Zeitschrift für
Gerontologie + Geriatrie

Organ der Deutschen Gesellschaft für Gerontologie und Geriatrie und des Bundesverbandes Geriatrie e.V.

Z Gerontol Geriat 2011 · 44:250–255 · DOI 10.1007/s00391-011-0224-z

W. von Renteln-Kruse · U. Dapp · J. Anders · F. Pröfener · S. Schmidt · C. Deneke · R. Fertmann · J. Hasford · C. Minder

Der LUCAS*-Verbund

Inhalte interdisziplinärer Forschung zu ausgewählten Themen des Alterns sowie zur gesundheitlichen Versorgung älterer Menschen im urbanen Raum

www.zgg.springer.de

Springer Medizin

Z Gerontol Geriat 2011 · 44:250–255
DOI 10.1007/s00391-011-0224-z

W. von Renteln-Kruse[1] · U. Dapp[1] · J. Anders[1] · F. Pröfener[2] · S. Schmidt[3, 8] · C. Deneke[4] · R. Fertmann[5] · J. Hasford[6] · C. Minder[7]

[1] Forschungsabteilung und Medizinisch-Geriatrische Klinik, Albertinen-Haus Zentrum für Geriatrie und Gerontologie, Wissenschaftliche Einrichtung an der Universität Hamburg
[2] Hamburgische Pflegegesellschaft (HPG)
[3] Institut für Medizinische Psychologie, Universitätsklinikum Hamburg-Eppendorf (UKE)
[4] Fakultät Life Sciences, Hochschule für Angewandte Wissenschaften Hamburg (HAW)
[5] Behörde für Gesundheit und Verbraucherschutz (BGV), Freie und Hansestadt Hamburg
[6] Institut für Medizinische Informationsverarbeitung, Biometrie und Epidemiologie (IBE), Ludwig-Maximilians-Universität München
[7] Horten Zentrum, Universität Zürich
[8] Abteilung Gesundheit & Prävention, Ernst-Moritz-Arndt-Universität Greifswald

The LUCAS* consortium

Objectives of interdisciplinary research on selected aspects of ageing and health care for older people in an urban community

The interactions between the continuous rise in life expectancy, changes in morbidity and disability trends are complex. At worst, the increase in life expectancy is accompanied by an increase in functional decline and disability. Frailty adds considerably to multimorbidity in the oldest ages. Therefore studying determinants of healthy ageing and health behaviour, changes in functioning and the development of frailty is of major importance [18]. This complexity and the implications for practical health-care provision warrant an interdisciplinary approach. According to the issues of the research funding program "Health in Old Age" (Gesundheit im Alter) of the German Federal Ministry of Education and Research both an interdisciplinary and a cross-sectional approach are central to the LUCAS (Longitudinal Urban Cohort Ageing Study) project (**Fig. 1**).

Decline in functional competence is a major determinant of older persons' needs, and the loss of independence and autonomy is of serious concern in older persons [7, 15]. Although the majority of elderly people in Germany are free from significant disability its rate is increasing with advancing age as reflected by the rate of frailty [20]. However, there is growing evidence that restrictions in daily life activities may respond to pro-active, preventative and therapeutic interventions. Accordingly, health promotion and disease prevention [6, 22] as well as studies on geriatric syndromes [5, 23] both refer to functional disability research.

Most research questions addressed in the LUCAS subprojects deal with particular aspects of functional competence. The reason is because results from studies in community-dwelling and in hospitalised older persons stressed the importance of functional capacities with regard to the development of dependency, use of medical and nursing care, clinical outcome and mortality. The subprojects refer to different target groups and care settings as shown in **Fig. 2**. Health-status dimensions are core components of comprehensive geriatric assessment [19]. The assessment instruments applied were chosen in order to facilitate cross-sectional comparisons between the study participants from different settings, i.e. general practices in the community, hospital and nursing home.

Methods

The LUCAS subprojects apply the following methodological approaches: a true longitudinal cohort follow-up study [10], as well as cross-sectional comparative and prospective interventional studies. Most LUCAS research questions originate from common problems confronted in practical health care in the ambulatory, hospital and nursing home care settings. The aims of the LUCAS project refer to multidimensional determinants of normal ageing and preclinical markers of

*Longitudinal Urban Cohort Ageing Study (Longitudinale Urbane Cohorten Alters Studie)

disablement as reflected by functional decline, pre-frailty and the frailty-syndrome.

