



Berzelius symposium 88

Personalized Geriatric Medicine

Improving prevention, assessment and management of multimorbid elderly people

20–22 August 2014 in Stockholm · Sweden

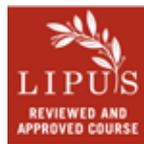
Programme · General information
Poster abstracts · Lectures abstracts



Svenska
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The symposium is under the Patronage of
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The symposium is granted 16 European CME credit (ECMEC) by the European Accreditation Council for Continuing Medical Education, EACCME®



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**Karolinska
Institutet**

The symposium is arranged by the Swedish Society of Medicine in cooperation with the European Union Geriatric Medicine Society
The Swedish Association of Geriatric Medicine | Karolinska Institute | The Swedish Research Council

Programme

Wednesday, 20 August 2014

09.00 Symposium registration

09.30–10.00 **Formal opening.**

Simon Kyaga, Scientific secretary of the Swedish Society of Medicine

Welcome and introduction.

Gunnar Akner, chair, organizing committee

10.10–12.10 **Theme: The predicted age quake**

Moderator: *Desmond O'Neill*, Dublin, Ireland

Discussant: *David Reuben*, Los Angeles, USA

Three state-of-the-art-presentations:

- **Demography.** *Laura Fratiglioni*, Stockholm, Sweden
- **Gerontology vs Geriatric Medicine.** *William Hazzard*, Winston-Salem, USA
- **The situation in Japan.** *Ken Toba*, Nagoya, Japan

Discussion

12.10–13.00 **Pressconference in the Clubroom, 3rd floor**

12.10–13.10 LUNCH

13.10–17.00 **Theme: Prevention in elderly people**

Moderator: *Alfonso Cruz Jentoft*, Madrid, Spain

Discussant: *Yngve Gustafson*, Sweden

Three state-of-the-art-presentations:

- **Frailty as a phenotype.** *Christine Ritchie*, San Francisco, USA
- **Screening for frailty.** *Hidenori Arai*, Kyoto, Japan
- **Integrative risk approach.** *Linn Getz*, Trondheim, Norway

COFFEE / TEA is served in the dining rooms at 2nd floor

15.00–17.00 **Workshops.** The workshops will give all participants an opportunity to discuss the themes and lectures in smaller groups. More information about the groups and rooms is available outside the lecture hall.

19.00 **Reception at the Stockholm City Hall** hosted by a member of the Presidency of the City Council and co-hosted by Stockholm's County Council.
Address: Hantverkargatan 1

Joint walk! We will meet in the lobby at the SSM at 18.15 for a joint walk from the SSM to the City Hall.

Thursday, 21 August 2014

09.00–12.00 **Theme: Diagnostics and management/care of individual elderly multimorbid people over time**

Moderator: *Kaisu Pitkälä*, Helsingfors, Finland

Discussant: *Masahiro Akishita*, Tokyo, Japan

Five state-of-the-art-presentations:

- **Case presentation:** *Gunnar Akner*, Örebro, Sweden
- **Comprehensive Geriatric Assessment (CGA)** *Tbd*, UK

10.00 Coffee / Tea

- **How much do we need to assess?** *Olav Sletvold*, Trondheim, Norway
- **Adverse drug reactions.** *Alfonso Cruz Jentoft*, Madrid, Spain
- **Remote monitoring.** *Hidenori Arai*, Kyoto, Japan

Discussion

12.00–13.00 LUNCH

14.00–17.30 **Theme: Continued**

Moderator: *David Reuben*, Los Angeles, USA

Discussant: *Hidenori Arai*, Kyoto, Japan

Three state-of-the-art-presentations:

- **Scientific basis for treatment.** *Gunnar Akner*, Örebro, Sweden
- **CGA vs. Comprehensive Geriatric Management and Rehabilitation.** *Yngve Gustafson*, Umeå, Sweden
- **Evaluation over time.** *Kaisu Pitkälä*, Helsingfors, Finland

COFFEE / TEA is served in the dining rooms at 2nd floor

14.50–17.00 **Workshops.** The workshops will give all participants an opportunity to discuss the themes and lectures in smaller groups. More information about the groups and rooms is available outside the lecture hall.

19.00 Conference dinner at the Swedish Society of Medicine
The conference dinner is open to participants who have registered within the stipulated time.

Friday, 22 August 2014

09.00–12.10 **Theme: Organization and quality management of elderly care**

Moderator: *William Hazzard*, Winston-Salem, USA

Discussant: *Ken Toba*, Nagoya, Japan

Five state-of-the-art-presentations:

• **Geriatric based organization of health care.**

Christine Ritchie, San Francisco, USA

• **The geriatric team:** *Alfonso Cruz Jentoft*, Madrid, Spain

10.00 Coffee / Tea

• **Education / training:** *Desmond O'Neill*, Dublin, Ireland

• **Quality control?** *Masahiro Akishita*, Tokyo, Japan

• **Geriatric Medicine in academia and/or health care.**

David Reuben, Los Angeles/USA

12.10–13.10 **LUNCH and discussion**

13.10–13.25 **Summary of discussions**

13.30–14.45 **Theme: Four personal opinions "Suggestions for the future regarding high quality management and care for the elderly"**

13.30–13.45 *Alfonso Cruz Jentoft*, Madrid, Spain

13.50–14.05 *Hidenori Arai*, Kyoto, Japan

14.10–14.25 *Desmond O'Neill*, Dublin, Ireland

14.30–14.45 *William Hazzard*, Winston-Salem, USA

14.45–15.00 **Final remarks and future plans.** *Gunnar Akner*, Örebro, Sweden

General information



The Society's building in Stockholm

When & Where?

20–22 August 2014 at the Swedish Society of Medicine (SSM), Klara Östra Kyrkogata 10 in Stockholm, Sweden.

Lunches and coffee are included in the participation cost and will be served in the on-site restaurant at the SSM.

Press Conference

Wednesday 20 August at 12.10–13.00 in the Clubroom, 3rd floor. For more information please contact Agneta Davidsson Ohlson agneta.ohlson@sls.se

Organizing Committee

Gunnar Akner, Yngve Gustafson, Carina Metzner and Per Tornvall.

Symposium Coordinator

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The conference Hall

Social programme

Wednesday, 20 Augusti 2014 at 7 p.m (sharp!):

Reception at the Stockholm City Hall. Address: Hantverkargatan 1. The city of Stockholm and the Stockholm County Council invite you to a buffet dinner. The Reception is free of-charge and open to participants who have registered within the stipulated time.



Thursday, 21 August 2014 at 7.p.m: Conference dinner at the SSM. Price: 500 SEK. The conference dinner is open to participants who have registered within the stipulated time.

