VITALiTY Research Workshop

Wosk Centre for Dialogue

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DRAFT

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INTRODUCTION

On January 12, 2009, 60 researchers and health care professionals in the fields of aging, mobility, cognition and mood took part in the *VITALiTY Research Workshop*, co-sponsored by the BC Network for Aging Research (BCNAR), the University of British Columbia (UBC) Department of Medicine, the Michael Smith Foundation for Health Research (MSFHR), and the Canadian Institutes of Health Research (CIHR).

Opening remarks

Dr. Janet McElhaney, Professor of Medicine, Allan M. McGavin Chair, Research Geriatrics, Division Head, Geriatric Medicine, at UBC, Providence Health Care and Vancouver General Hospital (VGH)

VITALiTY, the Vancouver Initiative to Add Years to Life, aims to help people age more successfully. The VITALiTY group organized this workshop to:

§ Develop research themes focused on reducing risk for catastrophic disability, with the potential to apply for team develop grants from MSFHR and CIHR.

§ Focus on cognition, mobility and mood as risk factors for catastrophic disability, with exercise as an intervention to lower risk.

§ Foster inter-professional collaborative practice as the vehicle for knowledge translation.

§ Build a community of practice to develop and integrate clinical strategies, knowledge translation and outcome measurement and to create partnerships with community groups as a means to advance mobility and physical activity in the community e.g. via UBC Channing Aging, BCRPA, Osteofit etc.

§ Articulate the next steps for continuing the work of VITALiTY.

Chronic diseases increase risk for catastrophic disability, which is defined as the loss of three or more activities of daily living (ADL) through acute illness. Of this group, 72% have been hospitalized- a target point of care where intervention should make a difference. The leading causes of catastrophic disability are stroke, congestive heart failure, pneumonia, influenza, ischemic heart disease, cancer and hip fracture.

The World Health Organization (WHO) is concerned with aging populations in the developing world. Older adults frequently go to hospital with an acute illness and are discharged as frail. The workshop was designed to examine how to prepare the older adult population for potential complications, reduce their risk, and minimize declines in mobility, cognition and mood.

Older adults can promote their own health and enhance their potential for recovery from illness by building confidence in their mobility, competence in their decision-making ability, and social connections in the community.

Conference proceedings

This report summarizes three keynote presentations, presents highlights of four breakout group discussions, and outlines the key research priorities that emerged from the workshop.

Summary of research priorities

Workshop particpants identified five priority areas for research that emerged during the workshop:

Investigate prevention and early intervention strategies to prevent the cascade to progressive and catastrophic disability
§ Examine prevention and early intervention for older adults in the community and those in hospital
§ Identify ways to prevent or mitigate the decline in health that often occurs in acute care settings
§ Investigate the synergism of factors that lead to catastrophic decline
§ Examine the transitions between home, acute care and residential care
§ Examine the impact of implementing a dementia pathway
Conduct action research to develop translational evidence
§ Investigate opportunities to adapt successful models from other areas
§ Focus on quick wins and longer term results
§ Conduct research within a quality improvement framework
Map shared risk factors for mood, cognition and mobility
§ Identify areas of overlap and opportunities to work together
§ Research the impact of exercise on reducing risks
§ Investigate delerium prevention
Create interdisciplinary, inter-professional research teams
§ Broaden VITALiTY participation to include nurses and population health researchers
§ Engage the spectrum of health care providers to work with geriatricians and participate in research
Coordinate research across health authorities and the continuum of care
§ Conduct plan-do-study-act (PDSA) rapid change cycles across the continuum

- Perform a SWOT (strengths, weaknesses, opportunities and threats) analysis
- Include home care, community care, primary health care, emergency care, acute care and social support systems

KEYNOTE PRESENTATIONS

Three keynote presentations at the *VITALiTY Research Workshop* examined ways to prevent or minimize disability and frailty in older adults and improve their quality of life.

Cognition and the risk of disability in older adults

Dr. Kenneth Rockwood, Professor of Geriatric Medicine, Dalhousie University; Physician, Queen Elizabeth II Health Sciences Centre; President/Chief Scientific Officer, Dementia Guide; Kathryn Allen Weldon Chair in Alzheimer Research

With age, the prevalence of maximal fitness goes down and the prevalence of frailty goes up. These two cross at the age when people most often need hospital care. Data from the National Population Health Survey found that most people are as fit as they will be at age 15, with 1-2% frail. By 75, only about 15% are as fit as they could be, more than a third are frail with multiple co-morbidities, and beyond that age, frailty increases exponentially. Consequently, the health care system must embrace complexity.

Frailty as an impaired ability to respond to stress exists throughout the lifespan and accumulates. Older adults become disabled through an accumulation of deficits. As people accumulate deficits, they become more dependent on their social environment to mitigate risks, so social vulnerability becomes increasingly important, but is present throughout life. How can some of this frailty be prevented? If everyone exercised, would the prevalence of Alzheimer's increase as more people age, creating a prevention paradox? Opportunities for prevention and intervention include:

- *Mitigating gradual deficit accumulation* – Exercise is overwhelmingly important. Social engagement and controlling vascular risk factors are important too. Engaging the mind also has a small impact.