In 2007/2008, all participants of the longitudinal cohort (subproject 1) were classified according to their functional state into subgroups as FIT, PRE-FRAIL or FRAIL. A random selection of participants from each of these subgroups was further assessed in two separate subprojects (subprojects 3 and 5). Another subproject (subproject 4) dealt with health and posttraumatic stress or depressive symptoms in persons who had or had not experienced displacement caused by World War II (**Fig. 3**). The LUCAS subprojects refer to particular samples, i.e.

- *A*: longitudinal urban cohort,
- *B*: hospital in-patients, and
- *C*: representative urban sample (**Fig. 1**).

A: Longitudinal urban cohort in the metropolitan region of Hamburg

Subproject 1

The longitudinal urban cohort (Fig. 1, Fig. 2, Fig. 3).

The LUCAS core project is a longitudinal follow-up study of a cohort of community-dwelling persons initially recruited in 2000/2001 (*N*=3,326 from the patient registers of 21 general practitioners in Hamburg) who then were 60 years and older, without need of help in basic activities of daily living, no nursing care according to the German long-term care legislation, no cognitive impairment, without terminal disease and able to understand German [8]. The study participants were characterised at baseline and in three further waves (1-, 7-, 9-year follow-up) by a multidimensional dataset covering socioeconomic status, self-perceived health, mood, memory, comorbidity, pain, medication use, functional status, fall risk, vision, hearing, oral health, physical activity, nutrition, alcohol and tobacco use, modal split: walking, cycling, car driving, use of public transport, use of urban activity space (surveillance zone), preventive care use (vaccinations and check-ups) and health behaviour attitudes. The re-recruitment of study participants was successful as reflected by dropout rates of less than 5% per year (from 2000/2001 to 2009).

Abstract · Zusammenfassung

Z Gerontol Geriat 2011 · 44:250–255 DOI 10.1007/s00391-011-0224-z

W. von Renteln-Kruse · U. Dapp · J. Anders · F. Pröfener · S. Schmidt · C. Deneke · R. Fertmann · J. Hasford · C. Minder

The LUCAS* consortium. Objectives of interdisciplinary research on selected aspects of ageing and health care for older people in an urban community

Abstract

Background. Decline in functional competence is a major determinant of older persons' needs, the development of dependency, use of care, clinical outcome and mortality. The interactions between rising life expectancy and changes in morbidity and disability warrant interdisciplinary research on functional disability, health promotion and prevention. The LUCAS (Longitudinal Urban Cohort Ageing Study) research consortium was established to study particular aspects of functional competence, its changes with ageing, to detect preclinical signs of functional decline, and to address questions on how to maintain functional competence and to prevent adverse outcome. The questions originate from problems encountered in practical health care provision in different settings, i.e. community, hospital and nursing home.

Methods. The subprojects apply a longitudinal cohort follow-up study, an embedded randomised controlled intervention, cross-sectional comparative, and prospective intervention studies.

Conclusion. The results will provide instruments to screen for preclinical signs of functional decline and concrete recommendations to sustain independence and prevent adverse outcomes in older age in daily practice.

Keywords

Functional competence in old age · Mobility · Frailty syndrome · Longitudinal cohort study · Multidimensional assessment

Der LUCAS*-Verbund. Inhalte interdisziplinärer Forschung zu ausgewählten Themen des Alterns sowie zur gesundheitlichen Versorgung älterer Menschen im urbanen Raum

Zusammenfassung

Hintergrund. Abnehmende funktionale Fähigkeiten bestimmen die Bedürfnisse älterer Menschen, die Entwicklung von Abhängigkeit, die Inanspruchnahme von Versorgungsleistungen, klinischen Verlauf und Mortalität. Die Wechselwirkungen zwischen steigender Lebenserwartung und Veränderungen von Morbidität und Behinderung erfordern interdisziplinäre Forschung zu funktionaler Beeinträchtigung, Gesundheitsförderung und Prävention. Der LUCAS-Forschungsverbund (Longitudinale Urbane Cohorten Alters Studie) untersucht Teilaspekte von funktionaler Kompetenz und ihren Veränderungen im Alter, um präklinische Hinweise für Fähigkeitsverlust aufzudecken und zu fragen, wie funktionale Kompetenz am besten zu erhalten und ungünstige Verläufe zu vermeiden sind. Die Forschungsfragen betreffen Probleme praktischer Gesundheitsversorgung in verschiedenen Bereichen, d. h. ambulant, im Krankenhaus und Pflegeheim.