Symposium website

www.sls.se/Utbildning/Berzeliussymposier/geriatricmedicine/

Speakers

Professor Masahiro Akishita

Department of Geriatric Medicine, University of Tokyo, Japan

Professor Gunnar Akner

School of Health and Medical Sciences, Örebro University, Sweden

Professor Hidenori Arai

Department of Human Health Sciences
Kyoto University Graduate School of Medicine, Kyoto, Japan

Professor Alfonso Cruz-Jentoft

Geriatric Unit, University Hospital Ramón y Cajal, Madrid, Spain

Professor Laura Fratiglioni

Department of Neurobiology, Care Sciences and
Society Karolinska Institutet Stockholm, Sweden

Professor Linn Getz

Dept of Public Health and General Practice
Norwegian University of Science and Technology, Trondheim, Norway

Professor Yngve Gustafson

Department of Community Medicine and Rehabilitation
Geriatric Medicine, Umeå University, Sweden

Professor William Hazzard

Division of Gerontology & Geriatric Medicine
Wake Forest School of Medicine in Winston-Salem, NC, USA

Professor Desmond O'Neill

Centre for Medical Gerontology, Trinity Center, Dublin, Ireland

Professor Kaisu Pitkälä

Department of General Practice and Primary Health Care
University of Helsinki, Finland

Professor David Reuben

Division of Geriatrics, UCLA Medicine, Los Angeles, USA

Professor Christine S Ritchie

Department of Medicine, Division of Geriatrics
University of California San Francisco, USA

Professor Olav Sletvold

Department of Neuroscience
St. Olavs hospital, Trondheim, Norway

Professor Ken Toba

National Center for Geriatrics and Gerontology, Nagoya, Japan

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Which methods for quality management and control are most appropriate for frail, multi-morbid people?

Masahiro Akishita, MD, PhD, Professor, Department of Geriatric Medicine, Graduate School of Medicine, Vice Director, Institute of Gerontology, The University of Tokyo

Frail, multi-morbid people are at higher risk of adverse outcomes in acute care hospitals, long-term care facilities and at home. These include functional decline, falls, delirium, pressure ulcers, and (re)admission to hospitals, but occur inconsistently among frail older people and may be preventable in some case. This indicates the importance of personalized assessment and care as well as quality management and control by facility and healthcare system. The latter has also been emphasized in international policy documents by EU.

A lot of quality indicators (QIs) have been developed for geriatric care and used in various settings. Nonetheless, most of them are based on comprehensive geriatric assessment and consist of functional aspects, geriatric conditions and safety indicators. Accordingly, combined but simple assessment of the three domains may be appropriate for universal use. Although I do not have the answer to the question, I will briefly review the literature, introduce our related data and discuss about this topic

Scientific basis for treatment

Gunnar Akner, MD, PhD, Professor in Geriatric Medicine at Örebro University, Associate Professor in Geriatric Medicine at Karolinska Institutet, Stockholm

The scientific basis for treatment of elderly patients aged 65 and over can be viewed in different ways:

- Results of randomized controlled trials (RCT) in single diseases, such as cardiac failure or dementia of Alzheimer type. This is done in principle by randomly allocating individual patients to two groups, where one group is exposed to a defined treatment method, for example a medical drug, for a certain time period, while the other group receives a placebo. The procedure should be performed in a double-blind way, so that neither the patients nor the researchers know which patient receives the active drug and who receives placebo. This type of trials provide evidence for how to treat individual diseases.
- Results of RCTs comparing care units that treat elderly people with different mixes of health problems, for example departments in hospitals, rehabilitation facilities, community home care programs, nursing homes etc. In this case, the purpose is not to compare the results of treatment of individual people, but rather compare different care giving units. This type of trials provide evidence for how to organize health care.

Both these type of treatment studies rest on the assumption that it is possible to randomly allocate patients or care units to different groups and consider the groups similar regarding various basal characteristics as well as 'potential reversibility' (treatability).

It is difficult to control for many variables by stratification and impossible to control for 'potential reversibility'.

Given the premise that elderly people often have multiple chronic conditions (multi-morbidity) and multiple treatments, it is difficult to know that the groups are really comparable at baseline.

In 2003, the Swedish Council on Health Technology Assessment (in Swedish: SBU) published a report entitled "Evidence based elderly care. An inventory of the scientific basis". The report summarized published treatment trials up to 2001 in patients aged 65 and over for 18 individual diseases and conditions known to be particularly common in elderly people. For a few areas such as dementia of Alzheimer type and stroke, the scientific literature was large enough to allow a formal evaluation, however, for most areas, there were only few published treatment trials. The authors concluded that care for elderly people to a large degree rests on extrapolation of results from treatment trials in younger patients, experience and local treatment traditions.

Screening for frailty: How to handle the results?

Hidenori Arai, Department of Human Health Sciences, Kyoto University Graduate School of Medicine

In Japan, the prevalence of older adults is over 25%, which is the highest on earth and the number of frail elderly people has increased rapidly during the past several decades. Frailty is increasingly prevalent with advancing age, and is characterized by impaired physical performance, malnutrition, cognitive impairment, isolation, and so forth. The development of frailty results in a spiral of decline that leads to an increased risk of adverse health outcomes such as disability, admission to hospital or nursing homes, and death. Because of these adverse health outcomes, frailty has a huge impact on our society; therefore, if we can attenuate the prevalence and severity of frailty, it will have large benefits for our society. Our country started to screen frail elderly by the frailty checklist in 2006, consisting of 25 items, based on the Japanese long-term care insurance system. In this symposium, I will discuss how we can use the frailty checklist to screen frail elderly and what we can do to prevent their functional decline.

Is there a role for remote monitoring and evaluation in elderly care?

Hidenori Arai, Department of Human Health Sciences, Kyoto University Graduate School of Medicine

In Japan the mean life expectancy is approximately 84 and we have more than 30 million elderly. According to the aging of our society, more than five million elderly are living alone in Japan and many of them have a geriatric syndrome, such as a cognitive or physical impairment and require care. Information and communication technology (ICT) is a means to cope with the increasing number of patients with disability or chronic diseases in our aging society. As a means of improving efficiency of home care of the elderly, ICT is becoming popular in healthcare for delivering accessibility to healthcare for people with chronic illness living at home. It is useful for communication between patients, family members and healthcare professionals. Because the use of ICT applications in home care is an expanding research area, I will introduce iPad-based communication tools among health care professions and telecommunication systems to educate diabetic patients and dementia patients.

Adverse drug reactions: How can they be identified and prevented?

