

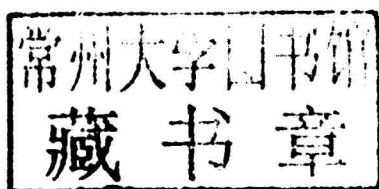


Geriatrics Handbook

Roger Simpson

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Edited by **Roger Simpson**



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Geriatrics Handbook

Preface

Geriatrics deals with the health care of elderly people. As the life expectancy of baby boomer generation has now gone up to 65 years, the focus of medical areas has shifted towards the issues of providing this population of geriatrics individuals with proper resources. Geriatric health care is complex by structure, inclusive of medical, educational, social, cultural, religious and economic aspects. This book presents a complicated interplay of these factors in the growth, organization and therapy of geriatric patients, starting with an analysis of sarcopenia, cognitive decline and dysphagia as the pivotal aspects of frailty syndrome. The book also sheds light on the schemes required to increase life expectancy, and quality of lifestyle, like exercise, nutrition and immunization, as well as the effect of physical, psychological and socio-cultural changes in old people. It also provides an analysis of problems related to the death of diseased people, including the advocacy by diseased and their families for extra sensitive care, their reactions towards autonomy and legal tools, and the expense of novel health care instruments and supply.

This book is a result of research of several months to collate the most relevant data in the field.

When I was approached with the idea of this book and the proposal to edit it, I was overwhelmed. It gave me an opportunity to reach out to all those who share a common interest with me in this field. I had 3 main parameters for editing this text:

1. Accuracy – The data and information provided in this book should be up-to-date and valuable to the readers.
2. Structure – The data must be presented in a structured format for easy understanding and better grasping of the readers.
3. Universal Approach – This book not only targets students but also experts and innovators in the field, thus my aim was to present topics which are of use to all.

Thus, it took me a couple of months to finish the editing of this book.

I would like to make a special mention of my publisher who considered me worthy of this opportunity and also supported me throughout the editing process. I would also like to thank the editing team at the back-end who extended their help whenever required.

Editor

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Permissions

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Part 1

Functional Loss Associated with Aging

Physical Function in Older People

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1. Introduction

Aging is a natural process. Improved maternal and infant health, better survival in infancy, childhood and early adult life, has led to increase life expectancy of older people. As of 2008, 7% (506 million) of the world's population was aged 65 years and older, an increased of 10.4 million since 2007 (Kinsella K and Wan He 2009). The current pace of population aging varies widely. While developed countries have relatively high proportions of people aged 65 years and over, the most rapid increases in older people are in the developing world. As of 2008, 62% (313 million) of the world's population aged 65 and over lived in developing countries (Kinsella K and Wan He 2009). Many developing countries will be experiencing a sudden rise in the proportion of older people within a single generation, with far less well developed infrastructure. In contrast, most developed countries have had decades to adjust to the changing age structure and this change has been supported by relative economic prosperity.

2. Theories of population health change

The implications of longer life mean increased risk of poor physical function as expounded by the theories of population health change. Four theories have been proposed in discussing the consequences of increased life expectancy in older people.

The expansion of Morbidity/Disability Theory (Gruenberg EM 1977), suggests that the gain in life expectancy in older people is mainly due to technological advances and secondary prevention strategies that have extended the life of older people with disability and underlying illness. This results in living with non-fatal diseases such as vision loss, arthritis, chronic pain and other diseases of old age, therefore living longer means living with more years of disability.

The opposing theory is called the Compression of Morbidity/Disability Theory (Fries 1980; Fries 2005). He suggested that primary prevention strategies modify risk factors for

mortality that delays the age-at-onset and progression of disabling diseases. Assuming that maximum life expectancy is fixed, this will result in the time live with disability and disease being compressed into a shorter period before death.