- *Preventing catastrophic changes in cognition and function* – We need to embrace the complexity of needs of frail elderly people, and not engage in interventions that are unlikely to benefit them and likely to cause harm. Anything that can prevent or ensure recovery from delirium is key.

Elderly people become frail as a result of interactions between their medical health, attitudes toward health, health practices, resources, dependence on others, and social problems. Disability can arise suddenly or gradually, in relation to deficit accumulation. If someone has impaired mobility, the most important question to ask is whether the condition is new.

Disability accumulates with age. While this cannot be generalized to all older adults, it appears that generally vision problems start first, then arthritis, thyroid problems and mobility disability, in that order. The rate of disability accelerates about 3% a year and has been defined in some circles as the result of an accumulation of various deficits. When people get to a certain point of deficit accumulation, they cannot get more deficits or they will die.

Studies in Canada and Australia have found that the maximum number of deficits people can have is two-thirds of the totaldeficits studied. For example, a clinical survey found the

maximum number of deficits reported was 67 of 100. Another study found the maximum was 33, when people were asked to self-report on 50 deficits. A limit to the number of deficits suggests reserve capacity becomes exhausted as people get closer to failure, so another deficit will kill them.

The way deficits accumulate over time shows it is hard to have a catastrophic disability from a fit state unless the insult is extreme.

The limit to accumulating physical deficits applies to cognition as well. Frailty arises in relation to deficit accumulation, and cognitive impairment arises from the accumulation of cognitive deficits, which arise from risk factors, head injury and a lack of stimulation. As cognitive deficits accumulate, mortality increases in both men and women. Analyzing the complexity of deficit accumulation for frailty and cognitive impairment can provide a scientific basis for responding to both catastrophic and gradual onset disability. No single fix exists; complex problems require complex interventions.

A social vulnerability index shows that social vulnerability is more common as people age, and predicts mortality independent of frailty:

§ Although women had better survival than men overall, survival for women with high social vulnerability was equivalent to that of men with low social vulnerability.

§ To distinguish between fit and frail outcomes, those with no disability deficits were divided into low, medium and high social vulnerability. People with many social deficits were at twice the risk of those with low social deficits.

§ With this older population, social vulnerability translated into a 20% increase in mortality risk in the fittest people, based solely on their degree of social vulnerability.

There is a maximum lifespan and the fittest jogger will still die. But if we focus on prevention to limit the accumulation of deficits as people age, there are bound to be payoffs throughout the lifespan, with less chronic disability. For catastrophic disability, we need to change the magnitude of insults as people become frailer. Even a young, fit person can have a catastrophic disability result from a major injury.

Data on deficits for non-smokers, light smokers and heavy smokers shows that it is always better to be a non-smoker. Heavy smokers have more deficits at any age. Conversely, exercise leads to better overall cognitive outcomes. People who exercise have a lower risk of dying and less chance of getting worse. The mortality benefit of exercise—the increase in risk from not exercising—is highest among people with the least cognitive impairment. The mortality benefit attenuates, cognition does not.

A comprehensive geriatric assessment form enables providers to embrace complexity. All the information to complete a complex assessment is collected on a single page, so providers can tell the patient's current status and what has changed, at a glance. The assessment can help identify the need for a team approach, targeted assessment techniques to prevent complications, discharge planning to shorten length of stay, and better communication across the spectrum of providers.

Another aspect of prevention is not doing harm with high tech treatments against very high odds, without proper assessment or understanding the complexity of risk. We shouldn't expose people to interventions they may not recover from. One study found a 40% chance of poor outcomes for frail older adults with these interventions.

Does "inflammaging" represent a viable target for strategies to preserve or enhance independence in older adults?

Dr. George Kuchel, Professor of Medicine and Chief, Division of Geriatric Medicine, University of Connecticut Health Center; Travelers Chair in Geriatrics and Gerontology; Director, University of Connecticut Center on Aging

Two distinct research perspectives and communities on aging have emerged. One addresses aging from the health system point of view, focused on enhancing function and validating interventions, and one from the basic research point of view, focused on prolonging longevity and understanding mechanisms.

Inflammation has become a hot topic bridging these two perspectives, with a predictive role in clinical outcomes. Evidence of chronic, low grade inflammation is relatively common in older adults, with elevated levels of inflammatory markers such as interleukin-6 (IL-6), tumour necrosis factor (TNF-á), and C-reactive protein (CRP):

§ Elevated CRP is linked to mortality and poor cardiac outcomes.

§ Elevated IL-6 is linked to frailty, ADL impairment and cognitive decline

§ Elevated TNF-á is linked to frailty, cachexia (weakness and loss of body weight and muscle mass), malnutrition and mortality

Researchers in geriatrics stress the potential of these biomarkers as predictors of declines in mobility and cognitive performance. Inflammatory markers in the blood have been associated with virtually all chronic diseases of older age, including heart disease, type 2 diabetes, cancer, frailty, cognitive decline, dementia and osteoporosis.

The role of inflammatory markers has been linked to progressive disability, but very little research has examined inflammation and catastrophic disability. One study looked at an array of markers and found elevation in three or more raised the risk of incident fracture, which does not indicate catastrophic disability but is a good marker for it.