Alfonso J. Cruz-Jentoft
Hospital Universitario Ramón y Cajal
Universidad Europea de Madrid
Madrid. Spain

Adverse drug reactions (ADR) are an important healthcare problem in older adults. They occur in more than 15% of older patients in any health care setting, and are a frequent cause of hospital admission, morbidity and mortality. ADR in older people may not be different than those that appear in adults, but some ADR seem to be characteristic of old age, including falls, delirium or cognitive impairment, functional decline, or orthostatic hypotension. At least half of the usual ADR are considered to be preventable.

Older adults are particularly susceptible to ADR. Polypharmacy and the prescription of inappropriate medications are frequent in older people, specially in those with high levels of comorbidity and functional impairment, and may contribute to ADR. Age-associated changes in homeostasis, pharmacokinetics and pharmacodynamics also contribute to errors in drug prescriptions that are responsible for ADR, increased mortality, and repeated hospitalizations.

Identification of ADR and detection of patients at high risk is not easy, as the presentation of ADR may be atypical or modified by comorbidity. The GerontoNet ADR Risk Score has been developed to identify patients at risk, but it has low sensitivity and specificity, a new version is under way.

Many interventions have been explored to improve the quality of drug prescription, and reduce ADR and ADR related adverse outcomes in different geriatric settings, including review of prescriptions by physicians or pharmacists, multidisciplinary assessment, computer interventions, and educational interventions, with inconsistent results.

The use of explicit criteria in the prevention of ADR is an active area of research nowadays. However, versions of the widely used Beers criteria published up to 2003 have failed to show a consistent relationship with ADR (this may be overcome by the most recent AGS supported version). The European STOPP/START criteria have a higher ability to predict ADR, specially preventable ADR, and some pieces of evidence show their systematic use may be able to reduce the incidence of ADR. A recent multi center trial in nursing homes showed that an educational intervention based on STOPP/START criteria was able to reduce ADR related outcomes (delirium, falls, use of health care resources). A large multi-center EU funded study (Senator) is under way to test if the new version of these criteria, embedded in the hospital prescription software, can prevent ADR in hospitalized older patients.

The effects of medications in older adults are not often properly studied in clinical trials. The European Medicine Agency is now exploring how to include complex patients with multimorbidity in clinical trials. In the future, this initiative may also improve the quality of the evidence available on how to use drugs safely in such patients.

The geriatric team

Alfonso J. Cruz-Jentoft
Hospital Universitario Ramón y Cajal
Universidad Europea de Madrid
Madrid. Spain

Every geriatrician states that working in a multidisciplinary geriatric team is a basic aspect of geriatric care, and one that makes Geriatrics different to other disciplines. This idea was developed in the eighties; however, little research has been performed on the composition, roles, education and organization of geriatric teams. The key elements that may explain improved health care outcomes compared with usual care are largely unknown.

Geriatric multidisciplinary teams seem to be different in different countries and in diverse geriatric care settings. A “usual” geriatric team -if such a thing exists- would generally have at least geriatricians, nurses and social workers. Other health care providers that may be part of such teams include other physicians (family medicine, rehabilitation, internal medicine, psychiatry...), nutritionists/dietitians, therapists (physio, occupational, speech), psychologists and pharmacists. Specific multidisciplinary approaches have been explored in cooperation with other specialties (cancer, orthopedics) or diseases (heart failure).

Geriatric acute or subacute wards seem to host the largest and most diverse teams; consultation/mobile teams are usually smaller; teams in rehabilitation wards tend to adapt to the needs of their patients; outpatient geriatric clinics may be very simple or host a wealth of professionals. No standard recommendations from international organizations have defined the optimal composition of teams based on the expected outcomes that have to be obtained or the population served.

We, as geriatricians, may need to reflect on multidisciplinary approaches and team work with other professionals, if we still consider this to be key to the success of Geriatric Medicine.

An integrative approach to risk and multimorbidity in the elderly

Linn Getz, MD, PhD, Professor, Dept. of Public Health and General Practice,
Norwegian University of Science and Technology, Trondheim, Norway.
E-mail: linn.getz@ntnu.no

The aim of personalized medicine is, for any age, to base medical prevention, therapy and rehabilitation on the unique health and disease susceptibility profile of each individual. It is then important to realize that knowledge of a person encompasses both biological and biographical perspectives. The latter includes significant events and experiences throughout the lifespan. Such a comprehensive approach to personal health finds support in data on disease clustering and multimorbidity in general populations; disease clusters typically defy not only diagnostic categories within the 'somatic' and 'mental health' domains respectively, but also transgress the dichotomy between these. Furthermore, adverse life experiences have substantial impact on the disease burden later in life. Consequently, the phenomenon multimorbidity might to a certain extent be considered an artifact of the reigning biomedical classification systems (sometimes referred to as medical "silo" thinking). From a clinical perspective, this interpretation poses a radical critique to current evidence-based medical guidelines which have come to dictate a fragmented approach that typically culminates in polypharmacy for which there is little evidence of effectiveness, but indications of potential harm. What is clearly needed in relation to multimorbid and fragile patients, is a scientifically sound, integrative approach where the human being can be regarded as an emergent and dynamic meaning-seeking whole person, as opposed to a carrier of numerous diagnoses and risk factors. For this purpose, the basic science concept allostasis (gr: stability through change) appears helpful. Allostasis refers to the living organism's physiological ability to guard its integrity (a concept with wide relevance, ranging from life's existential challenges to cellular homeostasis) in the face of challenges and stressors. As an integrative concept, allostasis directs the focus from isolated disease entities (can be regarded as outcomes) to a discussion of root causes. Two questions thereby arise: what has 'gained' (salutogenesis) and 'drained' (pathogenesis) this person's health throughout life? And how can medicine, with reference to this background, best influence the gain/drain balance in a positive manner?

Some past and ongoing projects which will inform this lecture:

- Getz L. Sustainable and responsible preventive medicine. Conceptualising ethical dilemmas arising from clinical implementation of advancing medical technology. PhD thesis. Trondheim: NTNU-trykk, 2006. Norwegian University of Science and Technology, Trondheim. Electronically available at <http://www.diva-portal.org/ntnu/abstract.xhtml?dbid=750>
- McEwen BS, Getz L. Lifetime experiences, the brain and personalized medicine: an integrative perspective. *Metabolism* 2013; <http://www.sciencedirect.com/science/article/pii/S0026049512003241>
- Mjølstad BP, Kirkengen AL, Getz L, Hetlevik Standardization meet stories: contrasting perspectives of the needs of frail individuals at a rehabilitation unit. *Int J Qualitative Stud Health Well-being* 2013, 8: 21498 - <http://dx.doi.org/10.3402/qhw.v8i0.21498>.
- Tomasdottir MO, Getz L Sigurdsson JA, Petursson H, Kirkengen AL Krokstad S, McEwen BS, Hetlevik I. Co- and multimorbidity patterns in an unselected Norwegian

population: cross-sectional analysis based on the HUNT Study and theoretical reflections concerning basic medical models. Eur J Person Centered Healthcare 2014 (In press).