Manton offered a third perspective called the “Dynamic Equilibrium Theory” that combines elements from both the expansion and compression theories (Manton KG 1982). Manton proposes that economic, medical and technical progress reduces mortality as well as having an influence on morbidity/disability. Decrease in mortality rates are accompanied by declines in the incidence and progression of chronic diseases. As a result, years of life gained are assumed to be achieved through a combination of postponement of disease onset, reduction in severity of disease and disease progression due to improvement in clinical management of diseases.

A recent theory takes into consideration the country's position in the demographic transition phase (Robine Jean-Marie and Michel Jean-Pierre 2004). Their “General Theory of Population Aging” encompasses all the three previous theories and relies on a cyclical movement. Firstly, there is an increase in the survival rates of sick people supporting the “expansion of morbidity theory”. Second, medical improvements take place, slowing down the progression of chronic condition and achieving certain equilibrium with mortality decline, supporting the “dynamic equilibrium theory”. The third phase is improvement in health status and health behaviours of new cohorts of older people, supporting the “compression of morbidity theory”. Eventually there will be an emergence of very old and frail populations, which brings back to the starting point, that is, to a new “expansion of morbidity”.

3. The language of physical function

Before further discussion regarding the subject of physical function and its relevance, some definitions are necessary. The definition of the term “disability” and “functional limitation” in this chapter follows the Nagi Disablement Model (Nagi 1976). This model has proven useful as a language used by researchers to delineate the consequences of disease and injury at the levels of body systems, the person and society. The definition of disability encompasses various aspects; pathology, impairment, and limitation are terms that are directly associated with the concept of disability.

According to the classification scheme provided by Nagi, *impairment* refers to a loss or abnormality at the tissue, organ and body system level. At the level of the individual, Nagi uses the term *functional limitations* that represent limitations in performance of specific tasks by a person. The term *disability*, as defined by Nagi, refers to limitations in performing socially defined roles and tasks expected of an individual within a socio-cultural and physical environment. Both impairment and functional limitation involve function. However, for impairment, the reference is to the levels of tissues, organs and systems while for functional limitation, the reference is to the level of the person as a whole. In differentiating functional limitation from disability, functional limitation refers to organismic performance; in contrast disability refers to social performance.

The term physical disability is often used to refer to restrictions in the ability to perform a set of common, everyday tasks, performance of which is required for personal self care and independent living. This includes the basic activities of daily living (ADL) and instrumental activities of daily living (IADL). These are the most widely used measurements of physical

disability in the literature. Basic ADLs are self-care tasks such as bathing, dressing, grooming and eating (Fried LP and Guralnik 1997). The IADL's are tasks that are physically and cognitively more complicated and difficult but are necessary for independent living in the community such as getting groceries, preparing meals, performing everyday household chores. ADL and IADL are measures of disability that reflect how an individual's limitation interacts with the demands of the environment.

The evaluation of mobility refers to the individual's locomotor system. Mobility disability is a critical component of activities of daily living (Fried LP and Guralnik 1997). Mobility disability is defined as difficulty or dependency in functioning due to decreased walking ability, manoeuvrability and speed.

The building blocks of restrictions in performing ADLs are termed functional limitations (Guralnik and Luigi 2003). Functional limitations are measures independent of environmental influences, and may explain the changes in functional aspects of health. Functional limitation refers to restriction in physical performance of tasks required for independent living, such as walking, balancing and standing.

Physical function is a general term that reflects one's ability to perform mobility tasks, ADLs and IADLs. Throughout this chapter "poor physical function" is used as a general term to refer to physical disability, mobility disability and functional limitation.