The term "inflammaging" was coined to reflect the relationship between inflammation and cellular processes intrinsic to aging. In younger people, inflammation is a positive, necessary response to protect against infectious disease and other damaging agents. In older adults, the immune system can become over stimulated and inefficient, so inflammation can become detrimental and contribute to many diseases.

One study investigated inflammatory responses following cardiac surgery to see which patients developed delirium and which ones did not. Six hours post-op, CCL-2 inflammatory molecules, which can disrupt the blood brain barrier, were elevated in individuals who became delirious. Researchers proposed that three risk factors led to

leakage in the blood brain barrier and delirium: advanced age, brain injury and opiate use, all of which are associated with increased CCL-2 levels.

The challenges of establishing cause and effect are the multiplicity of the risk factors in effect and the long time between exposure and outcome. If inflammation is identified as a risk factor, it may:

§ Be part of a driving force towards disability (so anti-inflammatory strategies may be desirable)

§ Reflect a compensatory response (so anti-inflammatory strategies may be undesirable)

§ Be an epiphenomenon (so anti-inflammatory strategies may be irrelevant)

Potential anti-inflammatory interventions can be pleotropic, having widespread effects across many cells and tissues, or targeted, with limited effects on fewer cells and tissues, and include physical activity, weight loss, hormones (low dose estrogen), vitamin D, fish oils (omega 3), antioxidants, anti-inflammatory medications, vaccination and specific cytokine antagonists.

A targeted intervention for incontinence in the frail elderly used modeling and pre-clinical tests to show urinary retention does not occur in animal models where the MIF gene is removed. MIF is implicated in the sequence of events leading to bladder muscle cell loss, detrusor under activity and incontinence. Testing is underway to see if targeted intervention strategies can alter the outcome, which could have implications for more complex geriatric syndromes. Small molecule MIF inhibitors could be the first orally available cytokine (proteins released by immune system cells) inhibitor.

Future directions to make progress in aging research need to include:

§ Dialogue among different disciplines

§ Multidisciplinary and inter-disciplinary research teams

§ A better definition of what constitutes proof

§ Population level research to identify clinically relevant associations

§ Basic and translational studies capable of defining mechanisms

§ Clinical trials capable of testing interventions

§ Risk factors for catastrophic disability

The traditional approach to translational research starts in a laboratory, moves to a clinical research centre, and then goes back to the community to disseminate. This approach doesn't work in geriatrics. A proposal for geriatric translational research should be circular instead, from defining population needs to addressing risk factors, discovering mechanisms, designing interventions, performing pre-clinical testing, conducting clinical trials, and conducting real world validation.

Exercise is the best medicine

Dr. Gareth Jones, Assistant Professor, Human Kinetics, University of British Columbia, Okanagan

Statistics Canada data found 62% of older adults were inactive, with men more active than women:

- 53% of men aged 65 to 74 were physically active or moderately active, almost the same as men aged 25 to 54 (51%)
- A smaller proportion of women aged 65 to 74 (42%) were physically active or moderately active
- Those 75 and older were the most inactive, which may be attributed to the physiological decline that reduces capacity to complete minimal levels of physical activity

Currently, 91% of people over 65 live with one or more chronic diseases, 40% live with disability, and the majority do not meet minimal recommendations for physical activity. Nevertheless, 78% of older Canadians report their health to be good or better. Since it is too late for disease prevention with much of the older adult population, we should instead consider how older adults could live better lives with chronic disease co-morbidities. Exercise prehabilitation and rehabilitation for those awaiting care can slow deficit accumulation and minimize the decrease in life expectancy associated with chronic disease.

Some older adults live close to frailty, where one catastrophic event can render them immobile and dependent. For example, recovery outcomes following a hip fracture are often not very good. Some loss of function, possibly due to inactivity or activity in adverse environments, precipitates a fall. With hospital rehabilitation, the patient may return home, but now uses a walker and does not reach the previous level of functioning. If function continues to decline, a second fall can occur, and then the patient enters a nursing home.

Frailty is present in the community as well as in nursing homes:

- 20-40% of of older adults in the community are robust
- 50% are pre-frail, with some characteristics of frailty and living on the edge
- 10-30% may already be frail but still living alone, likely with supportive care

Researchers have examined the link between fitness and functional limitations in older men and women with a variety of chronic conditions, including arthritis, cardiovascular disease and orthopedic problems. Results showed that factors other than pathology lead to functional limitation. In fact, a lack of cardiorespiratory fitness, muscle strength and morphology (including body composition, flexibility and bone density) in older adults was associated with loss of function.

Cardiorespiratory fitness is important in preventing cardiovascular disease and mortality, and exercise can attenuate functional decline and prevent frailty. Poor fitness causes

fatigue and difficulties with activities of daily living, while fitness improves function, which preserves independence.

A longitudinal study assessed factors related to loss of independence. The study found evidence that cardiorespiratory fitness is a critical determinant of developing dependency, even for people living with co-morbidities. Compared to the low fitness group, moderate fitness groups showed a 30% lower risk of dependence, and fitter groups a 40 to 50% lower risk.