-Tomasdottir MO, Getz L Sigurdsson JA, Petursson H, Kirkengen AL Krokstad S, McEwen BS, Hetlevik I. Difficult childhood as a predictor of multimorbidity – mediated by allostatic load? A cross-sectional analysis based on the Norwegian HUNT3 study (work in progress).

-Vogt H, Ulvestad E, Eriksen TE, Getz L, Getting personal: Can systems medicine integrate scientific and humanistic conceptions of the patient? (work in progress).

**CGA vs. Comprehensive Geriatric Management and Rehabilitation.
or
Comprehensive Geriatric Assessment - Prevention, Rehabilitation and
Management – CGA-PRM. (or "PRM" = "Professional Risk Manage-
ment").**

Yngve Gustafson, Professor, Geriatric Medicine, Umeå University Hospital, Umeå,
Sweden

Frail old people, usually with many diseases and functional limitations suffer a lot of unnecessary complications and loss of functional capacity. At least one third of acute hospital cost for old people are caused by unnecessary complications such as infections, decubital ulcers, delirium and in-hospital falls and injuries.

Comprehensive geriatric assessment needs to be developed to be more proactive by identifying the risk of complications before they occur.

For example: Has the patient an impaired immune system indicated by for example repeated urinary tract infections, fungus infections, periodontitis, a recent herpes zoster infection, poor nutrition or treatment with cortisone or cytostatics or laboratory tests indicating for example leukopenia or hypo-albuminemia. Then it is necessary to assess and treat the underlying causes of the impaired immune system and to improve hygiene routines. An asymptomatic bacteriuria (ABU) might be an important sign of an impaired immune system since the infections does not cause an inflammatory response.

Another example is the importance of identifying frail old people at risk of developing delirium or brain injury. Persons at risk of delirium should, be protected from anything that can cause hypo-perfusion or hypoxemia of the brain as well as conditions causing hyper-cortisolism or inflammation, all factors well known to induce delirium. People at risk of delirium should also be protected from improper medication such as drugs with anticholinergic properties as well as drugs contraindicated to people with sleep-apnoea. A comprehensive geriatric proactive assessment includes assessment of multiple common complications such as risk for malnutrition, falls, decubital ulcers, allergy, impaired vision or hearing, cognitive decline, osteoporosis, urinary incontinence, constipation, foot problems, pain, insomnia, osteoporosis, thromboembolism, poly-pharmacy, social isolation, communication difficulties, impaired balance, depression, leg ulcers, drug side effects, functional decline, social complications and abuse, spiritual suffering, impaired sexual function and quality of life.

A mandatory part of the CGA-PRM is the rehabilitative focus. All the person's resources should always be identified and if possible improved or at least any deterioration should be prevented. High intensity exercise near the persons maximal capacity is effective also in frail very old people – and at least as effective in people with dementia which means that people with dementia should not be excluded from active rehabilitation after a hip-fracture or a stroke.

To “Gerontologize” the Academic Health Center: A Promising Approach to Meeting the Health Care Needs of the Burgeoning Aging American Population

William R. Hazzard MD, Professor of Internal Medicine, Wake Forest University School of Medicine, Winston-Salem, NC, USA

The threat of economic and social upheaval posed by the retirement of 10,000 Americans each day poses special challenges to our nation. Not only are health care costs in the US already far higher than in any other developed nation but also, paradoxically, the number of certified geriatricians trained to provide their health care continues to remain very limited, as less than 1% of US medical graduates choose to pursue training in geriatrics. Hence a strategy has emerged whereby in order to meet the health care needs of older Americans, geriatric care must become an “all-hands effort”, incorporating the necessary skills and attitudes into the training and certification of all physicians --- primary care internists and family physicians, medical, surgical, neural science, rehabilitation and related specialists, and all other members of multidisciplinary teams of health care providers. This approach is designed to disseminate the principles and practice of geriatrics throughout the academic health center in order to maximally leverage the efforts of the limited number of trained geriatricians through their roles as researchers, educators, innovators in development of model health care systems, and leaders in health systems reform i.e., to “gerontologize” academic health centers with the goal of integrating the study of aging and the care of the elderly into the very DNA of the institution.

This strategy has proved promising at the Wake Forest University School of Medicine in North Carolina through leadership of its largest academic unit, the Department of Internal Medicine, and the J. Paul Sticht Center on Aging and Rehabilitation, both located on the main campus of the Wake Forest Baptist Health Center in Winston-Salem in partnership with the many departments and programs throughout the university, the community, and North Carolina.

Should Geriatric Medicine be considered an academic discipline focusing on research and education/training or should it also be part of the health care?

David B. Reuben, MD, Chief, Division of Geriatrics David Geffen School of Medicine UCLA

The role of geriatrics in academics and in health care continues to be a controversial issue. Because of that shortage of geriatricians, some argue that the few geriatricians can be most effective as researchers and teachers, thereby leveraging their geriatrics skills. Others believe that geriatrician should have a major clinical impact, both by caring for fail older persons and by developing systems of care that improve the health of older persons. This lecture will discuss the pros and cons of each viewpoint and identify emerging roles of geriatricians in academic medical centers, research, administration, and clinical care. It will also draw upon the seminal 2008 Institute of Medicine report, Retooling for an Aging America, to describe a strategic approach to ensure an adequate workforce to meet the health needs of the increasing numbers of older persons.

Frailty as a phenotype

Christine S Ritchie, Department of Medicine, Division of Geriatrics
University of California San Francisco, USA

In this session, we will describe the history of the term, “frailty,” and various definitions used to describe it. We will review the evidence for frailty as a phenotype, along with the validity and reliability of screening tools to assess for frailty. We will discuss the prognostic implications of frailty, its reversibility and potential management strategies. Finally, we consider the wide array of research questions that remain regarding frailty in the aging adult.

Geriatric based organization of health care

Christine S Ritchie, Department of Medicine, Division of Geriatrics
University of California San Francisco, USA

In this session, we will review a number of clinical care delivery models developed to address the challenges experienced by complex, frail and multimorbid older adults and their caregivers. We will describe predominantly inpatient programs such as Acute Care for Elders Units, outpatient models such as the Geriatric Resources for the Assessment and Care of Elders (GRACE) program, Guided Care, and Geriatric Evaluation and Management (GEM) programs. We will review home-based models such as Hospital at Home and Home-based Primary Care, and care encompassing the entire continuum of care such as the Program for all-inclusive care for the elderly (PACE). We will discuss the impact of these various programs on patient and societal outcomes.