4. The disablement process

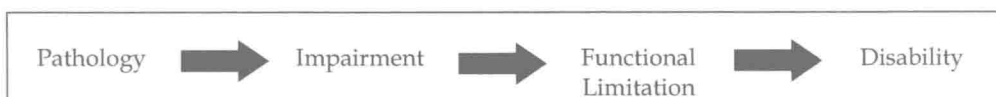
To discuss poor physical function in older people, it is important to have an understanding of the progression that ends with loss of physical function, or the disablement process. The disablement process describes how chronic and acute conditions affect functioning in specific body systems, basic human performance, and people's functioning in necessary, usual, expected, and personally desired roles in society (Verbrugge and Jette 1994). It also describes how personal and environmental factors speed up or slow down this process. There are two major models describing disability and related concepts. This chapter will describe both models. – the Nagi Model (Nagi 1976) and the International Classification of Impairments, Disabilities and Handicaps (ICIDH) (World Health Organization 1980) and its current version, the International Classification of Functioning, Disability and Health (ICF) (World Health Organization 2001) developed by the World Health Organization (WHO).

4.1 The Nagi disablement model

The pathway proposed by Nagi in 1965 to describe progression from disease to disability is shown in Figure.1. Nagi's disability model is based on four related components that described the sequential steps in the theoretical pathway from disease to disability (Nagi 1976). In the Nagi pathway, *pathology* (e.g. sarcopenia) first leads to *impairment* (e.g. lower extremity weakness) (Steven M Albert and Vicki A Freedman 2010). When lower extremity weakness crosses a certain threshold, *functional limitation* (e.g. slow gait speed) becomes evident (Steven M Albert and Vicki A Freedman 2010). When this happens, a person has a *disability* (e.g. difficulty or needing help with walking across a small room).

According to this pathway, *pathology* refers to biochemical and physiological abnormalities that are medically labeled as disease, injury or congenital/developmental conditions (Ferrucci, et al. 2007; Nagi 1976; Verbrugge and Jette 1994). *Impairment* is the consequence

and degree of pathology (Nagi 1976; Verbrugge and Jette 1994). *Functional limitations* are limitations in performance at the level of the whole organism or person (Ferrucci, et al. 2007). By contrast, *disability* is defined as limitation in performance of socially defined roles and tasks within a socio-cultural and physical environment (Ferrucci, et al. 2007). Disability can also refer to the expression of functional limitation in a social context. An important advantage of utilizing different definitions for functional limitation and disability, as proposed by Nagi, is that they can be considered as sequential steps on the pathway from disease to disability. The validity of this theoretical pathway is supported by a large body of literature (Ferrucci, et al. 2007; Fried and Guralnik 1997; Steven M Albert and Vicki A Freedman 2010). Practical issues of care and prevention can be addressed by utilizing this pathway.



