

LETTERS TO THE EDITOR

New dorsiflexion measure device: A simple method to assess fall risks in the elderly

Dear Editor,

Hip fracture is the third leading cause yielding bedridden status in Japan, and more than 80% of hip fractures are reported to be caused by falling. There are a variety of causes for falls in the elderly, and one of the significant causes is the inability to lift their toes when they walk. Here, we show a new device to measure dorsiflexion angle, an instrument that we developed to assess fall risks in the elderly.

Participants were requested to stand up straight and step back until the hip leaned on the wall (Fig. 1a). The fulcrum of the instrument was adjusted to the center of the external malleolus (Fig. 1b). The arm of the instrument was set to stay level, adjusting the branching thin arm placed on the ridge of the dorsum of the foot. Then, participants were asked to dorsiflex as much as possible. The mean time to measure bilateral dorsiflexion angles was within 5 min.

We measured dorsiflexion and Fall Risk Index (FRI),^{1,2} including the history of falls within the past year, in 131 women (46–89 years, mean age 78.0 ± 7.1 years) and 88 men (46–93 years, mean age 76.2 ± 8.6 years) who visited the fall prevention clinic in Kyorin University Hospital. The occurrence of falls within the past year was 35.6%. Falls occurred 2.0 ± 0.1 times in fallers within 1 year, and women fell more frequently than men (42.7% vs 25.0%, $\chi^2 = 7.2$, $P \leq 0.01$). The average FRI score was 6.7 ± 3.4 in non-fallers and 10.6 ± 3.0 in fallers ($P < 0.0001$). Women showed a higher FRI score than men (8.8 ± 3.6 vs 7.0 ± 3.8 , $P = 0.003$).

This new device appears promising in detecting the high-risk group of fallers, because the dorsiflexion angle was significantly smaller in fallers than non-fallers (right 9.6 ± 8.4 vs 13.7 ± 9.6 degrees, $P = 0.012$; left 10.0 ± 8.5 vs 14.2 ± 9.8 degrees, $P = 0.014$). Furthermore, the occurrence of falls was more frequent as the dorsiflexion angle decreased in women ($\chi^2 = 6.4$, $P = 0.042$; Fig. 1c), and half of the subjects, whose dorsiflexion angle was less than 10 degrees, experienced falls within a year.

Previously, it was reported that hip fractures occur more frequently in women than men, even though the incidence rate of falls was comparable until the age of 90 years. This is considered to be a result of the higher prevalence of osteoporosis in women.³ In contrast, the present study found that women less than 90 years-of-age fell more frequently than men in the Japanese population of this age group. We also found that the FRI score was higher in women than men, as has been shown previously.⁴ In addition, dorsiflexion angle was

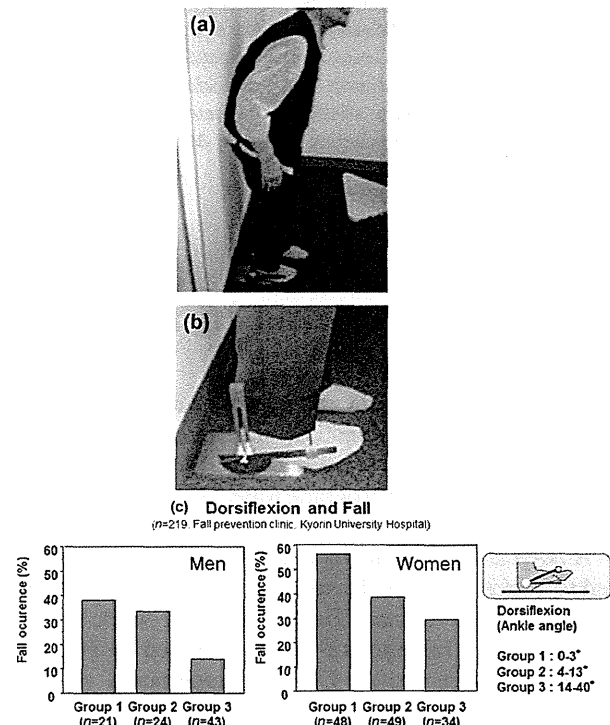


Figure 1 (a,b) How to measure dorsiflexion angle using a dorsiflexion measure device. (c) The relationship between dorsiflexion angle and the occurrence of falls within the past year. In men and women respectively, participants were grouped by tertile according to the dorsiflexion angle.

smaller in women than men (right 10.3 ± 8.4 vs 15.2 ± 10.1 degrees, $P = 0.0001$; left 11.0 ± 8.5 vs 15.2 ± 10.4 degrees, $P = 0.0013$), and a stepwise increase in the fall occurrence rate according to the level of dorsiflexion angle was evident in women (not significant in men). These results show that less ability to dorsiflex would partly explain the sex difference in the occurrence of falls and ensuing hip fracture.

