



Prevalence of geriatric conditions: A hospital-wide survey of 455 geriatric inpatients in a tertiary medical center

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ABSTRACT

The aim of this study was to investigate the prevalence of common geriatric conditions in a tertiary medical center. We conducted a cross-sectional, hospital-wide survey of 455 inpatients, aged 65 and older, from 24 medical and surgical units of a 2200-bed urban academic medical center in Taiwan. Patients were screened in face-to-face interviews for 15 geriatric conditions. The prevalence of geriatric conditions was determined and compared by medical versus surgical services. Our sample of participants had a mean age of 75.3 ± 6.1 years (\pm S.D.), range = 65–92. The prevalence of geriatric conditions ranged from 5% (pressure ulcers) to 57% (polypharmacy; taking > 5 prescriptions). The majority was visually impaired (74%) and complained of sleep disturbance during their hospital stay (58%). Prevalence rates of certain geriatric conditions differed significantly between medical and surgical units, suggesting that care should address not only common conditions but also those with higher rates on different units. Furthermore, high rates of geriatric conditions indicate strong needs for care that does not fit into traditional disease models of medicine. Care should be better targeted to address different risks for geriatric conditions of medical versus surgical geriatric inpatients in acute care settings.

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1. Introduction

Older patients aged 65 and older are at increased risk of suffering adverse outcomes of hospitalization. Indeed, the prevalence of geriatric conditions for hospitalized patients has been reported between 7% and 78% (Nair et al., 2000; Covinsky et al., 2003; Flood et al., 2006, 2007; Anpalahan and Gibson, 2008). This wide range in figures is due to differences in the conditions studied, methods employed, and indicators used for defining geriatric conditions.

Geriatric conditions such as incontinence, falls, malnutrition, depression, pressure ulcers, functional dependence, cognitive impairment, delirium, insomnia, and polypharmacy are not part of the traditional disease model of medicine and may be overlooked in the care of geriatric inpatients (Cigolle et al., 2007). The geriatric conditions commonly seen in the hospital have been called geriatric syndromes (Reuben et al., 1996). This term has been embraced by geriatricians to capture the clinical conditions in geriatric patients that are a necessary focus in managing patients (Inouye et al., 2007). The presence of these geriatric syndromes or conditions has been reported to strongly predict adverse outcomes of hospitalization, including prolonged

length of hospital stay, nursing home placement, and even death (Anpalahan and Gibson, 2008). However, no definition of geriatric syndrome or condition is generally accepted, leading to variation in what is considered a geriatric syndrome or geriatric condition (Flacker, 2003). For instance, most health care researchers and providers agree that incontinence, pressure ulcers, cognitive impairment, and falls are geriatric syndromes, but there is less agreement that depression, polypharmacy, and dehydration also qualify (Cigolle et al., 2007). In this study, we used the term “geriatric conditions” to indicate a collection of signs and symptoms common in older inpatients, but not necessarily fitting into discrete disease categories. We included all geriatric conditions for which our survey data were available.

The majority of reported prevalence data has been drawn from samples of geriatric inpatients at special geriatric units or at best, from selected medical units (Covinsky et al., 2003; Flood et al., 2006, 2007). However, the prevalence of geriatric conditions for geriatric patients admitted to surgical services has been less clear. With the number of older adults increasing dramatically and advances in surgical technology, those requiring surgery will proportionally increase in number. Furthermore, data on the prevalence of these common geriatric conditions, both at surgical and medical units are not available in the Taiwanese context. For clinicians and hospital administrators, knowing prevalence data is important for resource allocation and quality improvement.

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Therefore, the purpose of this cross-sectional hospital-wide survey was to examine the prevalence of geriatric conditions commonly occurring in geriatric inpatients of a tertiary medical center in Taiwan. We examined 15 common geriatric conditions: cognitive impairment, depression, functional dependence, malnutrition, polypharmacy, urinary or fecal incontinence, pressure ulcers, anemia, dehydration, visual and hearing impairment, chewing and swallowing difficulties, and sleep disturbance. We also compared the prevalence of geriatric conditions between medical and surgical services.