Methodik. In den Teilprojekten kommen eine Kohorten-Längsschnittsstudie, eine darin eingebettete, randomisiert kontrollierte Interventionsstudie, vergleichende Querschnitts- sowie prospektive Interventionsstudien zur Anwendung.

Schlussfolgerungen. Die Ergebnisse liefern Hinweise zum Screening beginnender funktionaler Verluste bei älteren Menschen und konkrete Handlungsanweisungen für die tägliche Praxis mit dem Ziel, Selbstständigkeit zu erhalten und ungünstige Verläufe im Alter zu vermeiden.

Schlüsselwörter

Funktionale Kompetenz im hohen Alter · Mobilität · Frailty-Syndrom · Longitudinale Kohortenstudie · Multidimensionales Assessment

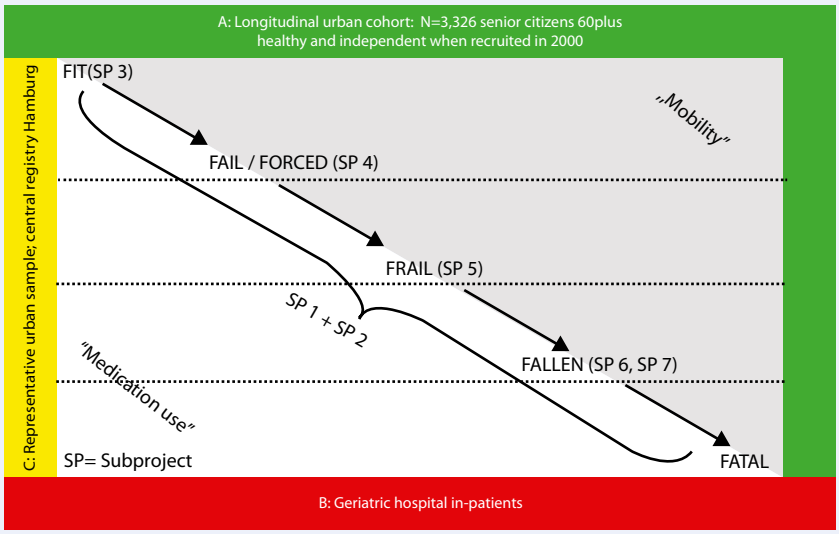

Fig. 1 ▲ Conceptual frame of the Longitudinal Urban Cohort Ageing Study (LUCAS)

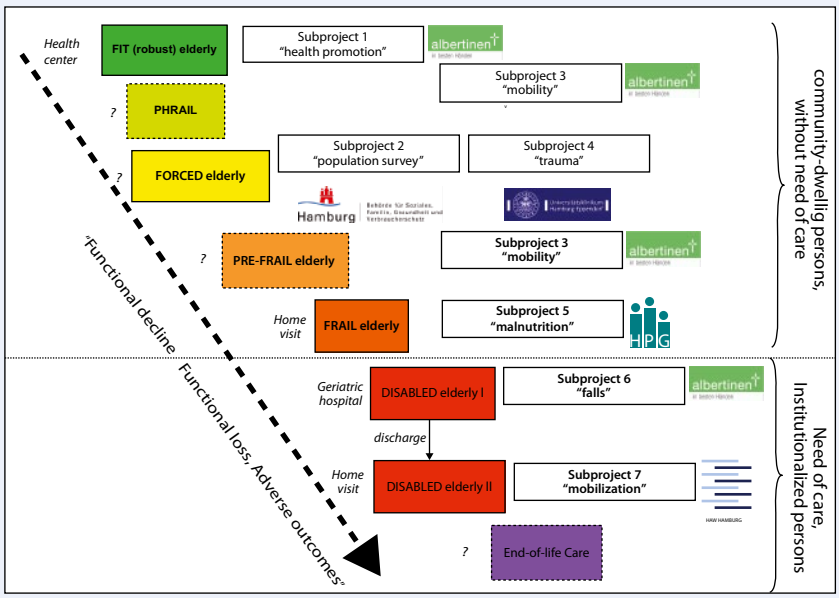

Fig. 2 ▲ LUCAS subprojects addressing normal ageing, functional decline, frailty and adverse outcome