So there is strong evidence for using exercise as treatment for the older adult population. Exercise is both prevention and therapy for most chronic diseases. Exercise is as effective as medication for all chronic diseases and, in some cases, may be more effective. Long-term exercise reduces dependency risk by 50% and improves functional capacity.

Physiological decline is often inevitable with aging, but the rate and magnitude differs among older adults. Once physiological capacity drops below the level required for independent living, the older adult becomes frail and vulnerable to disease and injuries. But prehabilitation aims to reverse or prevent frailty by developing the physiological capacity of older adults to withstand the inactivity of an acute medical event or treatment. Rehabilitation often occurs too late, after the treatment, when the patient no longer has the functional capacity to make a full recovery. Prehabilitation is needed to prevent the physical decline, increased health risk, and reduced potential to recover function in patients awaiting treatment. Early in vivo studies found animals that exercised had enhanced motor ability for recovery.

Frail older adults who require treatment are less likely to survive a medical procedure. Those who do survive experience more pain, a reduced quality of life, and a significant loss of functional ability. These patients often crowd emergency, block acute care beds and increase lengths of stay. Patients who prehabilitate have better outcomes. Recovery is more rapid and a successful return to previous functional levels is much greater. But the health care system has not adopted this early intervention model in geriatrics, even though athletes commonly use this approach.

A prehabilitation program should include cardiorespiratory, strength, balance and flexibility training, and be tailored to the individual to:

§ Use remaining physiological assets to help offset deficits like leg weakness, poor balance and stiff joints

§ Address medical problems like cardiovascular disease, diabetes and osteoporosis

§ Prepare the individual for treatment such as surgery or chemotherapy

Many older adults have unrecognized malnutrition, especially for nutrients that help preserve and build muscle. Consequently, prehabilitation can also include nutrition and supplements such as creatine, conjugated-linoleic acid, probiotics, vitamin E and other antioxidants. It may be beneficial for older adults to carry a little extra weight, rather than being too thin, because having energy reserves may provide some protection from functional decline.

From mid-life, regular exercise and good nutrition are needed to sustain levels achieved during peak growth and development. Ideally, people would prepare for treatments (prehabilitation) and recover from medical events (rehabilitation). The goal is to maintain or re-attain functional independence as long as possible. Exercise also preserves cognitive and sexual function as people age.

KEY DISCUSSION POINTS

Conference participants discussed the following topics with presenters:

§ *Identifying the role of inflammation in depression* – Evidence also links biomarkers with depression. Inflammation is defined as a local process, but with aging, it is more systemic. What is the source?

The underlying premise behind the inflammaging concept is the systemic nature of inflammation associated with aging. The challenge is that studies look at individual markers. IL-6 is produced in the liver, but the blood level is measured. It could be that what's going on in the liver tells us what's happening at the brain and muscle level, but what's happening in multiple places is unproven. Work into MIF could be relevant to the path of physiology, but it plays a different role in the brain.

§ *Clarifying the role of inflammation in delirium* – Surgery is associated with a huge inflammatory response, so why doesn't everyone get delirium in the bypass population?

It depends on whether or not the cytokine is produced that allows markers into the brain.

§ *Identifying research ideas* – Where would you start in bringing basic research and practice together?

Most importantly, any area of research—basic, clinical, community—begins with needs, so start by identifying what the community needs are and a primary goal, if there are multiple competing objectives.

§ *Conducting weight lifting research* – Have you ever done a project with weight lifting management?

No, but papers have been written on younger patients waiting for knee surgery who do have better outcomes with training. The problem with severe osteoarthritis in knee is pain. A couple of small studies have been done, but nothing definitive. People can't walk with a painful knee, but may be able to do another activity such as swimming or cycling to help them withstand surgery.

If hip patients awaiting surgery were involved in preparation for their treatment, it could improve their self-efficacy and outcomes, and they would already feel like they are in the system, not just waiting.

§ *Investigating whether prehabilitation might preclude need for treatment* – With enough research, preparing for treatment might **be** the treatment and should be required for surgery. Physicians ensure patients are *medically* stable prior to treatment. What if they also made sure patients were *physically* prepared?

Physicians could definitely be the gatekeeper and coordinate with other providers. A question arises with referrals. Physicians can be confident referring patients to physiotherapy and occupational therapy, but kinesiology doesn't have a college to oversee training. There is a problem with people working in gyms with training from all over the place. Efforts are underway to improve the quality of the training people obtain. The goal is to have geriatric physiologists to help with the prehab and rehab process, working alongside physiotherapists, occupational therapists and the care team.

BREAKOUT SESSIONS

Four breakout sessions at the *VITALiTY Research Workshop* gave participants an opportunity to:

§ Brainstorm issues related to the breakout topics with reference to preventing and/or minimizing risks that result in catastrophic disability in older adults.

§ Identify potential key areas of research study and knowledge gaps, as well as research collaborations needed to undertake these areas of study.

§ Identify intersecting issues connecting each of the research topics.