The new dorsiflexion measure device we report here is easy and less time-consuming to use, and will be sure to help identify a high-risk group of fallers in the elderly.

Disclosure statement

This study was approved by the Ethics Committee of Kyorin University School of Medicine. Accordingly, written informed consent was obtained from all patients. All authors contributed significantly to this work and are

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Kenji Toba,^{1,2} Kumiko Nagai,² Sayaka Kimura,²
Yukiko Yamada,² Ayako Machida,² Akiko Iwata,²
Masahiro Akishita³ and Koichi Kozaki²

¹National Center for Geriatrics and Gerontology, ²Department of Geriatric Medicine, Kyorin University School of Medicine, and ³Department of Geriatric Medicine, Graduate School of Medicine, The University of Tokyo, Mitaka, Tokyo, Japan

Rectal perforation as a result of self-administration of retrograde enema in an elderly dementia patient

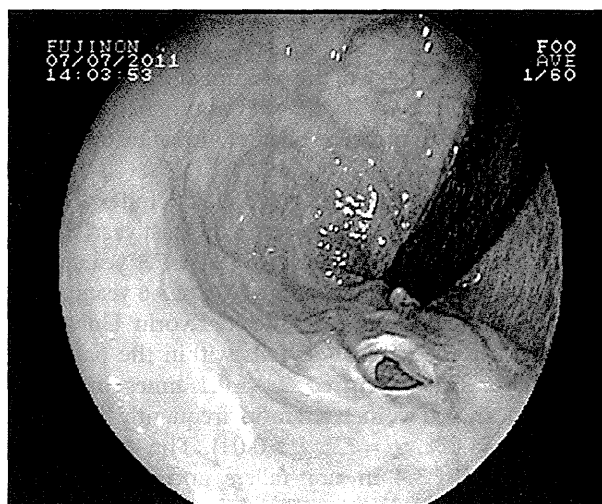
Retrograde cleansing enemas are commonly used in the treatment of chronic constipation, especially in the elderly.¹ We report a case of colorectal perforation as a result of self-administered retrograde water enema in an elderly dementia patient.

A 76-year-old chronically constipated man was admitted to Turkiye Yuksek Ihtisas Hospital Gastroenterology Department in Ankara, Turkey, with a 1-week history of rectal pain. His medical history showed he had the diagnosis of dementia. Clinical examination at that time showed normal vital signs, on examination of the abdomen there was no defense or rebound, digital examination was normal, and respiratory and circulatory system examinations were normal. All laboratory investigations including full blood count, serum amylase, liver function tests, urea and electrolytes were within normal limits. There was no abnormality in abdominal X-ray and abdominal ultrasonography. He was started on a retrograde enema by his family practitioner 7 days earlier for constipation. He described that the pain was precipitated by the first self-administration of the retrograde irrigation enema and the patient denied subsequent use. A preplanned colonoscopy was carried out, and on retroflexion a rectal perforation was detected (Fig. 1). An abdominal computed tomography scan showed perirectal air. Conservative management with intestinal rest and intravenous antibiotics was carried out. The clinical course of the patient was favorable without sepsis or generalized peritonitis. He was discharged home after a 7-day inpatient stay.

Perforation of the rectum and sigmoid colon caused by cleansing enemas, used by chronically constipated patients, has rarely been reported. In the largest series, Paran *et al.* reported that three of 13 patients with rectal perforation as a result of retrograde enema died because of late diagnosis.² Gayer *et al.* reported 14 elderly patients (average age 80 years) with rectal perforation as

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a result of cleansing enema. Surgery was carried out in 10 of 14 patients, and nine of the 14 patients died. Interestingly, in all of these cases the enema was given by paramedic personnel.³ It is perhaps not so well known that the rectal wall, even in the absence of disease, can be perforated by the tip of a rubber catheter introduced for the purpose of administering a simple cleansing enema.⁴ Because of the possible risk of morbidity and mortality, especially in elderly patients in whom the process can be more catastrophic, rectal perforation risk should be kept in mind and administration of rectal cleansing enemas should be carried out gently and carefully by paramedic personnel. Also, the position of the body when inserting the enema tip is important. An enema should be carried out, in principle, with the patient in the left lateral decubitus position.⁵