Embedded was a randomised controlled study testing effects of a health risk appraisal for older people (HRA-O) program with personal reinforcement. Among the intervention group (*N*=878), 580 persons made use of personal reinforcement, i.e. interdisciplinary small group sessions (*N*=503, 87%) or home visits (N=77, 13%) in addition to a regionally adapted HRA-O questionnaire. At the 1-year follow-up, persons in the intervention group had higher use of preventive services and more favourable health behaviour, as compared to the controls [8].

The main question of the project is how to maintain functional competence and to prevent disability by obtaining a quantitative description of the course of ageing using periodic assessments of key parameters over a 10-year period to obtain results appropriate for health care services in robust (fit), pre-frail and frail elderly persons. Long-term effects of the randomised controlled interventions will also be studied.

Subproject 3

Mobile metropolitans—FIT (Fig. 1, Fig. 2, Fig. 3).

The subproject with its focus on mobility, gait and balance studied the functional status of the subgroup of healthy, independent elderly persons classified as 'FIT' in order to describe normal values, to evaluate adequate instruments to assess functional competence and to validate the study participants' self reports by objective measurements. The aim was to differentiate between FIT or robust and PRE-FRAIL community-dwelling elderly persons with early symptoms of functional decline.

A random sample of 143 persons was drawn from the longitudinal cohort of whom 102 persons (47 males, 55 women, median age 72 years) agreed to participate and were investigated by an Extended Gerontological-Geriatric Assessment (EGGA) including a standardised interview [1], electronic gait analysis [3] and preventative recommendations. This assessment including a new fall-risk check was particularly developed for the target group of community-dwelling elderly persons in order to avoid potential ceiling effects with instruments used in the clinical setting. A subsample of 67 persons agreed to participate in neuropsychological testing [2]. Pre-tests suggested that there would be persons with mild cognitive impairment (MCI).

The majority of study participants rated their health as good or excellent. However a median of four chronic diseases (min 1–max 10) were reported with a median of 2.5 (min 0–max 9) symptoms such as slight pain. The functional level was high as reflected by regular performance of physical activities (87.3%) or social activities (96.1%). There were almost no geriatric syndromes or geriatric problems in this sample, for example high risk of falling (11%). However, depressed mood and fear were reported in a third of the study participants.

The results of some performance tests, e.g. as gait tests were not different from results in younger persons. Surprisingly, one third of the study participants showed slight difficulties in cognitive screening (Clock Completion Test). Neuropsychological testing did not reveal consider-

able cognitive impairment. However, persons with potential evidence of MCI in the screening tended to avoid further investigation. Finally, 7 and 9 years after inclusion into the study, the majority of persons still remained in the subgroup classified as being 'FIT'.

Subproject 5

Preventive home and nursing home visits for functional decliners—FRAIL (Fig. 1, Fig. 2, Fig. 3).

Data were collected on circumstances, course and handling of frailty with a focus on nutritional aspects [16]. Multidimensional assessments were performed during home visits in a randomised sample of persons with functional decline from the longitudinal cohort. In addition, Mini Nutritional Assessments were performed in care recipients. The subproject examined the impact, context and enhancement of nutritional habits as unintentional weight loss is regarded a frailty key component. The community-dwelling participants turned out to be frail due to loss of strength, reported fatigue, slowing of walking and reduced physical activity, but very seldom unintentional loss of weight.

The detailed cross-sectional data were additive to those of the LUCAS longitudinal cohort. The subproject explored self-related and social resources in frail persons, and the need for low-threshold professional advisory services.

Subproject 4

Psychosocial adaptation and subjective health in older adults with and without displacement after World War II—FORCED (Fig. 1, Fig. 2, Fig. 3).

This subproject studied the long-term effects of wartime trauma on the mental health of aged people displaced and non-displaced in World War II in those subjects from the longitudinal cohort who had reported displacement. Quantitative and qualitative methods (questionnaires and biographical interviews) were combined to explore the determinants of mental and physical health in old age based on the persons' biographical information [21].

