you lose weight of ≥ 3 kg in the last 6 months?	0. No	1. Yes
15 Do you feel that you have lost body muscle and/or fat during the last 6 months?	0. No	1. Yes

Key results

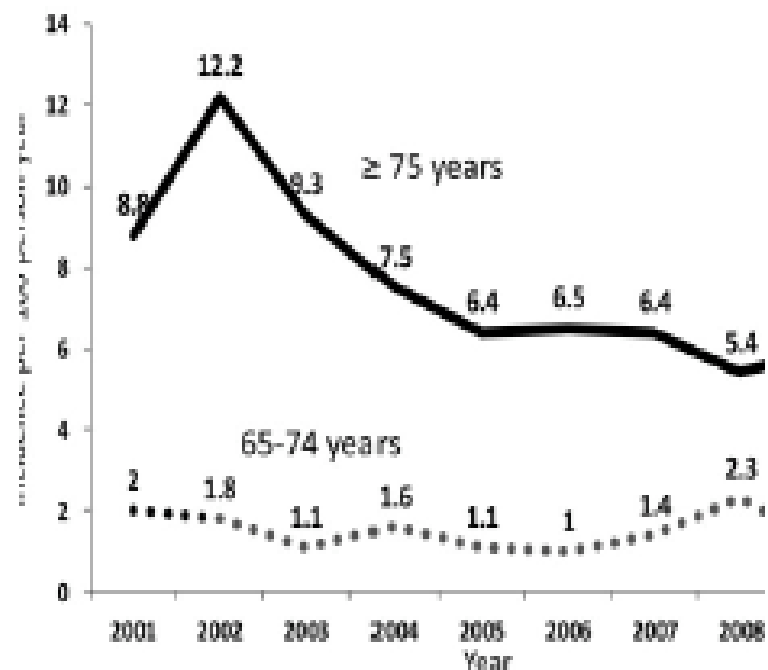
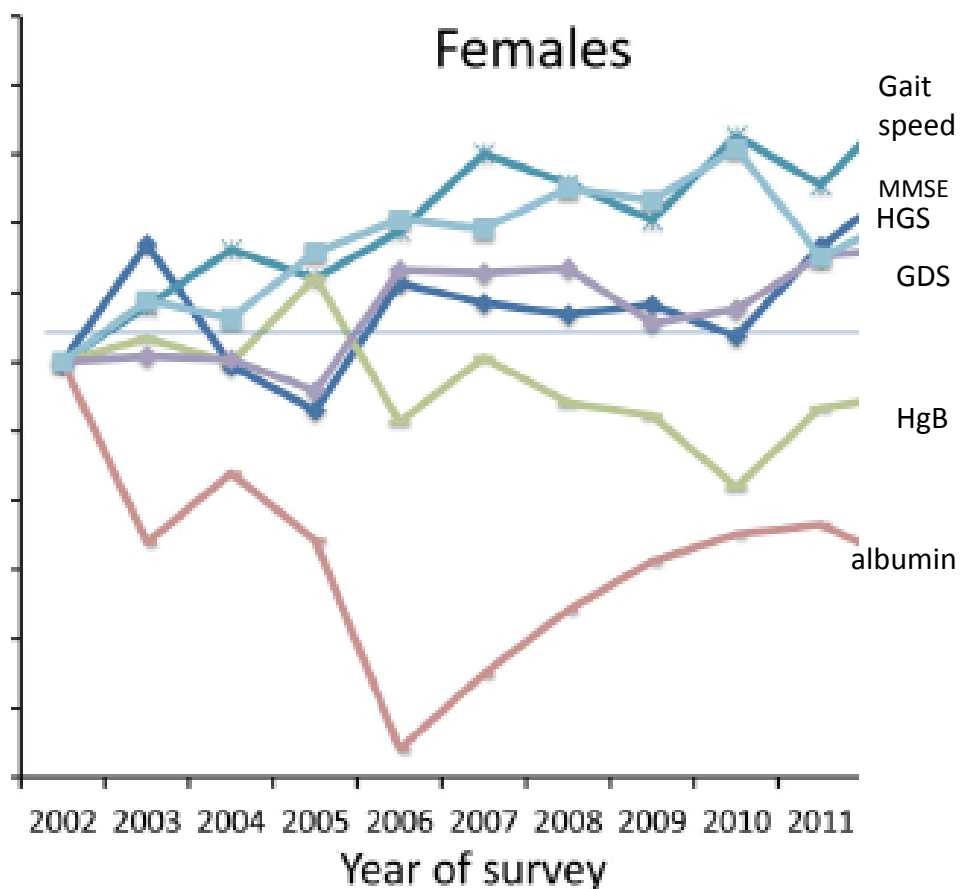
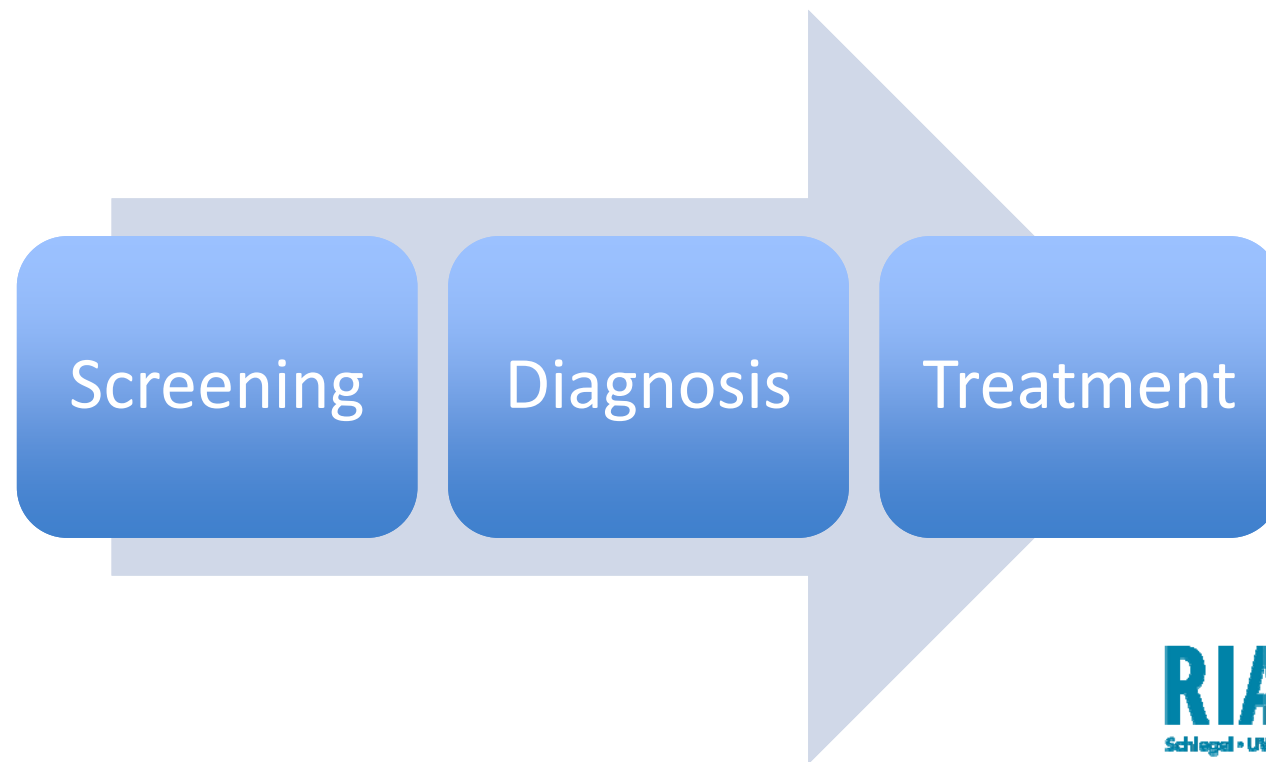