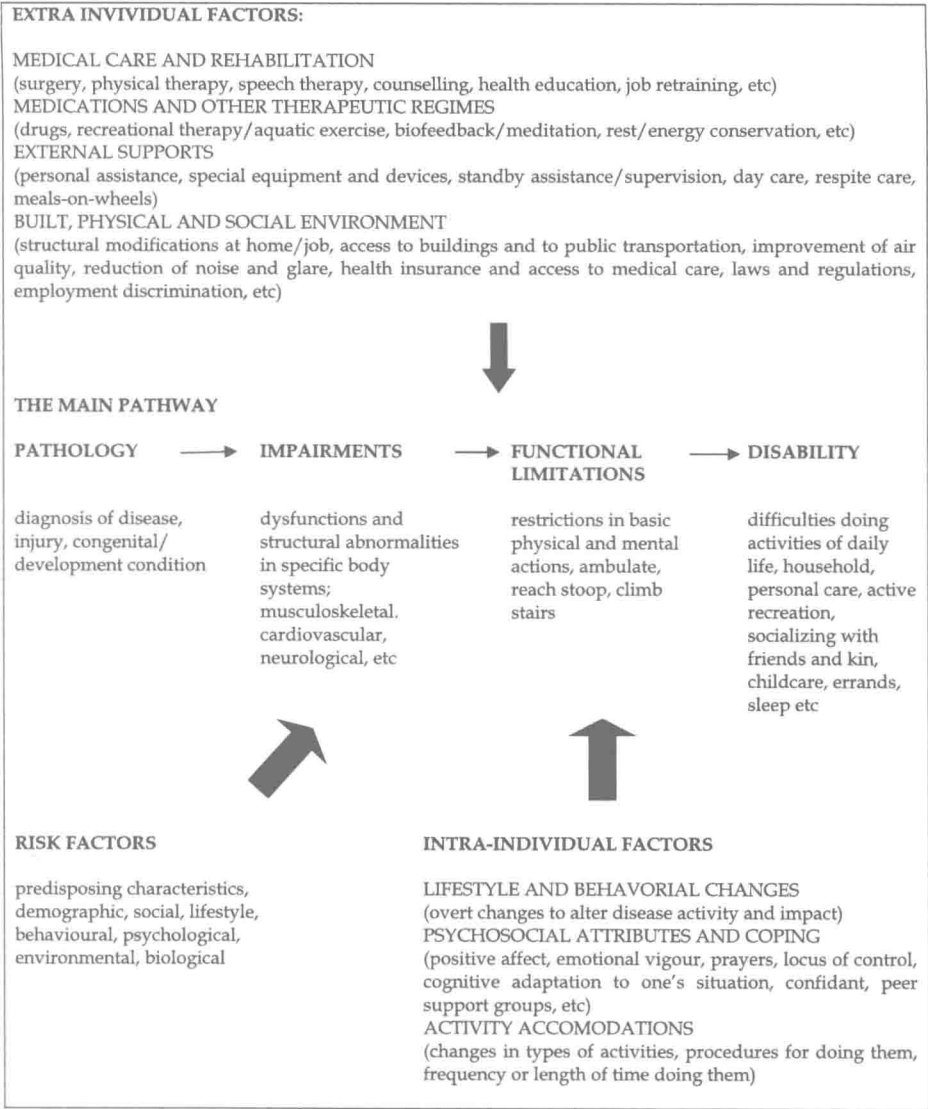
Source: Nagi S. An epidemiology of disability among adults in the United States. The Milbank Memorial Fund Quarterly. Health and Society. 1976; 54: 439-467

Fig. 1. Theoretical pathway from disease to disability proposed by Nagi (1965)

Nagi's model was extended to include personal and environmental factors that influence the evolution of the disablement process (Verbrugge and Jette 1994). Verbrugge and Jette differentiate the "main pathways" of the disablement process (i.e. Nagi's original concepts) with factors hypothesized or known to influence the ongoing process of disablement (Figure 2). This model emphasizes that predisposing risk factors, intra-individual and extra-individual factors may modify the relationship of the four components in the main pathway (Ferrucci, et al. 2007; Guralnik and Luigi 2003; Steven M Albert and Vicki A Freedman 2010; Verbrugge and Jette 1994). Risk factors are predisposing phenomena that are present prior to the onset of a disabling event that can affect the presence and/or severity of the disablement process. Intra-individual factors are those that operate within a person such as lifestyle and behavioural changes, psychosocial attributes and coping skills. Extra-individual factors are those that perform outside or external to the person. Nagi's definition of disability and the elaboration by Verbrugge and Jette also operationalizes disability as a broad range of role behaviours that are relevant to daily activities. This includes basic ADL, IADL, paid and unpaid role activities, such as occupation, social activities and leisure activities.

4.2 World Health Organization's models of disablement

In 1980, the World Health Organization (WHO) proposed a theoretical framework to describe the sequence from disease/disorder to impairment, disability and handicap named the International Classification of Impairments, Disabilities and Handicaps (ICIDH) (World Health Organization 1980) (Figure 3). At the foundation of the pathway is pathology, which is defined as any abnormality of macroscopic, microscopic or biochemical structure or function affecting an organ or organ system (Ferrucci, et al. 2007; Verbrugge and Jette 1994). The second step is impairment, defined as any abnormality of structure or function at the whole organism level, independent of any specific environment, symptom, or sign (Ferrucci, et al. 2007; Verbrugge and Jette 1994). At the third step is disability, which derives from the