2. Methods

2.1. Design

For this population-based, hospital-wide survey of geriatric inpatients, subjects were recruited by probability sampling with rotation method and assessed once during their hospital stay. This approach allowed the random survey of as many older hospitalized patients within a 2200-bed medical center as possible. All medical and surgical units except the intensive care and special oncology units (in another building) were randomly assigned a serial number from 1 to 24. Starting with the first unit in the series, two research nurses visited one unit a day, where they enrolled and screened all qualified subjects (see criteria in Section 2.2). The next day, research nurses moved to the next unit and screened all eligible subjects on that unit. The rotation process continued in this manner until all units had been visited. In total, five rounds of 24-unit visits were completed with 455 subjects enrolled to ensure a representative sample in terms of prevalence and risk factor profile for the studied geriatric conditions.

2.2. Study population

All 24 surgical and medical units at a 2200-bed tertiary medical center in urban Taipei, Taiwan, were randomly assigned a serial number. As described above, research nurses visited one unit a day and screened all inpatients for two inclusion criteria: age ≥ 65 years and able to communicate. Of the 1149 elderly patients screened, 474 did not meet the inclusion criterion for ability to communicate due to coma ($n = 75$), intubation ($n = 85$), verbal dysfunction or aphasia ($n = 118$), severe hearing loss ($n = 81$), respiratory isolation ($n = 105$), and others ($n = 10$). Of the 675 eligible patients, 455 (67.4%) were enrolled. The reasons given for not participating were conflict with scheduled diagnostic procedures ($n = 112$), not feeling well ($n = 50$), and declined to consent ($n = 58$). Subjects who declined to participate ($n = 108$) and those in our analysis ($n = 455$) did not differ significantly with respect to age ($p = 0.422$), gender ($p = 0.354$), education ($p = 0.711$), and type of specialty unit ($p = 0.562$).

2.3. Data collection and measures

Before data were collected, the study was approved by the Research Ethics Review Committee of the National Taiwan University Hospital. Data on study variables were collected by two trained research nurses who approached all eligible patients, explained the nature and purpose of the study, and invited them to participate. After patients signed informed consent, they were screened one time in face-to-face encounters for demographics, comorbidities, medications taken, cognitive status, depressive symptoms, functional dependence (performance of activities of daily living = ADL), nutritional status, urinary or fecal incontinence (yes/no), pressure ulcers (yes/no), dehydration (yes/no), anemia (yes/no), visual/hearing impairment (yes/no), chewing/swallowing difficulty (yes/no), and sleep disturbance (yes/no).

Demographics, number of prescriptive medications, and comorbidities were obtained from the medical record and confirmed by patient interview. Polypharmacy was defined as taking more than 5 prescriptive medications daily (Fulton and Allen, 2005). Comorbidities were based on the Charlson comorbidity index (CCI) which categorizes patients' mortality risk by the sum of weighted comorbidities into three groups by score: 0, 1, or ≥ 2 (Charlson et al., 1987).

Cognitive status was measured by the 11-item Chinese minimal state examination (MMSE), with scores < 20 (out of 30) indicating cognitive impairment (Folstein et al., 1975; Shyu and Yip, 2001). Depressive symptoms were measured by the 15-item Chinese version geriatric depression scale (GDS-15), with summed scores > 10 indicating depression (Yesavage et al., 1982–1983; Liu et al., 1998).

Functional status (performance of ADL) was measured by the 10-item Chinese version Barthel Index (BI), with scores < 60 indicating functional dependence (yes/no; Mahoney and Barthel, 1965; Chen et al., 1995). Nutritional status was measured by the 18-item Chinese version mini-nutritional assessment (MNA), with summed scores < 17.5 indicating malnutrition (Guigoz et al., 1996; Tsai et al., 2007).

A geriatric conditions checklist was used to assess urinary or fecal incontinence (yes/no), visual impairment (yes/no; defined as corrected vision worse than 20/70 using a special hand-held card), self-reported hearing impairment and chewing/swallowing difficulty (yes/no), self-reported sleep disturbance (yes/no), and pressure ulcers (yes/no; confirmed by raters). Sleep disturbance was screened by asking patients, "How have you been sleeping in the hospital?" When patients complained of sleep disturbance, probe questions were asked to identify the cause (environmental problems, pain- or dyspnea-related).