Figure 7 Changes in the incidence rate of disability certification over time under the Long-Term Care Insurance program in the young-old and old-old populations in Iusatsu. Adapted from Shinkai *et al.*¹⁴ with permission.

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Opportunity: implementation of malnutrition screening to find and treat the malnourished



Nutrition Screening: What is it?

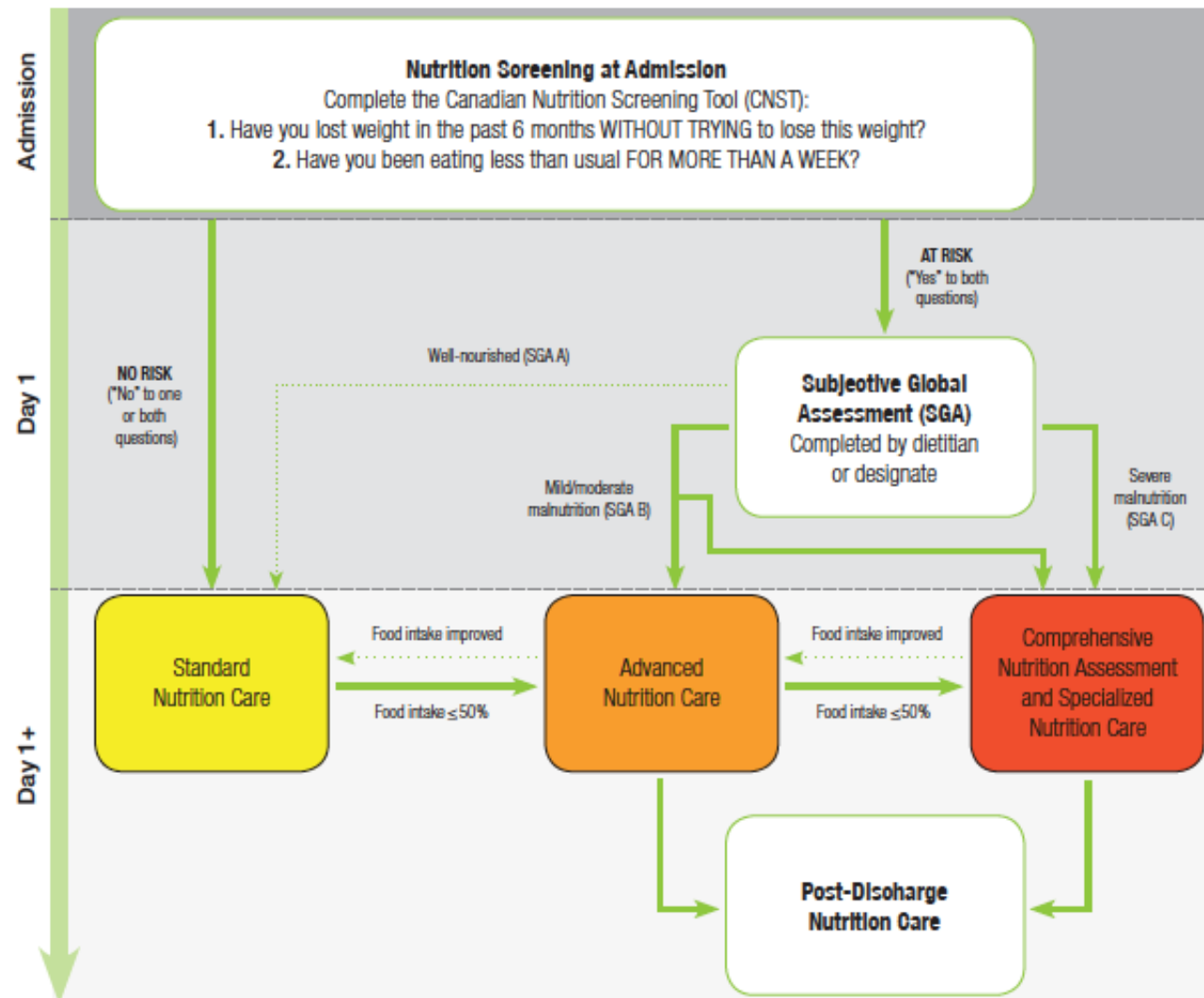
“The purpose of nutritional screening is to predict the probability of a better or worse outcome due to nutritional factors, and whether nutritional treatment is likely to influence this.”