Source: Verbrugge LM, Jette AM. The disablement process. Social Science and Medicine; 1994; 38(1): 1-14

Fig. 2. The Disablement Process (1994)

interaction between the organism and the environment and is defined as any change or restriction in an individual's goal-directed behaviour (Ferrucci, et al. 2007; Verbrugge and Jette 1994). Finally, handicap is defined as any alteration in a person's status in society, including alterations in roles. Each level of the pathway should be considered as independent and may or may not be determined by the previous level and/or cause the

successive level (Ferrucci, et al. 2007; Verbrugge and Jette 1994). This approach raised criticisms for several reasons: it was thought to be too medically-orientated, ignoring social and psychological dimensions; the negative connotation of the term ‘handicap’; and the omission of environmental factors. Some of these limitations were overcome by the model proposed by Nagi.

In 2001, the WHO presented a revision of the classification under a new name called the International Classification of Functioning, Disability and Health (ICF) (World Health Organization 2001) (Figure 4). The revised model moves away from the idea that disability is a consequence of disease or aging and focuses on components of health as human functioning. The ICF has two parts, each with two components (Table 1). Part One is entitled Functioning and Disability (which includes body functions and structures, activities and participation). Part Two is entitled Contextual Factors, which includes environmental factors and personal factors.



Source: World Health Organization. International Classification of Impairments, Disabilities and Handicaps: A Manual Classification Relating to the Consequences of Diseases. Geneva. WHO, 1980.

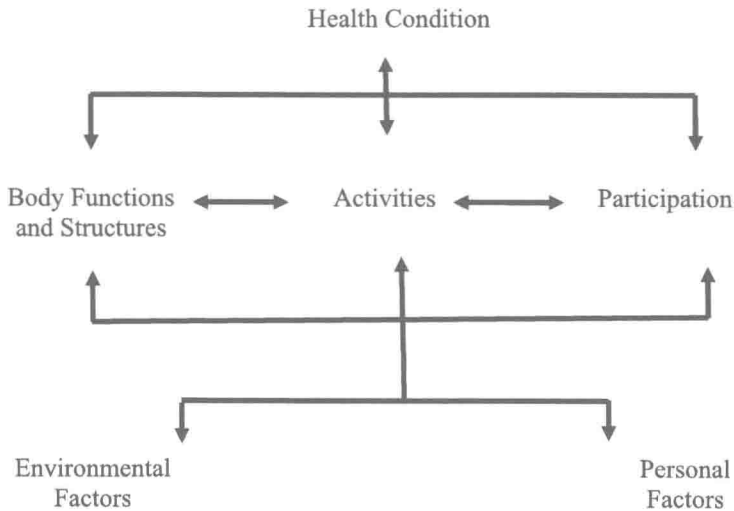
Fig. 3. The International Classification of Impairments, Disabilities and Handicaps Model (ICIDH), 1980

Component	Part 1 : Functioning and Disability		Part 2: Contextual Factors	
	Body functions and structures	Activities and participation	Environmental factors	Personal factors
Domains	Body functions Body structures	Life areas (tasks, actions)	External influences on functioning and disability	Internal influences on functioning and disability
Constructs	Change in body functions (physiological) Change in body structure (anatomical)	Capacity: executing tasks in a standard environment Performance: executing tasks in the current environment	Facilitating or hindering impact of features of the physical, social, and attitudinal world	Impact of attributes of the person
Positive aspect	Functional and structural integrity	Activities and Participation	Facilitators	Not applicable
Negative aspect	Impairment	Activity limitation Participation restriction	Barriers/hindrances	Not applicable

Source: World Health Organization. International Classification of Functioning, Disability and Health (ICF). Geneva. WHO, 2001.