The situation in Japan

Kenji Toba, President, National Center for Geriatrics and Gerontology, Japan

The attractive challenge for geriatricians in Japan is to harmonize “cure” and “care” to provide personalized optimal medico-welfare service for each elderly person. At present, the majority of the patients are elderly people; average age of out-patients is over 65, and that of inpatients is over 75. We have been improving the medical and health-care systems for elderly people which cover from prevention to end-of-life stage, to meet the needs of geriatric medicine and welfare. The strategies to provide optimal care for those with dementia is also significant considering prevalence of dementia and mild cognitive impairments in Japan (8 million, 15% of persons aged 65 and over). The basic principle is to provide services equally for those with dementia, e.g., one third of ambulance cars are used for dementia.

One of the pressing issues is to enhance the quality of medical services at acute care hospitals with care support after discharge for elderly patients including those with dementia. On the other hand, cost-saving is also the critical issue, consequently acute care hospitals are forced to shorten hospital stays without sacrificing the quality of medical services. Now, medical staff are struggling to manage multimorbid elderly patients with 5 diseases and 8 geriatric conditions in average within a week. Thus integration of “cure” and “care” to bridge hospitals and home should be crucial.

Comprehensive geriatric assessment (CGA), the integral assessment tool covering multiple domains including medical, functional, psychosocial factors, is the effective tool for medico-welfare cooperation and sharing information. We are now promoting effective use of personalized CGA for improvement of quality of life of elderly people.

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Title: “Multimorbidity: the inequalities of global ageing”

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Background: Multimorbidity, defined as the “the coexistence of two or more chronic diseases” in one individual, is increasing in prevalence globally; a trend linked to a rise in ageing populations, as well as a shift towards chronic disease burden. In high-income countries (HIC), Multimorbidity is associated with lower socioeconomic status (SES), increased healthcare expenditure and poor health outcomes. Little research has been done in low- and middle-income countries (LMIC). The aims of the study were to compare the prevalence of multimorbidity across LMIC and HIC, and by age and SES (defined by education).

Methods: Using the World Health Survey (WHS), an international cross sectional survey, 28 countries were selected with $\geq 90\%$ response rate for six (self-reported) doctor-diagnosed morbidities. A single variable on multimorbidity was constructed based on the co-occurrence of ≥ 2 conditions. A comparison was made to Wave 1 of the English Longitudinal Survey of Ageing (ELSA), using the same 6 chronic conditions and then 15 chronic conditions. Prevalence estimates were age-standardised to the WHO Population Standard. Post-stratification weights were applied to country data and individual countries were weighted by sample size to produce regional estimates.

Results: Age-adjusted multimorbidity ranged from 3.59% in Ghana to 15.15% in Nepal. There is a positive relationship between country GDP and multimorbidity prevalence, although countries such as Spain and England have a low multimorbidity prevalence relative to GDP. When 15 conditions were included in the ELSA analysis, prevalence increased. Multimorbidity is associated with younger adults in LMIC and older adults in HIC. The gap in multimorbidity prevalence between HIC and LMIC is wider for older adults, compared to young adults. Intra-region comparisons of multimorbidity by SES suggest a trans-generational difference in LMIC: younger adults have comparatively less multimorbidity burden on the least educated and less inequality.

Conclusion/ Implications: Multimorbidity is a global phenomenon and not just affecting older adults in HIC. Prevalence patterns suggest that there are differential exposures to risk, particular in LMIC. There is evidence of a multimorbidity transition in LMIC with increased multimorbidity prevalence, particularly for younger adults in LMIC. These results suggest a change in lifestyle and accumulation of risk for NCDs are leading to multimorbidity in LMIC. Implications are considerable, not least for health care provision, planning, policy and public health intervention.

Preventing injuries from falls in elderly: The Red Sock Program

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This retrospective study reports results on data of elderly, Caucasian and Non-Caucasian patients, ranging in age from 65-85 years (N=96), in the Community Living Centers at a teaching hospital in the Deep South of the United States over a one year period. Falls are a significant cause of injury and death among those aged 65 years and older. Thirty to 51% of falls in hospitals result in injury (Oliver, Healey, & Haines, 2010) and the incidence of falls among elderly in the United States is estimated to be about seven million annually (National Patient Safety Foundation, 2014). Research indicates that the elderly who take multiple prescription medications have higher risk of falls. Elderly who fall are also at high risk for repeat falls, fall-related injuries, and long-term disability or death. Falls among the elderly result in significant cost to the individual and society as a whole. At this hospital, patients at risk for falls were asked to wear red socks with a rubber lining on the bottom of the sock to better grip the floor. The socks were designed to help staff visually identify patients who were identified as high risk of falls. It was anticipated that these red socks would help reduce the number of falls. Patients in this study were divided into two groups. That is, those with cognitive impairment/dementia (Alzheimer's dementia = 15; Non-Alzheimer's Dementia = 44/Total N =59) and those with no history of cognitive impairment (N=37). The following variables were collected and assimilated: use of opioids, use of four or more prescription medications, diagnosis of depression, history of falls, and diagnosis of cognitive disorder/dementia. Patients at the hospital were screened for risk of falling upon admission and screened for fall-related injury risk factors/history. Staff and patients were also educated on patients' fall and injury risks. Standardized interventions for patients at risk of falling were implemented. The aim of this project was to describe an evidence based falls prevention education program and assess its impact on fall via the Fall Risk Assessment/Morse Fall Scale. In summary, in comparison with national rates, the hospital had significantly fewer falls after the Red Sock Program was implemented (approx. 200-250 falls/per year). Results and implications will be discussed.

Oliver, D., Healey, F., & Haines, T. (2010). Preventing falls and fall-related injuries in hospitals. *Clinical Geriatric Medicine*, 26, 645-692.