Laboratory data (serum hemoglobin, blood urea nitrogen, and creatinine) were extracted from medical records. Dehydration (yes/no) was defined as the ratio of plasma blood urea nitrogen to creatinine ≥ 18 (Inouye et al., 2000). Anemia (yes/no) was defined as a serum hemoglobin level < 12 g/dl for females and < 13 g/dl for males (WHO, 1994).

2.4. Statistical analysis

The data were double entered to ensure accuracy. Significance was set at $p < 0.05$. Descriptive statistics were used to characterize the sample and examine prevalence rates of geriatric conditions. For continuous measures whose values were dichotomized for analytic purposes, standard cutoff scores were employed.

3. Results

3.1. Participants

Our study sample was relatively diverse in age, gender, and educational level (Table 1). Most of the sample was married, living with others, and retired. The participants had a mean age of 75.3 ± 6.1 years, range = 65–92. Almost half the sample (42.9%) was illiterate, with a mean of 5.3 ± 5.4 of education (Table 1). Overall, 59.3% were admitted for surgical service. The mean CCI was 2.8 ± 2.2 with only 14% of participants scoring 0 and 73% scoring ≥ 2 , suggesting a very high mortality risk.

3.2. Overall prevalence of geriatric conditions

Geriatric conditions were highly prevalent among the 455 participants (Table 2). Cognitive impairment was common, with 21% of older participants having an MMSE score < 20 and 45% scoring less than 24 of 30 possible points. Depression was found in

Table 1
Sample characteristics and overall functionality, mean \pm S.D., or *n* (%).

Variables	
Age (years)	75.3 \pm 6.1
Education (years)	5.1 \pm 5.4
Females	229 (50.3)
Marital status	
Married	351 (77.1)
Widowed	100 (22.0)
Living with others	430 (94.5)
Retired	416 (91.4)
Monthly income >NTD\$ (\times 10K) ^a	315 (69.2)
Admitted for surgery services	270 (59.3)
CCI	2.8 \pm 2.2
Number of medications taken	5.2 \pm 2.9
BI score	61.2 \pm 26.1
MMSE score	23.4 \pm 4.6
GDS-15 score	7.7 \pm 3.8
MNA-score	18.7 \pm 4.2

^a NTD=New Taiwan Dollar; 32.5 NTD=1 USD.

30% of participants, with a GDS-15 score >10. Malnutrition was found in 33% of participants, with an MNA score <17.5. Functional dependence was common, with 42% severely dependent (BI < 60) in 10 ADLs. Polypharmacy was prevalent, with 57% of the sample taking at least 5 prescribed medications per day and 13% taking 9 or more. Urinary or fecal incontinence was identified in 14 and 8% of the sample, respectively, and pressure ulcers in 5%. Anemia was identified in 55% of subjects, and dehydration in 34%. Sensory impairment was common, with 74% having visual and 8% having hearing impairment. Chewing and swallowing difficulties were reported by 50% and 15% of the sample, respectively. The majority of participants (58%) complained of sleep disturbance, with 20% attributing their poor sleep to pain.

3.3. Prevalence of geriatric conditions: medical versus surgical units

Given the possibility of unit differences in geriatric conditions, we examined prevalence rates by medical versus surgical units. As shown in Table 3, rates of certain geriatric conditions differed significantly from medical to surgical units. The prevalence rates of malnutrition, functional dependence, both urinary and fecal incontinence, sleep disturbance, and percentage of sleep disturbance due to pain were significantly higher among surgical

Table 2
Overall prevalence of geriatric conditions in the sample of 455 subjects, *n* (%).