Table 1. An overview of International Classification of Functioning, Disability and Health (ICF)

This framework starts with the concept of *health conditions*, which includes diseases, disorders, injuries and trauma. *Impairments* may occur to either body functions (e.g. reduce walking speed) or body structures (e.g. narrowing of a heart valve) (World Health Organization 2001). *Activity limitations* are difficulties an individual may have in executing activities relating to mobility, self care or domestic life (Jette AM and Keysor J 2003). *Participation restrictions* are problems an individual may experience. Disability and functioning are defined as umbrella terms (Marilyn J. Field and Alan M. Jette 2007). In the pictorial representation of the ICF (Figure 4), the terms disability and functioning do not exist. Disability and functioning are considered outcomes of interactions between health conditions and contextual factors.



Source: World Health Organization. International Classification of Functioning, Disability and Health. Geneva. WHO, 2001.

Fig. 4. The International Classification of Functioning, Disability and Health (ICF) 2001

The first element of the ICF, the Body Functions and Structures is similar to Nagi’s concept of pathology and impairment while the second component of the ICF, the Activities and Participation closely corresponds to Nagi’s concept of functional limitations and disability (Jette AM and Keysor J 2003)(as shown in Table 2). The greatest limitations of the ICF is the aggregation of “activities and participation” into one domain (Guralnik and Ferrucci 2009). Using the ICF, the concepts of activity limitation and participation restriction are difficult to separate, unlike Nagi’s concept of functional limitations and disability. The ICF currently does not offer crisp distinction between activity and participation, although there is an increasing movement towards defining “activities” and “participation”. The Institute of Medicine (IOM) discussed this concern in its report entitled Future of Disability in America (Marilyn J. Field and Alan M. Jette 2007). Some sections of the report cited verbatim are as shown below:

“A first and well recognized aspect of the ICF that needs further development involves the interpretation and categorization of the concepts of activity and participation (page 42)”

“Several researchers have criticised the lack of clear operational differentiation between the concepts of activity and participation in the ICF as theoretically confusing and a step backward from earlier disability frameworks. Operational differentiation among concepts and the ability to measure each concept precisely and distinctly is important for clear communication, monitoring and research. (page 43)”

“Although this committee does not endorse any particular approach to resolving the problem, it believes that the lack of operational differentiation between the concepts of activity and participation is a significant deficit in the ICF. (page 44)”

Since the ICF’s distinction between activity and participation is still in the developmental stage, many studies have used the Nagi Disablement Model as a conceptual framework in their research to understand the dynamic relationships among factors associated with physical function. Furthermore, the ICF is not inherently a dynamic model, similar to the ICD-10, the ICF is a classification system that offers standardized internationally accepted language. It is also worth noting that the Nagi Disablement Model has been successfully used as a theoretical pathway that was empirically tested in many datasets (Guralnik and Ferrucci 2009). For example, evidence demonstrates the predictive value of disease for impairment (arthritis causing reduced strength) (Guralnik and Luigi 2003), of impairment for functional limitations (reduced strength leading to reduced gait speed) (Guralnik and Ferrucci 2009) and of functional limitations for disability (lower extremity limitations leading to activity of daily living and mobility disability) (Penninx, et al. 2000).

	Anatomical body parts	Physiological functions of the body	Task performance	Involvement in life roles
Disablement Model	Pathology Disease, injury, congenital condition	Impairment Dysfunctions and structural abnormalities in specific body systems	Functional Limitations Restrictions in basic physical actions	Disability The expression of a physical limitation in a social context
ICF	Body Functions and Structures Physiological functions of body systems and anatomical parts of body		Activities and Participation Activity : Execution of a tasks or action Participation: Involvement in a life situation	

Source: Jette AM, Keysor J. Disability Models: Implications for Arthritis Exercise and Physical Activity Interventions. Arthritis and Rheumatism (Arthritis Care and Research), 2003: 49; 114-120.

Table 2. The Disablement Model and the International Classification of Functioning, Disability and Health (ICF) frameworks.

5. Physical function measurement tools

Poor physical function can be assessed by using instruments based on self-report and by objective measurements or performance based tests. In the domain of physical and mobility