RELATIONSHIP BETWEEN TESTOSTERONE AND COGNITIVE FUNCTION IN ELDERLY MEN WITH DEMENTIA

To the Editor: A decrease in sex hormones with aging has been reported to be related to psychosomatic disorders such as late-onset hypogonadism syndrome, frailty, and cognitive impairment in adult men.¹ For example, a community-based cross-sectional study has shown that elderly men with a lower blood concentration of bioavailable testosterone have more-severe impairment of cognitive function.² Moreover, a longitudinal study indicated that serum free testosterone (FT) concentration could predict memory performance and cognitive status in elderly men,³ but it is unknown whether lower testosterone concentration is related to cognitive impairment in individuals with dementia, because the previous studies primarily focused on a healthy community-based population. Also, few studies have addressed the relationship between testosterone and cognitive function in elderly Japanese men.

One recent cross-sectional study showed that total testosterone and FT concentration were associated with activities of daily living (ADLs) in institutionalized elderly men.⁴ This study also revealed that a relationship between testosterone and cognitive function could be found even in institutionalized elderly men with physical or neuropsychiatric dysfunction. Thus, whether lower testosterone concentration is related to deterioration of ADL in elderly men with cognitive impairment was longitudinally investigated.

Fifty-two male outpatients attending the Center for Comprehensive Care on Memory Disorders at Kyorin University Hospital were recruited (mean age 77.0 ± 5.5 , range 65–87). Participants' clinical backgrounds were hypertension, 48.9%; diabetes mellitus, 12.2%; and dyslipidemia, 38.1%. None had a history of stroke. Comprehensive geriatric assessment was performed based on basic ADLs (Barthel Index),⁵ instrumental ADLs (Lawton and Brody IADLs, 0–5 points in men),⁶ cognitive function (Mini-Mental State Examination (MMSE)),⁷ mood (Geriatric Depression Scale (GDS), 15 items),⁸ and vitality (Vitality Index, 10-point scale).⁹ This assessment was repeated 1, 2, and 3 years after baseline assessment at the first visit to the clinic. At the first visit, blood was drawn after an overnight fast and FT concentration was measured using radioimmunoassay. FT values ranged from 1.0 to 53.0 pmol/L (mean \pm SD 30.4 ± 11.0 pmol/L). Participants were classified into three groups according to tertile according to the baseline FT value (Figure 1), and the parameters from the comprehensive geriatric assessment were compared between groups and visits. Statistical data were analyzed using SPSS version 17.0 (SPSS, Inc., Chicago, IL). One-way analysis of variance (ANOVA) was applied for comparisons between groups, and the Fisher post hoc test was applied when significant ($P < .05$). One-way repeated ANOVA was used for comparisons between baseline and the 1-, 2-, and 3-year visits, and the Fisher post hoc test was applied when significant ($P < .05$).

There were no significant differences between groups in age (high, 75.3; middle, 76.6; low, 79.0), basic ADLs (high, 96.9; middle, 99.1; low, 95.3 points), MMSE (high, 23.2; middle, 25.1; low, 23.1 points), GDS-15 (high, 5.1; middle,

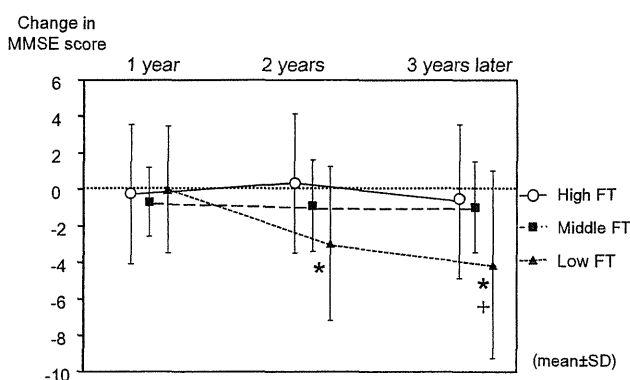


Figure 1. Change in Mini-Mental State Examination (MMSE) score according to tertile of serum free testosterone (FT) level in men. FT tertile: high, >36.1 pmol/L, $n = 17$; middle, 29.1 – 35.4 pmol/L, $n = 17$; low, <28.8 pmol/L, $n = 18$. * $P < 0.05$ vs highest FT group, + $P < 0.05$ vs middle FT group.