Geriatric condition	
Cognitive impairment, MMSE < 20	95 (20.9)
Depression, GDS > 10	134 (29.5)
Malnutrition, MNA < 17.5	148 (32.5)
Functional dependence, BI < 60	191 (41.9)
Polypharmacy (>5 medicines)	257 (56.5)
Polypharmacy (>9 medicines)	59 (13.0)
Urinary incontinence	103 (22.6)
Fecal incontinence	38 (8.4)
Pressure ulcers	24 (5.3)
Anemia ^a	252 (55.4)
Dehydration ^b	156 (34.3)
Visual impairment	335 (73.6)
Hearing impairment	36 (7.9)
Chewing difficulty	227 (49.9)
Swallowing difficulty	70 (15.4)
Sleep disturbance	264 (58.0)
Sleep disturbance due to pain	91 (20.0)

^a Anemia was defined as Hb <12 g/dl for females and <13 g/dl for males.

^b Dehydration was defined as the ratio of serum urea nitrogen to creatinine \geq 18.

Table 3
Frequency of geriatric conditions: Medical versus surgical inpatients, compared by χ^2 -test, with exception of pressure ulcers, where Fisher's exact test was used; *n* (%).

Geriatric condition	Medical	Surgical	<i>p</i>
Number	185	270	
Important in both groups			
Cognitive impairment, MMSE < 20	40 (21.6)	55 (20.4)	0.747
Depression, GDS > 10	49 (26.5)	85 (31.5)	0.251
Polypharmacy, \geq 5	104 (56.2)	153 (56.7)	0.924
Polypharmacy, \geq 9	28 (15.1)	31 (11.5)	0.254
Dehydration ^a	59 (31.9)	97 (35.9)	0.084
Anemia ^b	101 (54.6)	151 (55.9)	0.746
Visual impairment	137 (74.1)	198 (73.3)	0.864
Hearing impairment	15 (8.1)	21 (7.8)	0.898
Chewing difficulty	98 (53.0)	129 (47.8)	0.276
Dominant in surgical services			
Malnutrition	47 (25.4)	101 (37.4)	0.007
Functional dependence, BI < 60	44 (23.8)	147 (54.4)	<0.001
Urinary incontinence	24 (13.0)	79 (29.3)	<0.001
Fecal incontinence	9 (4.9)	29 (10.7)	0.026
Sleep disturbance	95 (51.4)	169 (62.6)	0.017
Sleep disturbance due to pain	21 (11.4)	70 (25.9)	<0.001
Dominant in medical services			
Pressure ulcers	15 (8.1)	9 (3.3)	0.025
Swallowing difficulty	36 (19.5)	34 (12.6)	0.046

^a Anemia was defined as Hb <12 g/dl for females and <13 g/dl for males.

^b Dehydration was defined as the ratio of serum urea nitrogen to creatinine \geq 18.

patients ($p < 0.05$). Conversely, pressure ulcers and swallowing difficulty were more prevalent among geriatric inpatients in medical service ($p < 0.05$). Polypharmacy, depression, cognitive impairment, anemia, visual and hearing impairment, and chewing difficulty were prevalent across both medical and surgical inpatients.

4. Discussion

The prevalence rates of the individual geriatric conditions in our study are generally consistent with those reported (Inouye et al., 2000; Nair et al., 2000; Congdon et al., 2004; Cigolle et al., 2007; Flood et al., 2007; Chan et al., 2009; Chen et al., 2009). Some conditions, e.g., polypharmacy (56.6%), anemia (55.4%), functional dependence (41.9%), malnutrition (32.5%), depression (29.5%) were as prevalent as common chronic diseases, such as hypertension (66.3% for 60 years and older) and diabetes (23.1% for 60 years and older) (ADA, 2007; Ong et al., 2007). At least half of geriatric inpatients reported visual impairment or chewing difficulty and had experienced polypharmacy, anemia, and sleep disturbance during their hospital stay. These high rates of geriatric conditions reflect the complexity of care that clinicians face today in the hospital setting.