Prevention of cognition decline/dementia

Facilitator: Dr. Philip Lee, Assistant Professor, Department of Medicine, UBC; Physician, St. Paul's Hospital and Alzheimer's and Related Disorders Clinic, UBC

This group recognized the complex interplay between all of the factors discussed in the breakout sessions—cognition, mobility, mood and exercise—and focused on identifying the role of cognition and impairment in older adults.

Different levels of cognitive impairment include dementia, delirium, cognitively impaired but not demented, and mild cognitive impairment. Each may have unique characteristics offering research opportunities. Delirium can be experienced by the well and the frail, depending on how great an insult is experienced. Clinical barriers to implementing strategies include a lack of access to care, nursing and community support. Translational research needs to integrate clinical value for clients.

Research priorities will differ for target populations at risk:

§ *Healthy community dwelling older adults* – This is a good population to target, because they have the most to lose. Risks include genetic factors, vascular risk factors (diabetes, hypertension, stroke), medication (psychotropic drugs), alcohol, smoking, social isolation, physical inactivity and psychiatric illnesses. Older adults are more at risk for cognitive impairment, but strategies may be most important in younger ages to prevent downstream impairment.

Potential research areas:

- Research risk factors for cognitive impairment and dementia. There is a lack of information on non-pharmacologic interventions and no familiarity with studies that are managing long-term risk factors.

- Study the impact of interventions in preventing catastrophic disability, including young adult prevention of cognitive impairments (head injury prevention) versus older adult preventions.

- Investigate the downstream impact of vascular risk factors, diet, exercise and mentally stimulating activities (formal such as Brain Age, or informal such as card games and social interaction).

- Study the importance of social networking.

- Examine the use of this population as peer role models for change within the community.

§ *Frail community dwelling seniors* – Frail individuals are at risk for adverse outcomes. This group does not benefit from physiotherapy coverage, and needs a targeted intervention (compared to the previous group, which could receive a population level intervention.) Frail people include healthy older adults who experience a sentinel event and older adults who experience an event leading to death.

Potential research areas:

- Define and measure frailty.

- Test targeted interventions such as the impact of physiotherapy on overall health.

- Develop a better understanding of what is defined as healthy living.

§ *Acutely ill seniors* – Contributing factors for cognitive decline in this group include delirium, a lack of social support, iatrogenic interventions in the emergency department, and medications. The consequences of cognitive decline can include safety issues and self-neglect.

Potential research areas:

- Evaluate the impact on outcomes of the delirium watch at Peace Arch Hospital, which identifies risk factors for delirium from the time a patient enters emergency.

- Identify the baseline for frail seniors.

- Examine prevention strategies for delirium.

- Evaluate the impact of using the comprehensive geriatric assessment form (see page 6).

- Study ways to decrease length of stay in acute care.

§ *Seniors in assisted living or residential care* – 80% of the seniors in this group are demented. Their average length of stay is 14 to 18 months. Some consequences include greater caregiver stress, decreased quality of life, and an underestimation of quality of life. Consequently, improving quality of life is the most important strategy. Avoiding unnecessary hospitalization is also important.

Potential research area:

- Investigate strategies to improve communication and documentation between the care home and emergency.

Prevention of diminished functional mobility

Facilitators: Dr. Maureen Ashe, Assistant Professor, Department of Family Practice, UBC; Investigator, Centre for Hip Health and Mobility; and Dr. Ken Madden, Assistant Professor, Geriatric Medicine, Department of Medicine, UBC

Mobility is often, though not always, synonymous with ambulation. For someone confined to bed or someone using a wheelchair, mobility may have a different definition. Being able to travel by car or bus is another component of mobility for some people. Concentric "spheres of mobility" may encompass a bed, a room, a household, a neighbourhood, and so on. This group identified some causes of immobility as adults age:

§ Emotions such as fear of falling or depression that may limit activity.

§ Social exclusion or the breakdown of social or family networks. Excluded people may choose to leave home less frequently, or have fewer opportunities to go out.

§ Lifestyle choices that lead to a sedentary lifestyle.

§ Complications due to chronic disease. For example, heart disease may lead to chest pains during vigorous walking, so a person may reduce mobility out of fear of experiencing chest pains. Or osteoarthritis or peripheral nerve damage from diabetes may make walking painful or difficult.

§ Environmental factors such as the availability of public transportation and walking paths or feeling safe leaving home.

§ Reduced physiological capacity and cardiorespiratory fitness.

Several standardized tests are available to measure mobility including Timed Up-and-Go (TUG), the six-minute walk test, and the Berg Balance Scale. In addition, experimental tests use the Global Positioning System (GPS) to measure mobility. In general, these tests give an accurate measure of mobility when used appropriately. Researchers must be careful to match the test to both the subjects and the research question. There are no measures designed to test mobility in a complex environment such as a rocky path.

§ *Bridging research between the lab and clinic* – It is important to define the goal of the test before choosing a particular tool. Many research studies use mobility tests that would be impractical in the clinical setting, and most mobility tests are not designed with acute care patients in mind. Consequently, there is a need for better communication between acute care and outpatient settings.