4.1; low, 4.6 points), and Vitality Index (high, 9.1; middle, 9.1; low, 8.8 points) at baseline, whereas IADLs tended to be lower (high, 4.1; middle, 4.1; low, 3.4 points, $P = .06$) in the low FT tertile group than in the other groups.

At the 1-year visit, there was no difference in change in MMSE score from baseline between the groups, although the decrease in MMSE score was larger in the low FT tertile group than in the middle and high tertile groups at the 2- and 3-year visits (Figure 1). Also, MMSE scores were lower in the low FT tertile group at the 2- ($P = .009$) and 3-year ($P < 0.001$) visits than at baseline, whereas they were not lower in the middle and high tertile groups. In contrast, there was no such trend in basic ADLs, IADLs, GDS scores, and Vitality Index.

Multiple regression analysis was performed with a decrease in MMSE score as a dependent variable and age; ADLs; body mass index; presence of hypertension, diabetes mellitus, or hyperlipidemia; and FT concentration as independent variables to consider factors affecting cognitive impairment, according to a previous report.⁴ Blood FT concentration was found to be an independent predictor of decrease in MMSE score at the 3-year visit ($\beta = 0.492$, $P = .02$).

A number of investigations support the biological plausibility of a protective effect of testosterone against cognitive dysfunction. The present findings from memory clinic outpatients are consistent with previous findings observed in elderly community-based men, showing a relationship between FT concentration and cognitive performance.³ Furthermore, the present findings indicate that a lower FT concentration could lead to a faster decline in cognitive function in elderly Japanese men who already show cognitive impairment. This study provides fundamental data for the future study of hormone replacement therapy for cognitive decline in elderly adults with low FT.

Kumiko Nagai, PhD
Shigeki Shibata, MD, PhD
Yoshio Kobayashi, MD
Yukiko Yamada, MA
Sayaka Kimura, MA

Ayako Machida, ST
Koichi Kozaki, MD, PhD
Department of Geriatric Medicine, School of Medicine
Kyorin University, Tokyo, Japan

Masahiro Akishita, MD, PhD
Department of Geriatric Medicine, Graduate School of
Medicine, University of Tokyo, Tokyo, Japan

Kenji Toba, MD, PhD
National Center for Geriatrics and Gerontology
Aichi, Japan

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BASELINE INSTRUMENTAL ACTIVITIES OF DAILY LIVING AND INCIDENT DEMENTIA

To the Editor: Sikkes et al.¹ have written an important paper showing that individuals without dementia with impairment in at least one of nine instrumental activities of daily living (IADLs) at baseline had a significantly higher incidence of dementia at 12 months (24.4%) than individuals without IADL impairment at baseline (16.7%) ($P = .04$). Their 531 participants who were followed for 12 months were relatively young (mean age 69.6), so it was decided to duplicate their study from prospective data from the Wyong Hospital Memory Clinic, 100 km north of Sydney. From 415 individu-

als attending a memory clinic, community-dwelling individuals aged 60 and older who were free of dementia at baseline and had a Mini-Mental State Examination score (MMSE²) of 25 to 30 and a follow-up MMSE and Montreal Cognitive Assessment (MoCA), range 0 (worst) to 30 (best)³ at 12 months were selected in a consensus conference of a geriatrician (PJ) and a clinical nurse consultant (EH). Each individual's family rated IADLs on the Nottingham scale,⁴ which ranged from 0 (worst) to 22 (best). Twenty-two of 82 (27%) converted to dementia at 12 months, compared with Sikkes conversion rate of 20.8% at 24 months—the most likely reason for this difference was that mean age (79.1) was 9.5 years older than theirs (69.6). Stats Direct Version 2.7.8b (StatsDirect Ltd, Altrincham, UK) from November 2011 was used to compare converters and nonconverters. Mean age of the 22 converters at baseline was significantly higher than that of the 60 nonconverters (82.0 ± 5.8 vs 78.0 ± 6.8 , $P < .01$), mean IADL score at baseline was significantly lower (13.1 ± 5.3 vs 16.1 ± 4.0 , $P = .0236$), MMSE score at baseline was by definition lower (25.6 ± 0.73 vs 27.5 ± 1.50 , $P < .001$), and MoCA score at baseline was lower (19.2 ± 3.5 vs 22.8 ± 3.9 , $P < .001$). At 12 months, IADL (11.4 ± 5.6 vs 15.4 ± 4.5 , $P = .004$), MMSE score (21.6 ± 4.5 vs 27.4 ± 1.6 , $P < .001$), MoCA (16.8 ± 3.6 vs 22.8 ± 4.2 , $P < .001$) remained significantly lower in converters.