Among these high rates of geriatric conditions, polypharmacy is a practice habit that can be modified if enough attention is paid. "Prescribing cascade" is a known problem, in which a medication results in an adverse drug event (ADE) that is mistaken for a separate condition and treated with more medications, placing the patient at risk for additional ADEs (Rochon and Gurwitz, 1997). The complex practice of polypharmacy can be currently addressed by several strategies. One strategy is STOPP (screening tool of older person's potentially inappropriate prescriptions) criteria, a useful guide to identify potentially inappropriate medications, particularly in the hospital setting (Gallagher and Mahoney, 2008). Although not a substitute for clinical judgment, STOPP encourages clinicians to consider medications as a possible cause of symptoms in older people, thereby avoiding unnecessary and potentially harmful prescribing cascades. As a first step, clinicians should be aware of a high prevalence of polypharmacy and understand that less is more when prescribing for older patients.

The high rate of dehydration found in this study is also worth attention. Dehydration is common in older patients because of decreased muscle mass (resulting in less free extracellular water), blunted thirst response, treatment-related factors such as a fluid-restricted diet or nothing-by-mouth order, and accelerated fluid loss due to illness or medical procedures (Hodgkinson et al., 2003). In our sample of older hospitalized patients, 34.3% had a high BUN/creatinine ratio (≥ 18). Although such an elevated ratio could be explained by poor perfusion caused by congestive heart failure or abnormal water metabolism related to sarcopenia or autonomic neuropathy, it is more often a measure of dehydration (Lindeman et al., 2000; Stookey et al., 2005). Mild dehydration corresponding to only 1–2% of body weight loss in adults has been shown to lead to significant impairment in both cognitive function (alertness, concentration, short-term memory) and physical performance (endurance, sports skills) (Shirreffs, 2005). Better identification and prompt management of dehydration are clinically indicated in both medical and surgical older hospitalized patients.

Our study results allow clinicians to better prioritize and target care, thus adding to the geriatric literature by clarifying the prevalence of 15 common geriatric conditions on medical and surgical units. We found that cognitive impairment, depression, polypharmacy, dehydration, anemia, sensory impairment, and chewing difficulty were highly prevalent and common among both medical and surgical inpatients. General practice should cover the aspects of care for these conditions so less medication is prescribed and more attention is paid to screening and identifying older patients who are cognitively impaired, depressive, dehydrated, anemic, sensory deprived, and having difficulty chewing.

On the other hand, geriatric inpatients on surgical units were found to have significantly higher rates of functional dependence, malnutrition, urinary/fecal incontinence, sleep disturbance, and sleep disturbance due to pain, suggesting that these conditions need more attention. For example, better pain control would enhance sleep quality and reduce barriers to postsurgical mobilization. Enforcing mobilization would decrease functional dependence and prompt gastric emptying so intake might improve as well (Balzano et al., 2008). Early feeding/providing nutritional assistance for older postoperative patients hastens recovery (Correia and Da Silva, 2004). Furthermore, early catheter removal reduces urinary tract infections and might avoid development of urinary incontinence (Phipps et al., 2006).

Such findings echo current research on “fast-track surgery.” The concept of fast-track surgery, or enhanced recovery after surgery, has evolved from recent evidence-based advances in the care of surgical patients (Wilmore and Kehlet, 2001). These advances include epidural or regional anesthesia, minimally invasive techniques, and aggressive postoperative rehabilitation, which optimize pain relief, early mobilization, and nutrition (early oral feeding). The combination of these approaches reduces the stress response, organ dysfunction, and complications, thus improving postoperative recovery (Wilmore and Kehlet, 2001). In caring for geriatric patients undergoing surgical procedures, these approaches might be even more important. Our study further suggests that care of older inpatients with surgical conditions should address not only the common issues of cognition, depression, medication, and sensory/chewing difficulties, but also prioritize pain control, early mobilization, and nutritional assistance with closer attention paid to identifying and managing incontinence.

Conversely, geriatric inpatients from medical units reported higher prevalence rates of pressure ulcers and swallowing difficulty than surgical inpatients. This difference might reflect the chronicity of geriatric patients commonly seen in medical units. Nevertheless, this finding suggests that the care of older

patients on medical units should address not only the common issues of cognition, depression, medication, and sensory/chewing difficulties, but also pay closer attention to identifying and managing pressure ulcers and swallowing difficulty.