A pressure ulcer prevention program for elderly in the rural deep south: A retrospective analysis

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This retrospective project reports results of adherence to a 12-month skin care/pressure ulcer prevention education program in the Community Living Centers (CLCs)/nursing homes of a rural teaching hospital in the Deep South of the United States. In comparing this pressure ulcer education program to other programs for risk assessment most facilities have three categories: No risk, standard risk, and at risk. This program required all patients to be evaluated by risk assessment on admission from only two categories: either at risk or standard risk (i.e., this process allowed a higher number of patients to be identified for prevention). In the CLC units, pressure ulcers have the potential to affect multiple aspects of life. Analysis were conducted on data on elderly inpatients, white and non-white, ranging in age from 65–85 years (N=96) with pressure ulcers (PUs). Persons evaluated included those with history of diabetes (N=31) and those with no history of diabetes (N=65). Known PU risk factors include: immobility, weight loss/malnutrition, incontinence (bowel and/or bladder), history of previous PUs, and chronic illness (e.g., DM, heart failure, cancer, circulation problems). The aim of this project was to describe a pressure ulcer prevention educational skin care program and assess PU occurrence (i.e., educational materials were developed for caregivers, staff, and patients). Method: A two-group comparison design was implemented. Data was gleaned from hospital medical records by hospital statistician, wound care nurses, and analyzed by the hospital statistician. Variables of interest included: pressure ulcer occurrence, pressure ulcer severity, and bed days of care. Measures: Braden Scale. Current data shows that the PU prevalence/incidence rates were lower (0.2–0.3% based on bed days of care) than national average (6–13%) when bench marking with like facilities in the United States. During skin assessment individuals with darker skin pigmentation appeared to be at higher risk due to inability to visualize the pressure area. Standards of care require inspections/palpation of skin area to determine temperature to area and/or discoloration (e.g., hues of blue in darker skin). Findings suggest that persons with darker skin were at higher risk of developing PUs, which supports previous findings. Overall results revealed that patients who participated in the pressure ulcer prevention educational skin care program performed skin checks/pressure reliefs more frequently, developed fewer and less severe PUs, noted increased patient/family satisfaction, and fewer bed days of care. However, persons diagnosed with DM were more vulnerable to developing PUs.

Pressure ulcer prevention and quality of life in an older patient with sci and multiple chronic wounds: A case study

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This project reports the results of adherence to a 12-month skin care/pressure ulcer prevention education program in a multidisciplinary treatment setting at a teaching hospital in the rural Deep South of the United States. Specifically, this is a case history of a 65 year old, African American man, with 12 years of education, who was admitted to the hospital's Community Living Center with spinal cord injury (SCI: Paraplegia T3 injury), multiple chronic pressure sores (PUs) with duration greater than two years, and history of poor nutritional status (emaciated), as well as noncompliance with medication/health care management of diabetes mellitus-type II (DMII). Supporting labs confirmed nutritional deficits. SCI affects an individual both physically and psychologically, as well as overall quality of life. The patient was admitted to the hospital from his home where he had lived alone. Treatment at the hospital included: supportive therapy, pressure relief education, nutritional intervention, skin care education, and wound care. The initial skin assessment was done by wound care nurse upon admission to the hospital and revealed wounds to right hip with exposed bone (1 cm length, 1 cm width, and 8 cm depth). Results from this case study revealed that the structured/comprehensive hospital skin care education program resulted in improved overall health and quality of life. That is, the patient performed skin checks daily, weight training, completed pressure reliefs (e.g., pushups and leans from side to side while in his wheelchair) every 20 minutes, and turned himself while in bed every two hours in order to decrease risk of tissue breakdown. Results and implications will be discussed.

Using behavior modification techniques to reduce aggressive behaviors: A case study of an older male with schizophrenia

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This project reports the results of an 8-month long behavioral program with a 58 year old, Latin American man diagnosed with Paranoid Schizophrenia and history of aggressive behaviors (e.g., self-mutilation behaviors, inappropriate behaviors). The patient was seen in a nursing home in a large metropolitan area of the United States. Treatment included: supportive therapy, behavior modification, and patient and staff education. Psychological scales used included: Psychological face valid self-report measures (Beck Anxiety Inventory: BAI, Beck Depression Inventory, Second Revision: BDI-II, Beck Hopelessness Scale, BHS), ABC sheets, Mini-mental Status Exam (MMSE), Warning Sign Rating Sheet, behavior charts/Ogden Lindsey's Standard Celebration Chart, and McCullough coping style questionnaire. The patient was referred for treatment by his psychiatrist. The treatment program consisted of weekly treatment sessions and direct observations that lasted approximately two to three hours per visit for a total of 32 sessions. Hospital staff was also trained by the clinician on how to use behavioral techniques, collecting data on response frequency, and modelling of intervention strategies. The program utilized Differential Reinforcement Other (DRO), backward chaining, social skills training, and positive reinforcement to teach and encourage desirable behaviors and time out (rather than punishment procedures) to eliminate undesirable behaviors. Behaviors assessed included: aggressive behaviors (e.g., biting/attempting to bite others, striking out/attempting to strike others when they may be in close proximity), needy behaviors (e.g., interrupting, asking the same questions repeatedly, discussing inappropriate topics in group setting), an "mad man" behaviors (e.g., screaming, uncontrolled laughter). These behaviors had been problematic for years and gradually increased in frequency. Through modeling, practice and feedback staff gradually learned how to implement strategies. Each behavior was counted and recorded on a daily basis. The clinician also keep records of antecedent events, consequences of behaviors, and subsequent events. With this treatment program both staff learned how changes in their behavior directly produced changes in the patient's behavior. Frequencies of all target behaviors were recorded by staff daily. Staff were encouraged to praise the patient when he engaged in appropriate behaviors. Research has shown that time out procedures can be effective in treating both tantrums and aggressive behaviors. In the present single subject design study time outs were brief (at most five minutes in duration). Our data suggest that at the end of treatment, the patient's behavioral problems had markedly diminished. Tantrums appeared to be initiated when the patient wanted attention. The results of this study illustrate the utility using behavior modification as an alternative treatment strategy rather than solely pharmacological tactics. Results and implications will be discussed.



Body Mass Index, Mini Nutritional Assessment and their association with five-year mortality in very old people

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Background and aim

Malnutrition is very common in old (>65 years) people¹ and associated with mortality². Although previously studied, studies of people aged ≥85 years are more rare.

The aim of this study was to investigate the prevalence of malnutrition and the association between Body Mass Index (BMI), Mini Nutritional Assessment (MNA) and five-year mortality in people aged ≥85 years.

Method

Data came from the population based Umeå 85+/GERDA study, a study of very old people, free-living or living in institutional care. In total, 832 individuals who had a BMI value or a MNA score documented were included (mean age 90.2±4.6 years).

Participants were assessed using BMI and the MNA. Body Mass Index (kg/m²) is commonly used for assessing under- and overweight and, often used to determine when screening for malnutrition should be initiated³.

The MNA (0-30) is a validated and widely used tool for evaluating nutritional status in old people¹.

Associations among BMI, MNA score and five-year mortality were analyzed using Cox proportional hazards regression analyses.

Results

Thirteen percent were malnourished (MNA<17) and 40.3% were at risk of malnutrition (MNA 17-23.5) according to MNA. More women than men were malnourished (17.0% vs. 4.4% P<0.001). Also, 34.8% of those with a MNA score <17 still had a BMI value ≥22.2 kg/m².