- ESPEN Guidelines for Nutrition Screening

- ✓ At **risk** of malnutrition (risk factors are present that impair intake and/or increase the body’s needs for nutrients and/or energy)
- ✓ **Malnourished**
- It is a **rapid and simple process** conducted by admitting staff

A.S.P.E.N. 2010 / ADA EAL © 2012 / Chen et al. 2001 / ADA 2003 / ESPEN 2008 / Reuben, 1995 / Mueller et al., 2011 / Kondrup et al., 2003 / Chen et al., 2001

The Integrated Nutrition Pathway for Acute Care (INPAC)



Hospital: Canadian Nutrition Screening Tool

Identify patients who are at risk for malnutrition

	Date:		Date:	
	Admission		Rescreening	
Ask the patient the following questions*	Yes	No	Yes	No
Have you lost weight in the past 6 months WITHOUT TRYING to lose this weight? <small>If the patient reports a weight loss but gained it back, consider it as NO weight loss.</small>				
Have you been eating less than usual FOR MORE THAN A WEEK?				
Two "YES" answers indicate nutrition risk†				

* If the patient is unable to answer the questions, a knowledgeable informant can be used to obtain the information. If the patient is uncertain regarding weight loss, ask if clothing is now fitting more loosely.

Subjective Global Assessment: Diagnose malnutrition

Assessment:

- Medical History
- Nutrient Intake
- Weight
- Symptoms
- Functional Capacity
- Metabolic Requirements

Subjective Global Assessment Form

MEDICAL HISTORY

Patient: _____ DOB: _____

DIETARY INTAKE

1. No change
 2. Reduced intake of _____
 Reduced intake of _____
 Reduced intake of _____
 Reduced intake of _____
 Reduced intake of _____

3. **Dietary Intake in the past 2 weeks?**
 No change
 Reduced intake of _____
 Reduced intake of _____

WEIGHT Usual weight: _____ Current weight: _____

1. **Net fluid weight change past 6 months** _____
 No change
 Weight gain of _____
 Weight loss of _____
 Weight loss of _____

2. **Weight change past 2 weeks?** _____
 No change
 Weight gain of _____
 Weight loss of _____

SYMPTOMS (check all that apply)

1. Anorexia Nausea Diarrhea Constipation
 Abdominal pain Bloating Heartburn
 Fatigue Dizziness Headache

2. **Symptoms in the past 2 weeks?**
 No change
 Increased symptoms
 Decreased symptoms

FUNCTIONAL CAPACITY (check all that apply)

1. No change
 2. Reduced capacity to perform _____
 Reduced capacity to perform _____

3. **Functional Capacity in the past 2 weeks?**
 No change
 Increased capacity
 Decreased capacity