Potential research areas:

- Develop a common definition of mobility.
- Develop tools for measuring mobility in a useful, clinically predictive fashion in acute care and outpatient settings.
- Assess the role of environment and physiological reserve in causing immobility.
- Investigate the interaction of geography and medical/clinical outcomes.
- Examine how people function in various "spheres of mobility" in life (i.e., bed, home, community, hospital) and develop ways to measure across the range of mobility. (Be cautious in extrapolating the results of a mobility test outside of its natural sphere of mobility.)
- Look for outcomes that are applicable and useable in research and clinical settings (easy to administer, easy to understand and easy to interpret).
- Determine the existence of literature with a focus on a systematic review of mobility measures e.g. published work of D. Vicky Scott on a systematic review of mobility assessments for falls prevention across the continuum. In the absence of satisfactory literature findings, conduct a systematic review of mobility measures, both performance-based and self-reported tests. Look at existing databases (CCHS 4.2 and CLSA).
- Conduct a national survey of what is being used by health professionals to measure mobility as a means to address outcomes that can be used across the continuum. Identify knowledge gaps to address in future research.

Impairments in mood and the impact on cognition and mobility

Facilitator: Dr. Rishi Bhalla, Neuropsychologist, Vancouver General Hospital

The contribution of mood to risk for catastrophic disability is an evolving area. Mood is a critical factor in motivating people to exercise. However, mood is rarely asked about during geriatric assessments. Health care professionals tend to focus on solving problems with disability, disease or illness, and mood does not get addressed. Yet mood is often an overarching theme that overlays physical problems. Rates in literature suggest 15-30% of elderly individuals have clinically significant depression, and the rate goes up to 50% for seniors in nursing homes or hospital. This group identified several areas for study related to mood, cognition and mobility:

§ *A lack of screening tools* – Identification and screening tools linking mood, cognition and mobility are lacking. Providers have limited time in most health care settings to deliver screening tools. As a result, physicians often decide to medicate older adults experiencing depression, anxiety or other mood symptoms, but this might not be the most beneficial tool, and can increase risk for falling and other medical issues. In addition, follow up of medication management is lacking.

Potential research areas:

- Investigate screening tools to identify emotional components as stressors. Look for screening tools any health care provider can employ, using a public health approach, rather than relying on specialist intervention.

- Assess the potential to build on primary health care chronic disease self-management by asking questions about mood and anxiety as co-morbidities.

- Investigate early detection of subsyndromal states to support early intervention.

- Examine the impact screening for mood, depression and anxiety in primary and acute care. Find out what evaluation is useful.

§ *Person-oriented care is the best model* – Care needs to be tailored to personal needs and goals, rather than global policies that apply to all patients.

Potential research areas:

- Investigate models designed to tailor information to vulnerable individuals that can be adapted to support patients dealing with mood and emotional issues.

- Examine how person oriented care impacts further treatment. (For example, a patient with cognitive impairment or depression who suffers a hip fracture may be sent to a nursing home rather than acute rehabilitation. Does person oriented care result in treatment that is the best fit?)

- Study whether person oriented care affects participation in physical activity, by designing exercise programs based on personal interests.

§ *Health care literacy* – Literacy about mood and emotional problems needs to be improved to help address the lack of time facing providers, help professionals identify the link between mood, mobility and cognition, educate the public, and reach different cultural groups.

Potential research areas:

- Examine proven techniques used in cardiovascular research with heart attacks and stroke. Identify ways to build similar literacy for mood and cognition. For example, people may just brush off a fall and not follow up with their physician, but the fall may not be a random event.

- Explore using the BCNAR website and advertising to educate the public about mood, cognition and mobility, similar to the way people learn what to do for a heart attack or stroke.

- Find out where best practices are happening and see if they can be expanded to other areas.

- Investigate culturally sensitive ways to educate different groups and minimize the stigma associated with mood and emotional issues in some cultures.

- Examine the potential to use trained volunteers to educate other older adults, such as the model used by the White Rock medication project and brain injury and stroke groups.

§ *Need for action research* – A lot of intervention studies have been done in silos, but have not been translated into action.

Potential research areas:

- Create multidisciplinary, inter-professional research teams to collaborate on intervention studies.

- Conduct action research that is generalizable and can change the system. Given the shortage of human resources in health care, include a range of practitioners on the research team—physicians, nurses, social workers, physiotherapists, occupational therapists and well-trained volunteers.

- Build on existing research showing a link between depression and cognitive impairment. Investigate what leads patients to decline and what interventions can make a difference.

- Examine the incidence of Post Traumatic Stress Disorder in patients who have falls, and systemic methods to address the trauma.

Exercise and leisure activities for risk factor reduction

Facilitator: Dr. Teresa Liu-Ambrose, Assistant Professor, Faculty of Medicine, Department of Physical Therapy, UBC

This group questioned whether current research literature can be generalized to the broader population, since so many studies are based in specific settings/populations

Exercise needs to begin in childhood and continue throughout the lifespan to most effectively reduce risk factors in older adults. If physical activity is introduced to children and continued through adulthood, many of the conditions we treat in older adults could perhaps be prevented or be less severe. Strategies are needed to engage youth and children in regular physical activity, because people are more likely to continue exercising when they begin young.