The Nottingham IADL covers seven of the nine IADL items that Sikkes used, excluding medications and finances. Women are more likely than men to perform five of the Nottingham IADL items unless the men live alone with no home care services: cleaning the kitchen, making a hot snack, washing small items of clothing, doing a full clothes wash, and doing housework.

Although the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, criteria for dementia include a decline in social and occupational function, there is a surprising lack of research into IADLs as a predictor of incident dementia. This is an important topic for future research and ongoing studies are being conducted in three cohorts: Wyong Memory Clinic; general medical inpatients with delirium or subsyndromal delirium—a prospective randomized controlled trial, Central Coast Australia Delirium Intervention Study; and PhD study, PR DEFEAT DELIRIUM, in outpatients at high risk for incident delirium. One study⁵ with 255 community-dwelling individuals attending a memory clinic who were followed an average of 13 months has been published. The 11.4% of participants with antithyroid antibodies had similar outcomes at 12 months with respect to IADLs, decline in IADLs, MMSE and MoCA scores, and transfer to residential care.

Paul Regal, MD
Department of Geriatric Medicine

Eileen Heatherington, RN
Dementia Advisory Service, Wyong Hospital, Kanwal
New South Wales, Australia

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高齢者の総合機能評価と多職種連携

神崎 恒一

Key words : 基本チェックリスト, CGA7, 多職種連携, 退院支援, 介護保険

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患者記載による生活機能低下のスクリーニング

区市町村が実施する「介護予防事業（地域支援事業）」において、要介護認定調査で非該当（自立）の人や要介護認定を受けていない人で、将来介護が必要になる可能性がある人に対して生活機能低下をスクリーニングするために基本チェックリストが実施される。基本チェックリストは自分で記入するもので、項目別の合計点がある一定以上となった場合、最寄りの区市町村窓口や地域包括支援センターに行くよう指示する。これは要介護状態に陥る危険のある高齢者を早期発見するための方略であり、自己記入式の総合機能評価といえることができる。1～3は手段的 ADL, 4, 5は社会的 ADL, 6～10は運動器・転倒, 11, 12は栄養状態, 13～15は口腔機能, 16, 17は閉じこもり, 18～20は認知症, 21～25はうつに関する質問項目である。

一定の基準を超えた場合「二次予防に係る対象者」と判定され、地域支援包括センターで介護予防プログラム（運動器の機能向上, 栄養改善, 口腔機能向上, 閉じこもり予防・支援, 認知症予防・支援, うつ予防・支援）が実施される。

基本チェックリストは地域在住高齢者を対象とした簡易な総合機能評価であり、病院通院者でも情報を確認すべきである。

診察時の生活機能低下のスクリーニング

CGA7は最も簡易な総合機能評価であり、5分以内で実施可能である（表1）。誰にでも実施でき、スクリーニング検査として感度が高く、日常診療の中で行うこと

が可能である。7項目からなり、生活意欲に関して、外来通院患者であれば、診察室に入ってきたときに自分から挨拶をするか、入院患者の場合、朝自分から起床するか、または、リハビリその他の活動に自分から参加する意思を示すかで判断する。続いて、即時記憶をみるために「桜、猫、電車」の復唱をさせる。次に、手段的 ADL に関して、乗り物の利用について尋ねる。これは次の短期記憶課題のための干渉課題としての役割もある。次が、課題2の遅延再生で短期記憶をみるための課題である。その次の2項目は屋内生活の自立をみるための基本的 ADL に関する2項目である。比較的早期に落ちやすい入浴と排泄動作に関する質問である。最後はうつに関する質問である。それぞれの課題に問題があった場合、右の欄の“次へのステップ”にある、より詳細な総合機能評価を行う。

スクリーニング後の詳細な総合機能評価

総合機能評価の実施は医師でも他の職種でも構わないが、検査に習熟しておく必要がある。CGA7の課題1に問題があった場合、vitality index を評価する。これは、起床の様子、意思の疎通、食事摂取、排泄の意思、リハビリまたは屋外活動への参加の積極性で判断する。各2点で合計10点となっている。外来通院者の場合8点以下だと意欲の低下があると考えてよい。

CGA7の課題2もしくは4に問題があった場合、認知機能検査として Mini Mental State Examination または改訂長谷川式簡易知能評価を行う。MMSEでは時間、場所の見当識、即時記憶、計算、短期記憶、物品の呼称、短文の復唱、3段階の従命、文書指示に従えるか、文章の筆記、図形の模写を行う。30点満点で23点以下の場合、認知症が疑われる。