The specificity of biography indicated a major psychological burden in displaced persons with four or more war traumas (64%). In contrast to non-displaced people, displaced reported significantly more traumatic experiences. The displaced showed higher scores relating to depression and posttraumatic stress disorder. No significant differences were detected with regard to panic disorder. Displaced people rated their health as significantly poorer compared to non-displaced people. However, displaced were not more constrained in their activities and did not consult physicians more often. Thus, 53% of the variance of health-related quality of life was predicted through significant contributions to social integration, low anxiety and depression scores, a positive attitude towards age and social support. The study showed a high level of acceptance of the biographical interviews, and even video documentation was accepted by the older study participants.

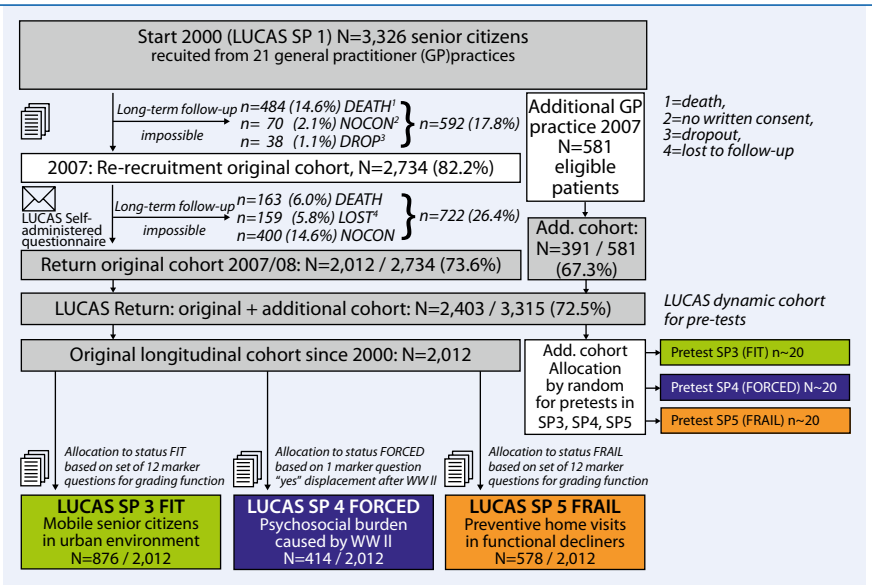

Fig. 3 ▲ Flowchart of the LUCAS longitudinal urban cohort (subproject 1) and LUCAS subprojects 3, 4 and 5

B: Complementary sample of geriatric hospital in-patients

Subproject 6

In-hospital falls and relation to drug use—FALLEN (Fig. 1, Fig. 2).

Falls are among the most frequent unwanted events in older hospital in-patients. However, information on fall-prevention intervention in hospitals is still limited [14]. In particular, combinations of fall-risk factors are highly prevalent in hospitalised elderly patients, and preventive measures effective in community-dwelling older persons cannot be simply translated to the hospital setting. The aim was to further improve prevention of in-hospital falls [17] by reducing the use of fall-risk increasing and potentially inappropriate medication and by optimising the identification of patients at high risk of falling.

Preliminary results show that few selected parameters are strongly associated to in-hospital falls. In a retrospective case–control study, potentially inappropriate medication (PIM) as evaluated according to the PRISCUS list [11] was associated with in-hospital falls [13].

Subproject 7

Immobility in older patients: nurse-driven counselling—FALLEN (Fig. 1, Fig. 2).

The subproject's aim was to develop and implement a concept for nurse-driven patient counselling in order to sustain mobility in patients with multimorbidity after discharge from hospital. Based on current state of research a multidimensional concept was developed integrating coping strategies, prevention and health promotion [4]. An extended understanding of mobility includes psychological, physical, emotional and cognitive dimensions. The intervention was based on unstructured participating observation. Preliminary results show that a resource-orient-

ed consultation added to improved mobility and quality of life on a sustainable level.

C: Representative urban sample (central registry Hamburg)

Subproject 2

Representative cross-sectional comparisons of elderly citizens in Hamburg (Fig. 1, Fig. 2).