A number of gaps were identified, with strategies to address these areas:

§ *Barriers to the uptake of physical activity among seniors* – Barriers include low self efficacy and fear, family members worrying that activity may increase the risk of a fall or fracture, a lack of financial resources to participate in programs, no transportation to and from programs, ageism, cultural perceptions, misinformation regarding physical activity, and environmental issues such as cracks in sidewalks or poorly lit areas that do not encourage walking.

Potential research areas:

- Study the impact of implementing minor but evidence-based changes (such as the types of services available through the Saskatchewan Aids to Independent Living, or SAIL program, and providing caregivers with education on falls and basic exercises)

- Early detection of risk factors for falls among healthy senior and identification of risk factors among those with dementia and cognitive impairment. Can better education about falls lower risk for future events? Integrate the family physician with the specialized medical team (i.e., geriatrician) as the GP is more accessible to the patient. (Not so much a research area as a point for health care system delivery)

- Identify gaps in primary fracture prevention and conduct research is needed in the area of secondary fracture prevention.

- Assess the impact of better health policy and funding for programs on overcoming the barrier of financial cost.

- Identify misinformation, ageism and cultural differences and the impact of providing accurate education and setting realistic goals.

- Assess the impact that urban planning can have to reduce barriers and promote activity in the community.

§ *Developing outcome measures* – Better, more clinically-based outcome measures are needed to move research from the lab into the home. In addition, researchers and clinicians need access to provincial statistics to help identify community needs, and as indicators of how well those needs are being addressed.

Potential research areas:

- Conduct a systematic review or survey to determine what outcome measures, standardized tools and function tests clinicians and researchers are currently using and why. *Are* standardized tools, measures and tests commonly used? Which are the most valid and reliable

- Investigate why other models of disease-specific management are effective. For example, cardiac rehabilitation programs have high adherence, as do recommendations and programs for individuals experiencing memory loss. What can be learned and applied to other conditions, in particular, falls and fractures. What messaging is used?

- Research the transitions from acute to community and community to acute.

- Examine the impact of integrating community-based resources such as home care, physiotherapy, occupational therapy, and support for family caregivers on health and acute care utilization.

§ *Providing better public education* – Prevention, education and support are needed at the individual, family, and community levels to increase the awareness of the

significance of mild events (e.g., falls) and to optimize health and prevent/minimize both major and minor falls.

Potential research areas:

- Research and develop the current Brain Gym® brain-body fitness program for older adults as a self-management program for chronic health conditions (www.braingym.org).

- Investigate the mentoring approach used in the Giving Back Mentoring® program in Maui, Hawaii, which trains senior volunteers as mentoring partners of elders in care facilities and community programs. (Visit www.givingbackmentoring.org.) Review the University of Hawaii's evaluation of program-related improvements including fall and injury prevention, and Maui health authorities' analysis of averting health costs.

VITALITY RESEARCH PRIORITIES

Moderator: Dr. David Hogan, Professor of Medicine, University of Calgary, and Brenda Strafford Foundation Chair in Geriatric Medicine

Following the presentations and breakout sessions, workshop particpants discussed the importance of distinguishing between catastrophic and progressive disability, and noted the dearth of research on catastrophic disability. Participants identified the opportunity to coordinate research across health regions and the continuum of care, within a quality improvement framework, to maximize impact. Interdisciplinary teams should be created to conduct research that focuses on both quick wins and longer term results. Research should examine shared risk factors for mood, cognition and mobility, and identify preventive and early intervention strategies.

Particpants identified five priority areas for research that emerged during the workshop. Each priority area includes more detailed research topics:

Investigate prevention and early intervention strategies to prevent the cascade to progressive and catastrophic disability

§ Examine prevention and early intervention for older adults in the community and those in hospital

§ Identify ways to prevent or mitigate the decline in health that often occurs in acute care settings

§ Investigate the synergism of factors that lead to catastrophic decline

§ Examine the transitions between home, acute care and residential care

§ Examine the impact of implementing a dementia pathway

Some observations on this research priority from the presenters and workshop participants include:

- Why was "catastrophic disability" used for this workshop? Why not just disability? A lot of the discussion seemed to be about progressive disability. We heard there is little research on how to prevent catastrophic disability.

- Catastrophic creates a picture of a high insult versus a progressive decline.

    - In the home and community care sector, one reason to look at catastrophic disability is that an older adult can become catastrophically disabled in an acute care setting, when they did not start that way. For example, someone goes to emergency after a fall and ends up in residential care, when they were walking around the seawall at the time of the fall. We have alot of work to do in this area.

    - Researching ways to keep people more functional upon discharge home from acute care - ways to maintain/improve function in different settings e.g. at home, in residential care etc.

- Catastrophic disability is an acute decline in functional state, noticeable and not reversible. We see people coming into acute care in a premorbid state and that's where failure occurs. We do not recognize the synergism of predisposing factors leading to catastrophic decline, so they are sometimes not addressed early on or managed.

- Catastrophic disability is not being addressed in the literature, but was identified a long time ago. It is not easy to study and a huge gap to take on. However, responsibility lies with us to figure out how to address the problem if this happens in a hospital setting. We provide great medical care, but don't pay attention to iatrogenic issues, like not getting people out of bed the first day.