METABOLIC REQUIREMENT

Increased requirement No Yes

PHYSICAL EXAMINATION

1. No change No Mild Severe
 2. No change No Mild Severe
 3. No change No Mild Severe


CACHEXIA

No Yes

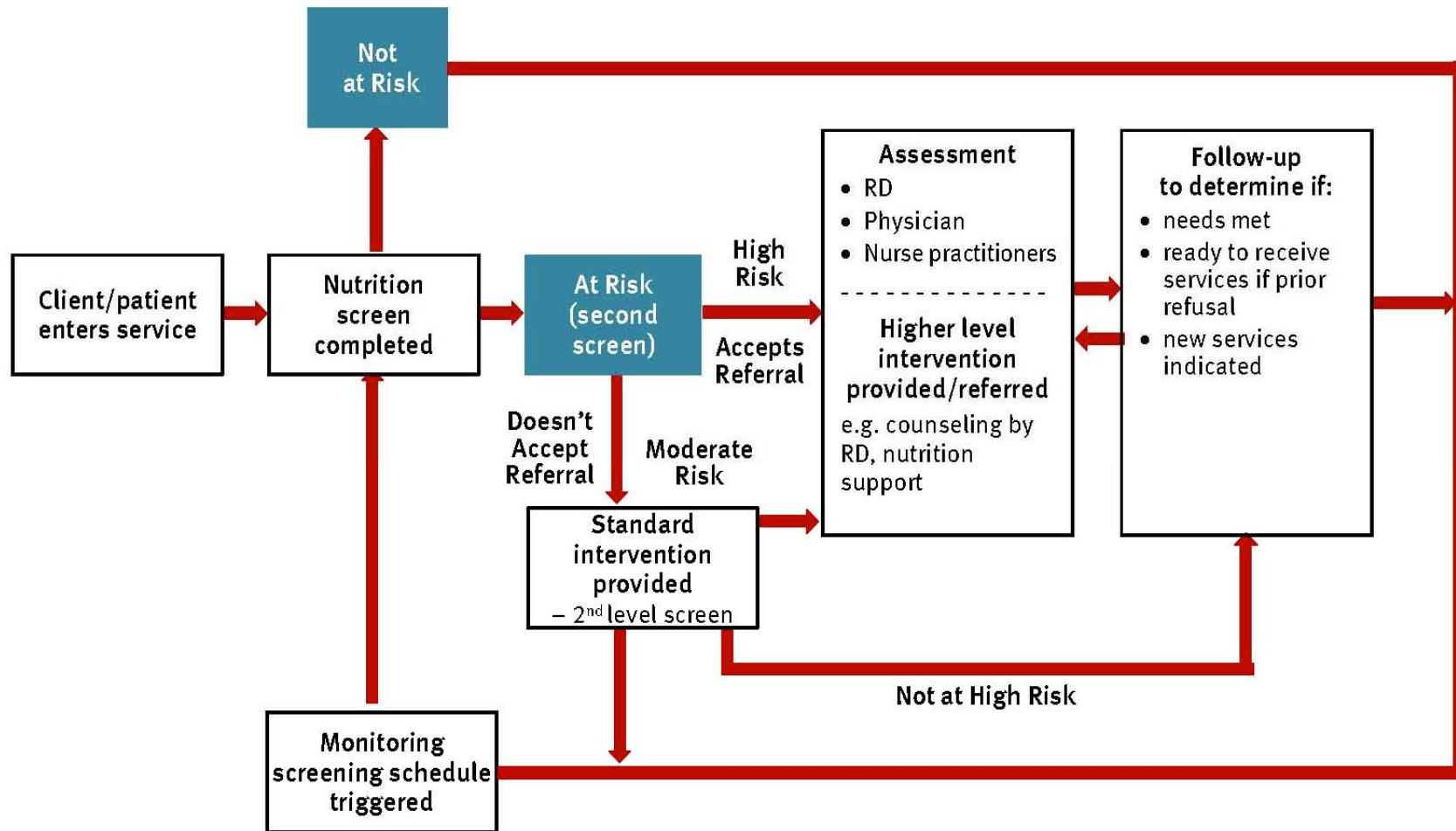
SGA RATING

A (Well-nourished) B (At risk of malnutrition) C (Moderate to severe malnutrition)

*See page 2 SGA Rating for more description.

 Canadian Malnutrition Task Force | Le Groupe de Travail sur la malnutrition
Adapted from the Canadian Malnutrition Task Force by permission of the authors.