The objective was to collect, describe and evaluate information on health status, health determinants, health competence and health literacy of Hamburg citizens aged 60 years and older in a representative random sample including persons with migration background (mean age 71±7 years). The methodological approach combined computer-assisted telephone interviews and written, short questionnaires. The questions of the telephone interview were adapted to instruments used in the LUCAS subprojects 1 and 4, and the telephone interviews (nationwide surveys) by the Robert Koch Institute. These were provided in German, English, French, Turkish and Polish. The study was successfully completed with over 1,200 telephone interviews and over 1,600 written, short questionnaires.

The preliminary results [9] are in accordance with the findings from other investigations that higher economic status was associated with better self-perceived health [12]. About one third of the study participants (36%) had experiences in health promotion with a focus on mobility (28%), nutrition (14%) and stress coping strategies (11%). The preliminary results [9] will be completed by a second health record to be published in 2011. Both health reports will contribute to maintain and/or improve health in the elderly population of Hamburg.

Comments

The LUCAS consortium members represent the fields of geriatrics, gerontology, medical geography, sport science, nursing science, psychology, statistics and epidemiology, social science, economics and public health according to the interdisciplinary approach. This approach has integrated motivational, affective and cognitive factors in most subprojects. Correlates of frailty are considered not only from a clinical perspective but also from the perspective of social and behavioural science. The subprojects 1, 3, 4 and 5 have identified important affective and behavioural components of healthy ageing which will be used as outcomes in intervention studies.

It is of relevance to consider individual resources, risk factors, health and sociopsychological problems to develop appropriate interventions for promoting or reconstituting health in older persons. A multidimensional approach to evaluate determinants of healthy ageing has been applied whenever possible in the subprojects. It is a challenge dealing with interdisciplinary teams to follow the general lines and to always keep in mind the practical context. Therefore, the LUCAS consortium members are grateful for the input provided by the members of the LUCAS advisory board[1] representing those scientific disciplines engaged in the LUCAS subprojects, the official representative of the senior citizens of Hamburg and representatives of administrative institutions in the community.

Particular emphasis is paid to translational aspects in order to provide research findings back to practice. For example, a geriatric mobility centre is planned as a model of integrated service provision including general practitioners, nurse consultants, the geriatric clinic and existing community network resources. Another subproject will evaluate and provide research data appropriately to be used for educational purposes.

[1] Carsten Hendriksen, Copenhagen; Angelika Kempfert, Hamburg; Reto W. Kressig, Basel; Klaus Püschel, Hamburg; Doris Schaeffer, Bielefeld; Tischa J.M. van der Cammen, Rotterdam; Petra Weritz-Hanf, Berlin; Irmgard Wolff, Hamburg

Corresponding address

Prof. Dr. W. von Renteln-Kruse
Forschungsabteilung und Medizinisch-Geriatrische Klinik, Albertinen-Haus Zentrum für Geriatrie und Gerontologie, Wissenschaftliche Einrichtung an der Universität Hamburg
Sellhopsweg 18–22, 22459 Hamburg
w.renteln-kruse@albertinen.de

Acknowledgment. The LUCAS research consortium is funded by the German Federal Ministry of Education and Research (BMBF grant nos. 01 ET 0708, 01 ET 0709, 01 ET 0710, 01 ET 0711, 01 ET 0712).

Conflict of interest. The corresponding author states that there are no conflicts of interest.