A BMI value <22.2 kg/m² and a MNA score<17 were associated with lower survival. The association with mortality seemed to be J-shaped for BMI, and linear for MNA.

	Total	Women	Men	P value
BMI, mean±SD	25.1±4.5	25.1±4.7	25.1±3.8	0.938
MNA, mean±SD	22.5±4.6	22.0±4.8	23.8±3.7	<0.001

Table 1. BMI and MNA for the whole sample and gender.

BMI	HR (CI 95%)	P value
22.2-24.6	0.808 (0.642-1.016)	0.068
24.7-27.9	0.630 (0.498-0.797)	<0.001
≥28.0	0.739 (0.584-0.936)	0.012
MNA		
17-23.5	0.608 (0.478-0.774)	<0.001
24-30	0.298 (0.229-0.386)	<0.001

Table 2. Association with five-year mortality, age- and sex-adjusted analyses. The lowest BMI group (<22.2) and the lowest MNA group (<17) were set as reference.

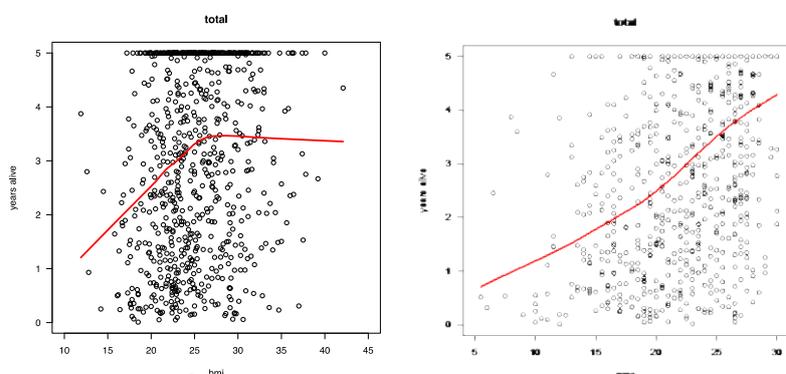


Figure 1. Plots of the association between BMI, MNA and five-year mortality respectively.

Conclusion

Malnutrition according to MNA was common, but a substantial portion of those with a low MNA score still had a high BMI value. The association with mortality appeared to be J-shaped for BMI, and linear for MNA. The MNA seems to be a good measurement of malnutrition in very old people, and BMI might be misleading and could underestimate the prevalence of malnutrition, especially in women.

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Development of Physical Performance After Acute Hip Fracture: An Observational Study in a Regular Clinical Geriatric Setting

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Abstract

Background and aim: Hip fracture is a leading cause of mortality, morbidity, and disability in older people. The aim of the present study was to prospectively assess the development of physical performance in patients with hip fracture after surgery. **Setting:** Prospective, observational study in a Swedish university hospital. **Methods:** Assessment of 102 consecutive patients (65 females), with a mean age of 82 years (range 35-98) without specific inclusion or exclusion criteria. Seven physical functions were assessed using the following 4 measuring methods and 3 rating scales at baseline 7 to 10 days after surgery and follow-up after 4 months (F4): 10-m habitual walking speed (HWS), timed up and go (TUG), 30-second chair stand test (CST), handgrip strength (HGS), Berg balance scale (BBS), functional ambulation category (FAC), and general mobility. **Results:** The 47% dropout patients were significantly older and more often lived alone or in nursing homes and used indoor walking aids. At baseline, the mean HWS was 0.4/0.5 (females/males) m/s; TUG 53/30 s; CST 4/5 kg, and HGS 17.4/31.2 kg. The medians of BBS and FAC were 20/20 and 4/4, respectively. There were significant mean improvements at F4 for all 4 measured functions, except for HGS in males but for neither of the rating scales. There was a large heterogeneity in all assessed variables, both at baseline and regarding change at 4 months. Therefore, the mean/median results are depicted in figures, showing all individual results at baseline and F4, compared to reference values and discussed in relation to degree of improvement. **Conclusion:** The observed large heterogeneity at baseline as well as F4 makes it essentially meaningless to report means and median data of functional assessment of patients with hip fracture. There is a strong need for individualization in both health analysis and how the treatment program is targeted, carried through, and evaluated over time in patients with hip fracture.

Keywords

elderly, hip fracture, physical performance, follow-up

Factors associated with depression among old people with and without stroke

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Background: Depression is more common among elderly people who have had a stroke compared with those without stroke. In order to understand this difference, it is necessary to compare what factors are associated with depression in people with and without stroke. Considering the disputed efficiency of existing treatments for depression, differences between depressed people with and without stroke may implicate how a targeted approach for managing depression should be modeled.

Methodology: A survey was sent to 65-, 70-, 75- and 80-year-olds in Swedish West Bothnia and Finish Ostrobothnia in 2010. The response rate was 63.9%. Stroke was defined as answering the question “Have you had a stroke?” with a “yes”. Depression was defined as answering the question “Are you depressed?” with a “yes” or having a >1 score on the Geriatric Depression Scale-4 assessment scale. The people who answered the stroke and depression questions were selected, resulting in a sample size of 5307 individuals. Associations were tested with log binomial regression models, using a restricted optimization routine, from which prevalence ratios were calculated.

Results: The stroke prevalence was 365 (6.9%) overall, and increased from 102 (4.7%) among the 65-year-olds to 90 (12.1%) among the 80-year-olds ($p < 0.001$). The depression prevalence was 739 (13.9%) overall, and increased from 266 (12.1%) among the 65-year-olds to 163 (21.9%) among the 80-year-olds ($p < 0.001$). Depression was 1.97 (1.71–2.24) times more common among those with stroke overall. Consistent results were found in all age and sex subgroups, but there was only a trend among the 80-year-olds. In the group without stroke, age (1.02, 1.00–1.03), diabetes (1.28, 1.06–1.51), dependence in instrumental activities of daily living (1.49, 1.29–1.70), living alone (1.65, 1.43–1.86), not having a confidant to talk to (1.77, 1.37–2.18), poor finances (1.82, 1.54–2.11), pain problems (1.44, 1.21–1.67) and a life crisis the last year (1.77, 1.55–1.99) were independently associated with depression. In the group with stroke, dependence in personal activities of daily living (2.03, 1.51–2.55) and a life crisis the last year (1.66, 1.13–2.19) were independently associated with depression.

Conclusions: The depression and stroke prevalence rose with increasing age, but the otherwise consistent association between stroke and depression grew weaker in the oldest age group. Depression in people without stroke appeared to be independently associated with a broader range of external factors, while depression in people with stroke was only associated with dependence in personal activities of daily living and having a life crisis the last year. The difference in factors associated with depression may indicate that different approaches are needed for prevention and treatment of depression among people who have had a stroke compared with people without stroke.