Primary Care

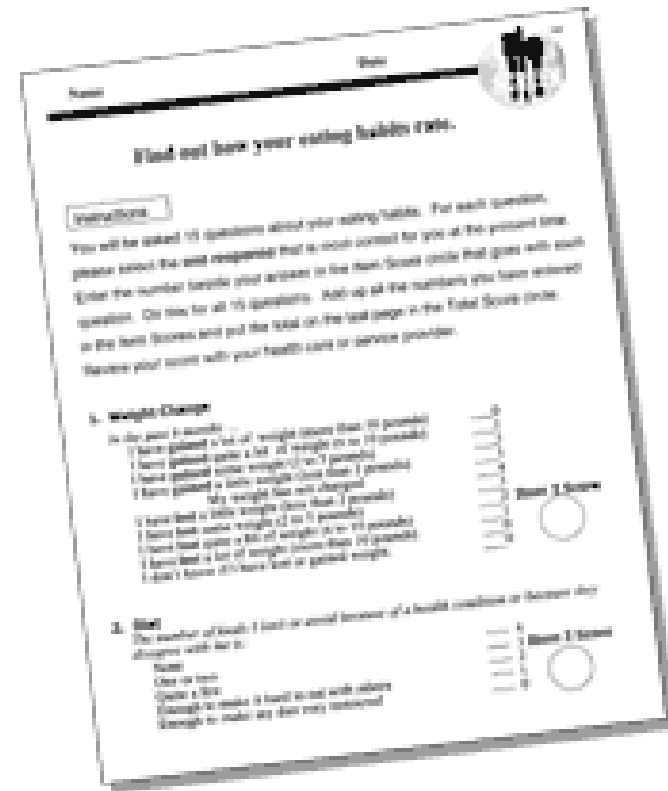


Principles of “Ethical Screening”

- **Target** people in potential need of nutrition assessment and treatment
- **Identify** nutrition problems and appropriate course of action (e.g. assessment, treatment)
- Have a **referral/treatment algorithm** in place to promote appropriate and efficient referral
e.g. Integrated Nutrition Pathway for Acute Care
- Include follow-up and **monitoring** post treatment

What is SCREEN II?

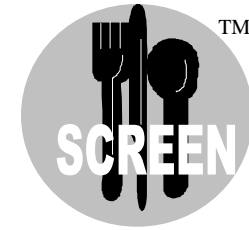
Seniors in the
Community:
Risk
Evaluation for
Eating and
Nutrition



Systematic Review Power et al. 2018
SCREENII best tool for community-living

SCREEN II

EJCN, 2005; J Clin Epi, 2007



- SCREEN can be self or interviewer administered
- Expert involvement in wording
- Seniors involved in development
- Abbreviated version also available
- Validated against a dietitian's rating of nutritional risk
- Predicts mortality, health related quality of life, perceived health
- Demonstrated test-retest reliability
- Intermodal, inter-rater reliability
- SCREEN program
 - Referral process based on identified risk items
- Can be included on EMR or other platforms

Available from
[http://www.flintbox.com/
public/project/2750/](http://www.flintbox.com/public/project/2750/)

Items on SCREENII

- Weight change*
 - Loss/gain
 - Intentionality
 - Perception
- Skipping meals*
- Diet restrictions/difficulty
- Appetite*
- Eating alone*
- Use of meal replacements
- Intake
 - F&V*
 - Milk products
 - Meat & alternatives
 - Fluid*
- Swallowing*
- Chewing
- Grocery difficulty
- Cooking difficulty*

* On abbreviated version

Example Question

How much fluid do you drink in a day?