References

1. Anders J, Dapp U, Laub S, Renteln-Kruse W von (2007) Einfluss von Sturzgefährdung und Sturzangst auf die Mobilität selbständig lebender, älterer Menschen am Übergang zur Gebrechlichkeit. Z Gerontol Geriat 40:255–267
2. Anders J, Kowalewski V, Golgert S et al (2011) Früherkennung physischer, kognitiver und psychischer Risikofaktoren für das Frailty-Syndrom in der geriatrischen Mobilitäts-Ambulanz. In: Stoppe G (ed) Die Versorgung psychisch kranker alter Menschen. Deutscher Ärzteverlag, Köln, pp 77–85
3. Bridenbaugh SA, Kressig RW (2011) Laboratory review: the role of gait analysis in seniors' mobility and fall prevention. Gerontology 57:256–264
4. Brunnett R, Hasseler M, Strupeit S, Deneke C (2009) The concept of mobility revisited. J Nutr Health Aging 13(Suppl 1):667
5. Cigolle CT, Langa KM, Kabeto MU et al (2007) Geriatric conditions and disability: The Health and Retirement Study. Ann Intern Med 147:156–164
6. Dapp U, Anders J, Renteln-Kruse W von, Meier-Baumgartner HP (2005) Active health promotion in old age: methodology of a preventive intervention programme provided by an interdisciplinary health advisory team for independent older people. J Public Health 13:122–127
7. Dapp U, Lorentz CH, Laub S et al (2009) Im Alter aktiv und gesund leben – Ergebnisse einer repräsentativen Seniorenbefragung in Hamburg. Z Gerontol Geriat 42:245–255
8. Dapp U, Anders JAM, Renteln-Kruse W von et al (2011) A randomized trial of effects of a health risk appraisal combined with group sessions or home visits on preventive behaviours in older adults. J Gerontol A Biol Med Sci 66A:591–598
9. Freie und Hansestadt Hamburg Behörde für Soziales, Familie, Gesundheit und Verbraucherschutz (BSG) Amt für Gesundheit u. Verbraucherschutz Fachabteilung Gesundheitsberichterstattung und Gesundheitsförderung (2010) Die Gesundheit älterer Menschen in Hamburg I. http://www.hamburg.de/gesundheitsberichte. Accessed 7 July 2011
10. Guralnik JM, Kritchevsky SB (2010) Translating research to promote healthy aging: the complementary role of longitudinal studies and clinical trials. J Am Geriatr Soc 58:S337–S342
11. Holt S, Schmiedl S, Thürmann PA (2010) Potenziell inadäquate Medikation für ältere Menschen: Die PRISCUS-Liste. Dtsch Arztebl Int 107(31–32):543–551

12. Lampert T, Ziese T (2005) Armut, soziale Ungleichheit und Gesundheit. Expertise des Robert-Koch-Instituts zum 2. Armuts- und Reichtumsbericht der Bundesregierung. Robert-Koch-Institut im Auftrag des Bundesministeriums Gesundheit und Soziale Sicherung, Berlin. http://www.bmas.de/portal/988/property=pdf/armut_soziale_ungleichheit_und_gesundheit.pdf. Accessed 7 July 2011
13. Modreker MK, Neumann L, Hoffmann V et al (2010) Medikation, potenziell ungeeignete Medikamente, die PRISCUS-Liste und Stürze älterer Patienten im Krankenhaus. Z Gerontol Geriat 43(Suppl 1):23
14. Oliver D, Healey F (2010) Preventing falls and fall-related injuries in hospitals. Clin Geriatr Med 26:645–692
15. Phelan EA, Anderson LA, LaCroix AZ, Larson EB (2004) Older adults' view of 'successful aging' – how do they compare with researchers' definitions? J Am Geriatr Soc 52:211–216
16. Pröfener F, Anders J (2008) Ernährung und Flüssigkeitsversorgung von Seniorinnen in unterschiedlichen Lebens- und Versorgungssituationen. Z Gerontol Geriat 41(Suppl 1):105
17. Renteln-Kruse W von, Krause T (2007) Incidence of in-hospital falls in geriatric patients before and after the introduction of an interdisciplinary team-based fall-prevention intervention. J Am Geriatr Soc 55:2068–2074
18. Robine JM, Michel JP (2006) Looking forward to a general theory on population aging. Tijdschr Gerontol Geriatr 37:29–37
19. Rubenstein LZ, Wieland D, Bernabei R (eds) (1995) Geriatric assessment technology: the state of the art. Editrice Kurtis, Milan
20. Santos-Eggimann B, Cuénoud P, Spagnoli J, Junod J (2009) Prevalence of frailty in middle-aged and older community-dwelling Europeans living in 10 countries. J Gerontol A Biol Sci Med Sci 64A:675–681
21. Strauss K, Dapp U, Anders J et al (2011) Range and specificity of war-related trauma to posttraumatic stress; depression and general health perception: displaced former World War II children in late life. J Affect Disorders 128:267–276
22. Stuck AE, Kharicha K, Dapp U et al (2007) Development, feasibility and performance of a health risk appraisal questionnaire for older persons. BMC Med Res Methodol, doi:10.1186/1471-2288-7-1
23. Tinetti ME, Fried T (2004) The end of the disease era. JAMA 116:179–185