Frailty in community dwelling older people with multimorbidity

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Introduction

The frailty syndrome is the result of age-related decline in physiological function, characterized by diminished strength and endurance. It is associated with increased risk of falls, disability, dependency, long-term care and death, which are costly adverse outcomes. The prevalence of frailty ranges between 14 and 24% in people aged over 65, and increases with age. Multimorbidity and frailty are distinct conditions which often coexist. With possible interventions and treatments emerging, it is important to find people affected by frailty.

Aim

To describe the prevalence of frailty in community dwelling older people with multimorbidity.

Methods

This was a cross-sectional analysis of baseline data from the Ambulatory Geriatric Assessment – a Frailty Intervention Trial (AGe-FIT). Inclusion criteria were: 75 years and older, three or more ICD-10 diagnoses and three or more hospitalizations during the last year. Participants also had to be community dwelling. The frailty syndrome was defined using the five Fried criteria: *weight loss* ($\geq 5\%$ during the preceding year), *exhaustion* (Center for Epidemiological Studies Depression Scale), *muscle weakness* (handgrip strength), *slow walking speed*, and *low physical activity* (International Physical Activity Questionnaire). Participants were classified as robust (no criteria present), pre-frail (one or two criteria present) or frail (three or more criteria present).

Results

The 381 participants had a mean age of 83, with 183 (48%) women. Of all, 140 (37%) were classified as frail, 223 (58%) as pre-frail and 18 (5%) as robust. The mean age (\pm SD) in the frail group was 83,2 (5,1) years, versus 82,2 (4,6) in the pre-frail and 80,9 (3,9) years in the robust group ($p > 0.05$). Frailty was present in a higher proportion among women, 43,7%, than among men, 30,3% ($p < 0.01$).

Conclusion

Almost one third of the participants were classified as frail and two thirds were pre-frail. Given the amount of adverse outcomes affecting frail older people, the identification of individuals with, or at risk of developing the frailty syndrome could convey important information in clinical decision making concerning prevention or intervention.

Blood Pressure, Gait Speed, and Mortality in Very Old Individuals: a population-based cohort study

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Importance: Clinical trials and observational studies have produced contradictory results regarding the association of blood pressure (BP) and mortality in very old individuals. Gait speed at usual pace has been shown to moderate this association in a population of younger old, non-institutionalized individuals.

Objective: To investigate the association of BP with all-cause mortality in a representative sample of very old people and to assess whether gait speed moderates this association.

Design, Setting, and Participants: Participants in the population-based prospective Umeå 85+/GERDA study aged 85, 90, and ≥ 95 years. Baseline assessments were performed in 2000–2007 with a 5-year follow-up period. Of 1310 eligible participants, BP was measured in 806 who accepted home visits (total sample).

Main Outcome and Measures: Hazard ratios (HRs) for all-cause mortality according to systolic and diastolic BP categories in the total sample and in faster- ($\geq .5$ m/s, $n=312$) and slower-walking cohorts ($< .5$ m/s, $n=433$); the latter including habitually non-walking participants. Gait speed was measured over 2.4 m at usual pace. Comprehensive adjustments were made for sociodemographic and clinical characteristics associated with death.

Results: Mean age and baseline systolic and diastolic BP were 89.6 ± 4.6 years, 146.8 ± 23.9 mmHg, and 74.8 ± 11.1 mmHg, respectively. Most ($n = 561$ [69%]) participants were women, 315 (39%) were care facility residents, and 566 (70%) were prescribed BP-lowering drugs. Within 5 years, 490 (61%) participants died. In the total sample and the slower-walking cohort, systolic BP appeared to be inversely associated with mortality, although the associations were not independent of adjustments. Among those faster-walking, mortality risk was independently higher with systolic BP of 140–149 mm Hg (HR = 2.25, 95% confidence interval [CI] = 1.03–4.94) and ≥ 165 mmHg (HR = 2.13, 95% CI = 1.01–4.49), compared with systolic BP of 126–139 mmHg. Mortality risk was also independently higher with diastolic BP of >80 mmHg in the faster-walking cohort, compared with diastolic BP of 75–80 mmHg (HR = 1.76, 95% CI = 1.07–2.90).

Conclusions and Relevance: The gait speed threshold of .5 m/s may be clinically useful for the distinction of very old people with and without increased all-cause mortality risk due to elevated systolic and diastolic BP.

Who was Berzelius?



Jöns Jacob Berzelius, one of the most prominent natural scientists of the 19th century, was born in 1779 in Väversunda, in the county of Östergötland in southern Sweden, a region with rich cultural traditions.

Orphaned at an early age, he went to several foster-homes and received his schooling in nearby Linköping. After graduating in medicine at the University of Uppsala, he moved to Stockholm, where he became assistant master without pay at the so-called »Surgical School«, and earned his keep by working as a doctor for poor people. At the age of 28 he became professor of medicine and pharmacy.

In 1808 Berzelius was one of the seven men who founded The Swedish Society of Medicine »For the perfection of science through mutual mediation of knowledge and collective experience, for the promotion of friendly confidence between doctors«.

Berzelius have enriched our knowledge of nature of life phenomena, established the atomic weights of most of the known elements, presented his electrochemical theory for the understanding of the nature of chemical compounds and laid the foundation for the sciences of the chemistry of rock types.

He also found that elements combine with each other according to fixed numerical relationships. In addition to this, in his striving for order and method, with his talent for simplicity and clarity in expression, he created the chemical symbolic language in 1813, which since that time has been an essential instrument of chemistry.

With time he became a practised lecturer but preferred to express himself in writing and this he did superbly. Impressive are the great scientific works where he also demonstrated his interest and ability to spread knowledge about the latest advances of natural sciences.

Berzelius delight in research and debate was united with a great humility before the great scientific questions. Both his attitude and artistry of formulation is illustrated by the following passage in his *Manual of Chemistry* (vol 3, 1818):

»All our theory is but a means of consistently conceptualizing the inward processes of phenomena, and it is presumable and adequate when all scientifically known facts can be deduced from it. This mode of conceptualization can equally well be false and, unfortunately, presumable is so frequently. Even though, at a certain period in the development of science, it may match the purpose just as well as a true theory. Experience is augmented, facts appear which do not agree with it, and one is forced to go in search of a new mode of conceptualization within which these facts can also be accommodated; and in this manner, no doubt, modes of conceptualization will be altered from age to age, as experience is broadened, and the complete truth may perhaps never be attained. But even if the goal can never be reached, let us never abandon our endeavor to get closer to it.«

Parts of this text is found in: Berzelius – Creator of the chemical language, by Carl Gustaf Bernhard, the Royal Swedish Academy of Sciences



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