In conclusion, the high rates of functional dependence, malnutrition, cognitive impairment, and depression reported in this study have previously been linked to poor outcomes. For example, BI scores < 60 have not only been associated with poor outcomes, but also suggested to be a pivotal point at which patients moved from assisted independence to dependence (Sulter et al., 1999). Malnutrition is a major cause of functional decline and increased morbidity and mortality in geriatric patients (Olde Rikkert and Rigaud, 2003). Similarly, cognitive impairment has been shown to predict functional decline in geriatric patients (Mehta et al., 2002). Indeed, geriatric patients who developed cognitive decline during hospitalization were found to be 16 times more likely to develop functional decline than non-cognitive decliners (Pedone et al., 2005). These geriatric conditions are suggested by growing evidence to be markers for decline since their commonality has been associated with poor outcomes. Therefore, future studies should examine all these conditions in the context of a diverse geriatric population (not limited to certain disease categories), so a unified approach can be developed to target performance of ADLs, nutrition, cognition, and depressive symptoms (Chen et al., in press).

4.1. Strengths and weaknesses of the study

A major strength of the present study is that 15 common geriatric conditions were studied in a large and representative sample of hospitalized geriatric inpatients. The study had a few limitations. First, subjects were recruited from one medical center, which might limit the generalizability of our findings. Second, most conditions were identified by self-report questionnaires. Third, we used MMSE scores < 20 to indicate cognitive impairment, recognizing that important conditions such as delirium and dementia were not assessed. Further, all instruments are screening tools; although they are reasonable to use, their outcomes should be followed up by more thorough assessments.

5. Conclusion

This research has relevance to the ongoing care of geriatric patients. Geriatric conditions fall outside the disease models that now govern much of health care, resulting in geriatric conditions being highly prevalent as well as poorly recognized and managed (Oliver, 2008). One goal of a responsive health care system is to promote the well-being of those suffering from illness. Comprehensive geriatric assessment (CGA) is a multidisciplinary evaluation in which the multiple problems of older persons are uncovered, described, and explained, if possible, and in which the resources and strengths of the person are cataloged, need for services assessed, and a coordinated care plan developed (Chen et al., 2004; AGS, 2006). Randomized trials of CGA, applied across multiple health service settings, show this approach to be a cost-effective intervention that improves quality of life, quality of health, and quality of social care. Its benefits have been most robustly demonstrated when applied in a hospital or rehabilitation unit (AGS, 2006). Our study findings support the use of CGA to screen and develop care plans to manage these highly prevalent geriatric conditions, with different priorities for older patients admitted for medical versus surgical conditions.

Conflict of interest statement

None.