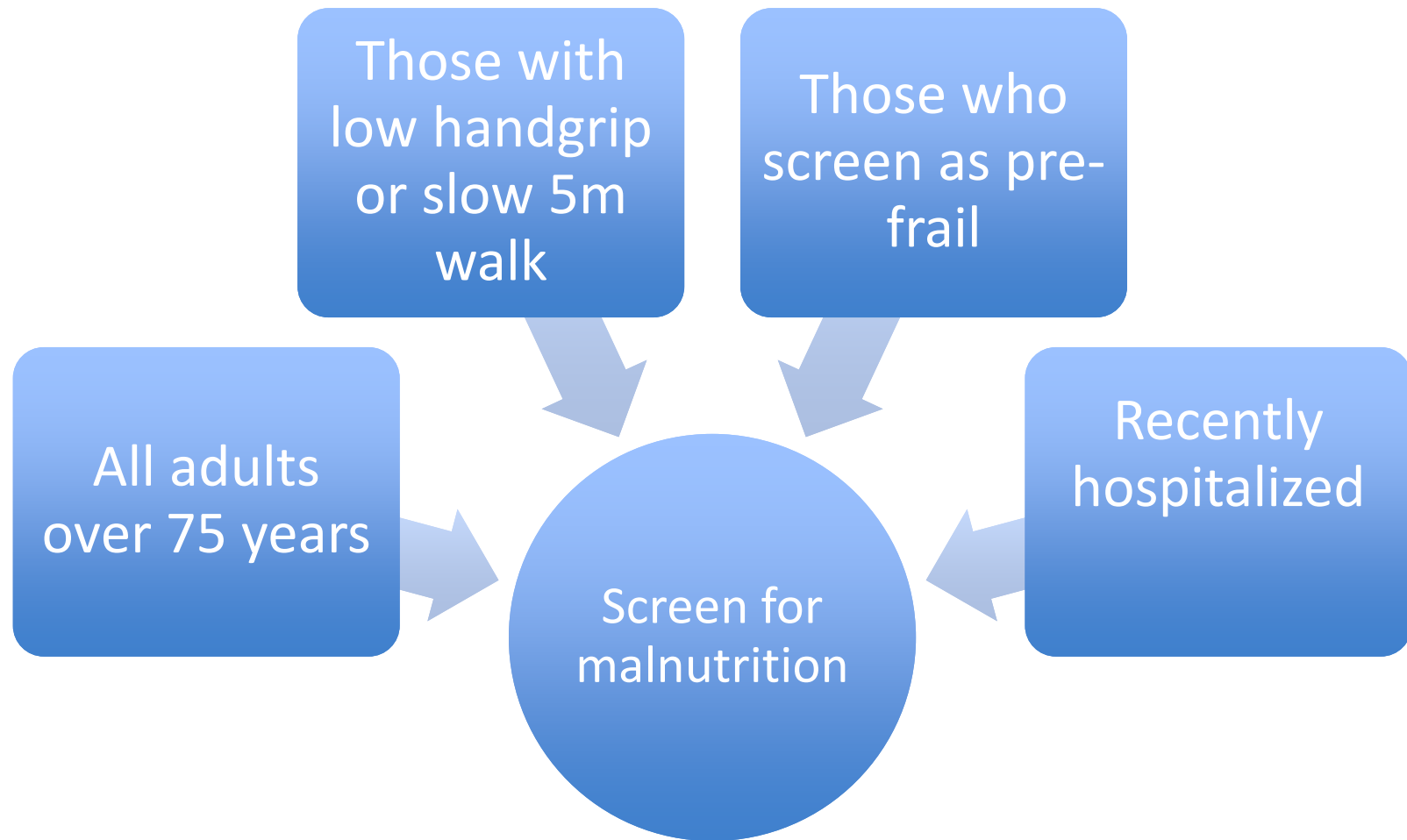
Examples are water, tea, coffee, herbal drinks, juice, and soft drinks, but not alcohol.

- 4 Eight or more cups
- 3 Five to seven cups
- 2 Three to four cups
- 1 About two cups
- 0 Less than two cups

Health & Community Services

- Dietitians, dentists, speech language therapists
- Meal programs: congregate dining, meal delivery, seniors centres
- Physical activity: Y, seniors centres
- Cooking services/programs: seniors centres, home delivery food box
- Homemaking: home care, private support
- Food shopping: store delivery, specialized services, garden fresh box

Using pre-frailty as case finding



Geriatric Medicine Role

- Champion nutrition screening in hospital and primary care
 - Follow screening with diagnosis and treatment
- Champion diagnosis
 - Learn and practice using subjective global assessment (SGA)
- Advocate for healthy lifestyle programs for older adults
 - Nutrition education
 - Physical activity
 - Frailty awareness
- Treat malnutrition when you see it
 - Refer to registered dietitian

In Summary...

- 34% of Canadians are at nutrition risk
 - 30-45% of medical patients are at nutrition risk/malnourished at admission to hospital
- There is an overlap in nutrition risk and frailty
 - Frail patients= at nutrition risk or malnourished patients
- Multifactorial interventions are required to address frailty, including nutrition treatment
- Nutrition screening needed to identify those in need of treatment
- Diet= Mediterranean + protein + sufficient calories +vitamin D

Acknowledgements



Canadian Malnutrition Task Force™ | le Groupe de travail canadien sur la malnutrition™

Advancing Nutrition Care in Canada / Améliorer les soins nutritionnels au Canada



Canadian Frailty Network

Réseau canadien des soins aux personnes fragilisées



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Questions?

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