- The older adult population that comes into emergency has deficits. They may arrive with pneumonia, become dehydrated, then the kidneys go, and a cascade happens. If we intervene early, maybe we can stop the cascade.How can we identify people in the community and take steps to prevent the cascade?

- The system needs prevention and early strategies that give people tools to prevent cognitive decline, and tools to improve mobility and muscle strength to help prevent catastrophic events.

    - We should call the discharge issue a transition from acute to home, and look at care that consumers don't want or need and that don't help.

- Sometimes catastrophic disability is the event that leads to death. Physicians are uncomfortable doing nothing. We need education around catastrophic terminal events to talk about palliative care, not aggressive treatments.

Conduct action research to develop translational evidence

§ Investigate opportunities to adapt successful models from other areas (e.g., using trained peer volunteers like the *Knowledge is the Best Medicine* program in White Rock, and cardiac rehabilitation and health literacy initiatives)

§ Focus on quick wins and longer term results

§ Conduct research within a quality improvement framework

Some comments on this priority include:

- Let's push for action research to move toward a different way of thinking. The risk of catastrophic disability in acute settings makes it the perfect place to do action research, taking a quality approach. We need to be careful with our research orientation, and not look at randomized trials or a program or an article few will read. Our orientation is to episodic care, and action research will help us understand that an event is a point along a continuum.

- Quality improvement linked to research can change one part at a time. The methodology needed for this approach will be very different than traditional research.

- The *Knowledge is the Best medicine* group in White Rock was a fabulous intervention. A pharmacist went home with seniors to review medications when they were discharged, and seniors were trained to educate other seniors about medications at meetings. People ended up on more relevant, safe drugs, and emergency visits and admissions were significantly reduced.

- We should think of research like an apple orchard. Sometimes fruit takes years to grow, and sometimes the low-lying fruit is harvested. We have to do both: plant trees and harvest to deal with this crisis. Studying risk for catastrophic disability from the provider perspective is the low lying fruit, and studying risk from the public health and policy perspective is the tree planting.

- We need research that gives us the best evidence to use toward quality improvement. A lot of work in the health authorities focuses on efficiency. Without evidence, we can do more harm than good.

Map shared risk factors for mood, cognition and mobility

§ Identify areas of overlap and opportunities to work together

§ Research the impact of exercise on reducing risks

§ Investigate delerium prevention

Some observations on this research priority include:

- A lot of risk factors are shared among mobility, cognition and mood, so we can look for ways to maximize the overlap.

- Physical inactivity is a risk factor for mood, cognition and mobility. Medications and social isolation can have a negative impact on motivation to exercise.

- Try to map out the predisposing factors for catastrophic disability.

One way to prevent delirium is to get people out of bed quickly, which is also good for mobility and mood.

  - Having different interventions for impaired cognition, mood and mobility is too much. We need to pull together and figure out what cuts across.

- How do you take exercise studies done with selective samples and generalize as a factor in risk reduction? Are these studies applicable to the general population?

- Would pleotropic interventions, prehabilitation and rehabilitation cover mood, cognition and impaired mobility?

Create interdisciplinary, inter-professional research teams

§ Broaden VITALiTY participation to include nurses and population health researchers

§ Engage the spectrum of health care providers to work with geriatricians and participate in research

Some observations on this priority include:

- We don't have the full interdisciplinary team here today and without any population health colleagues.

- To have an impact on the older adult population, we have to look at a research model that will work in different settings with all providers, not just geriatricians.

- The only people who embrace complexity are geriatricians. With so few of us working in Integrated Health Networks, how can we develop programs to help general practitioners get the ball rolling?

- We don't have enough nurses at this workshop, but do have allied health representatives.

- VGH has produced some evidence that having a geriatric triage nurse in emergency makes a difference in identifying people and following up. Emergency is enhanced by having a multidisciplinary group. Social workers are part of the team too.

- Whatever is done has to be leveraged to mobilize seniors and engage other practitioners. Most of the work will have to be done by others (healthcare professionals_and will change their practice.

Coordinate research across health authorities and the continuum of care

§ Conduct plan-do-study-act (PDSA) rapid change cycles across the continuum

§ Perform a SWOT (strengths, weaknesses, opportunities and threats) analysis

§ Include home care, community care, primary care, emergency care, acute care and social support systems

Some comments on this research area include:

- We are looking at modifying existing processes for just-in-time delivery of care, in a quality improvement framework with rapid cycling technology to test changes.

- It is important to do a SWOT analysis. What's unique here is a regionally coordinated health care system. The US does not have this system. Preventing catastrophic disability will save money.

- Health authorities in BC are relatively new and taking a continuum approach is still not in place. We need to look at the journey of a person as a whole, not in silos, from community care, primary care, emergency and mental health to prevent a downward course. It takes a culture shift to think of care across the continuum, and geriatrics has the best opportunity to do this first. Then we need to focus on PDSA cycles using evidence around the patient journey, not just in one setting.

- To have an impact at the population level on disability, our audience includes primary care, emergency and acute care.

- We also need to include social systems, parks and recreation, and community organizations in prevention.

APPENDIX

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