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References

- ADA (American Diabetes Association), 2007. Diabetes Statistics. Retrieved from <http://www.diabetes.org/diabetes-basics/diabetes-statistics/> on 19 February 2010.
- AGS (American Geriatrics Society), 2006. Comprehensive Geriatric Assessment Position Statement. Retrieved from: <http://www.americangeriatrics.org/products/positionpapers/cga.shtml> on 12 February 2010.
- Anpalahan, M., Gibson, S.J., 2008. Geriatric syndromes as predictors of adverse outcomes of hospitalization. *Intern. Med. J.* 38, 16–23.
- Balzano, G., Zerbi, A., Braga, M., Rocchetti, S., Beneduce, A.A., Di Carlo, V., 2008. Fast-track recovery programme after pancreaticoduodenectomy reduces delayed gastric emptying. *Br. J. Surg.* 95, 1387–1393.
- Charlson, M.E., Pompei, P., Ales, K.L., MacKenzie, C.R., 1987. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J. Chron. Dis.* 40, 373–383.
- Chan, D.-C., Hao, Y.-T., Wu, S.-C., 2009. Polypharmacy among disabled Taiwanese elderly: a longitudinal observational study. *Drugs Aging* 26, 345–354.
- Chen, C.-H., Kenefick, A., Tang, S.T., McCorkle, R., 2004. Utilization of a comprehensive geriatric assessment in cancer patients. *Crit. Rev. Oncol. Hematol.* 49, 53–67.
- Chen, C.-H., Tang, S.T., Wang, C., Huang, G.-H., 2009. Trajectory and determinants of nutritional health in older patients during and six-month post hospitalization. *J. Clin. Nurs.* 18, 3299–3307.
- Chen, C.-H., Dai, Y.-T., Yen, C.-J., Huang, G.-H., Wang, C., in press. Shared risk factors for distinct geriatric syndromes in older Taiwanese inpatients. *Nurs. Res.*
- Chen, Y.J., Dai, Y.T., Yang, C.T., Wang, T.J., Teng, Y.H., 1995. A Review and Proposal on Patient Classification in Long-term Care System. Department of Health, Republication of China, Taipei.
- Cigolle, C.T., Langa, K.M., Kabeto, M.U., Tian, Z., Blaum, C.S., 2007. Geriatric conditions and disability: the health and retirement study. *Ann. Intern. Med.* 147, 156–164.
- Congdon, N., O'Colmain, B., Klaver, C.C., Klein, R., Muñoz, B., Friedman, D.S., Kempen, J., Taylor, H.R., Mitchell, P., Eye Disease Prevalence Research Group, 2004. Causes and prevalence of visual impairment among adults in the United States. *Arch. Ophthalmol.* 122, 477–485.
- Correia, M.I., Da Silva, R.G., 2004. The impact of early nutrition on metabolic response and postoperative ileus. *Curr. Opin. Nutr. Metab. Care* 7, 577–583.
- Covinsky, K.E., Palmer, R.M., Fortinsky, R.H., Counsell, S.R., Stewart, A.L., Kresevic, D., Burant, C.J., Landefeld, C.S., 2003. Loss of independence in activities of daily living in older adults hospitalized for medical illnesses: increased vulnerability with age. *J. Am. Geriatr. Soc.* 51, 451–458.
- Flacker, J.M., 2003. What is a geriatric syndrome anyway? *J. Am. Geriatr. Soc.* 51, 574–576.
- Flood, K.L., Carroll, M.B., Le, C.V., Ball, L., Esker, D.A., Carr, D.B., 2006. Geriatric syndromes in elderly patients admitted to an oncology-acute care for elders units. *J. Clin. Oncol.* 24, 2298–2303.
- Flood, K.L., Rohlfing, A., Le, C.V., Carr, D.B., Rich, M.W., 2007. Geriatric syndromes in elderly patients admitted to an inpatient cardiology ward. *J. Hosp. Med.* 2, 394–400.
- Fulton, M.M., Allen, E.R., 2005. Polypharmacy in the elderly: a literature review. *J. Am. Acad. Nurse Pract.* 17, 123–132.
- Folstein, M.F., Folstein, S.E., McHugh, P.R., 1975. "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. *J. Psychiatr. Res.* 12, 189–198.
- Gallagher, P.J., Mahoney, D.O., 2008. STOPP (Screening Tool of Older Person's potentially inappropriate Prescriptions): application to acutely ill elderly patients and comparison with Beers's criteria. *Age Aging* 37, 673–679.
- Guigoz, Y., Vellas, B., Garry, P.J., 1996. Assessing the nutritional status of the elderly: the Mini Nutritional Assessment as part of the geriatric evaluation. *Nutr. Rev.* 54, S59–S65.
- Hodgkinson, B., Evans, D., Wood, J., 2003. Maintaining oral hydration in older adults: a systematic review. *Int. J. Nurs. Pract.* 9, S19–S28.
- Lindeman, R.D., Romero, L.J., Liang, H.W., Baumgartner, R.N., Koehler, K.M., Garry, P.J., 2000. Do elderly persons need to be encouraged to drink more fluids? *J. Gerontol. A: Biol. Sci. Med. Sci.* 55A, M361–M365.
- Liu, C.J., Lu, C.H., Yu, S., Yang, Y.Y., 1998. Correlations between scores on Chinese versions of long and short forms of the geriatric depression scale among elderly Chinese. *Psychol. Rep.* 82, 211–214.
- Inouye, S.K., Bogardus, S.T.Jr., Baker, D.I., Leo-Summers, L., Cooney Jr., L.M., 2000. The Hospital Elder Life Program: a model of care to prevent cognitive and functional decline in older hospitalized patients. *J. Am. Geriatr. Soc.* 48, 1697–1706.
- Inouye, S.K., Studenski, S., Tinetti, M.E., Kuchel, G.A., 2007. Geriatric syndromes: clinical, research, and policy implications of a core geriatric concept. *J. Am. Geriatr. Soc.* 55, 780–791.
- Mehta, K.M., Yaffe, K., Covinsky, K.E., 2002. Cognitive impairment, depressive symptoms, and functional decline in older people. *J. Am. Geriatr. Soc.* 50, 1045–1050.
- Mahoney, F.I., Barthel, D.W., 1965. Functional evaluation: the Barthel Index. *Md. Med. J.* 14, 61–65.
- Nair, B., O'Dea, I., Lim, L., Thakkinstian, A., 2000. Prevalence of geriatric syndromes in a tertiary hospital. *Australasian J. Aging* 19, 81–84.
- Olde Rikkert, M.G.M., Rigaud, A.S., 2003. Malnutrition research: high time to change the menu. *Age Ageing* 32, 241–243.
- Ong, K.L., Cheung, B.M.Y., Man, Y.B., Lau, C.P., Lam, K.S.L., 2007. Prevalence, awareness, treatment, and control of hypertension among United States adults 1999–2004. *Hypertension* 49, 69–75.
- Pedone, C., Ercolani, S., Catani, M., Maggio, D., Ruggiero, C., Quartesan, R., Senin, U., Mecocci, P., Cherubini, A., GIFA Study Group, 2005. Elderly patients with cognitive impairment have a high risk for functional decline during hospitalization: the GIFA Study. *J. Gerontol. A: Biol. Sci. Med. Sci.* 60A, M1576–M1580.
- Phipps, S., Lim, Y.N., McClinton, S., Barry, C., Rane, A., N'Dow, J., 2006. Short term urinary catheter policies following urogenital surgery in adults. *Cochrane Database Syst. Rev.* CD004374.
- Reuben, D.B., Yoshikawa, T.T., Besdine, R.W., 1996. *Geriatrics: Review Syllabus*, 3rd ed. Kendall and Hunt, Dubuque, IA.
- Rochon, P.A., Gurwitz, J.H., 1997. Optimising drug treatment for elderly people: the prescribing cascade. *Br. Med. J.* 315, 1096–1099.
- Shirreffs, S.M., 2005. The importance of good hydration for work and exercise performance. *Nutr. Rev.* 63, S14–S21.
- Shyu, Y.L., Yip, P.K., 2001. Factor structure and explanatory variables of the Mini-Mental State Examination (MMSE) for elderly persons in Taiwan. *J. Formos. Med. Assoc.* 100, 676–683.
- Stookey, J.D., Pieper, C.F., Cohen, H.J., 2005. Is the prevalence of dehydration among community-dwelling older adults really low? Informing current debate over the fluid recommendation for adults aged 70+ years. *Public Health Nutr.* 8, 1275–1285.
- Sulter, G., Steen, C., De Keyser, J., 1999. Use of the Barthel Index and modified Rankin scale in acute stroke trials. *Stroke* 30, 1538–1541.
- Tsai, A.C., Ho, C.S., Chang, M.C., 2007. Population-specific anthropometric cut-points improve the functionality of the mini nutritional assessment in elderly Taiwanese. *Asia Pac. J. Clin. Nutr.* 16, 56–62.
- Oliver, D., 2008. Geriatric syndromes continue to be poorly managed and recognized. *Br. Med. J.* 337, a892.
- Wilmore, D.W., Kehlet, H., 2001. Management of patients in fast track surgery. *Br. Med. J.* 322, 473–476.
- WHO (World Health Organization), 1994. Indicators and strategies for iron deficiency and anemia programmes. In: Report of the WHO/UNICEF/UNU Consultation. WHO, Geneva.
- Yesavage, J.A., Brink, T.L., Rose, T.L., Lum, O., Huang, V., Adey, M., Leirer, V.O., 1982–1983. Development and validation of a geriatric depression scale: a preliminary report. *J. Psychiatr. Res.* 17, 37–49.