HDS-RはMMSEと類似しており、日時、場所の見当識、3単語の復唱（即時記憶）、計算、3単語の遅延再生

表1 CGA7: 評価内容・正否と解釈・次へのステップ
健康長寿診療ハンドブック p7 より引用¹⁾

番号	CGA7の質問	評価内容	正否と解釈	次へのステップ
①	<外来患者>診察時に被験者の挨拶を待つ	意欲	正: 自分から進んで挨拶する 否: 意欲の低下	Vitality index
	<入院患者・施設入所者>自ら定時に起床するか、もしくはリハビリへの積極性で判断		正: 自ら定時に起床する、またはリハビリその他の活動に積極的に参加する 否: 意欲の低下	
②	「これから言う言葉を繰り返して下さい(桜、猫、電車)」, 「あとでまた聞きますから覚えておいて下さい」	認知機能	正: 可能(できなければ④は省略) 否: 復唱ができない⇒難聴、失語などがなければ中等度の認知症が疑われる	MMSE・HDS-R
③	<外来患者> 「ここまでどうやって来ましたか?」	手段的ADL	正: 自分でバス、電車、自家用車を使って移動できる 否: 付き添いが必要⇒虚弱か中等度の認知症が疑われる	IADL
	<入院患者・施設入所者> 「普段バスや電車、自家用車を使ってデパートやスーパーマーケットに出かけますか?」			
④	「先程覚えていただいた言葉を言って下さい」	認知機能	正: ヒントなしで全部正解。認知症の可能性は低い 否: 遅延再生(近時記憶)の障害⇒軽度の認知症が疑われる	MMSE・HDS-R
⑤	「お風呂は自分ひとりで入って、洗うのに手助けは要りませんか?」	基本的ADL	正: ⑥は、失禁なし、もしくは集尿器で自立。入浴と排泄が自立していれば他の基本的ADLも自立していることが多い 否: 入浴、排泄の両者が×⇒要介護状態の可能性が高い	Barthel index
⑥	「失礼ですが、トイレで失敗してしまうことはありませんか?」			
⑦	「自分が無力だと思いますか?」	情緒・気分	正: 無力と思わない 否: 無力だと思う⇒うつ傾向がある	GDS-15

(近時記憶)は、同一ではないものの共有されている。HDS-Rも30点満点で、20点以下の場合、認知症が疑われる。しかしながら、MMSEもHDS-Rも点数だけで認知症と診断してはならない。

手段的ADLは独居機能をみるための尺度で、乗物を使った屋外の移動、電話の使用、金銭管理、服薬管理、買物、食事の準備、選択、掃除などの家事の可否を評価する。男性は5項目、女性は8項目となっている。

基本的ADLは屋内生活の自立をみるための尺度であり、屋内の移動とセルフケア能力を評価するものである。具体的にはベッドまたは布団からの移動、ならびに屋内移動、階段の上り下り、整容、着替え、トイレ動作と排泄が確実にできるか、食事、入浴が一人でできるかを評価する。5~15点の配点で、全部で100点となる。

うつについてはGDS15で評価する。はい、いいえで答えてもらい、左側の回答数が多いほどうつ状態が強い。目安として5点以上の場合うつ傾向、10点以上の場合うつ状態と判断する。簡易版として5項目でスクリーニングすることも可能である。

シンポジウムでは総合機能評価が有用であった例を紹介したが、総合機能評価を行うことによって、疾患管理

や生活介助の具体策、リスクマネジメント対策を立てることができることがわかる。

多職種連携

これまで述べてきた総合機能評価の内容は、入退院に際して、在宅や施設など地域から病院へ、病院から地域へ伝達することが重要である。これにより、環境が変わっても入院前、退院後の問題点を共有することができ、円滑な診療・支援を行うことが可能となる。

特に、急性期医療を終えた後、生活を見据えた医療や介護の対策を立てるためには、医療職間および他の職種との連携をうまく作れるかがカギとなる。急性期病院からの退院を支援するにあたって、表2に示す要因を考慮する必要がある。医療的要因、身体機能、精神機能、社会的要因、医療福祉制度要因、家族環境要因などである。身体機能、精神機能にはADLや認知機能、うつ、生活意欲など、先ほど話した高齢者総合機能評価が含まれている。それ以外に生活に関わる重要な情報が④~⑥に入っている。

そしてこれらの情報は、退院時カンファレンスを行う場合、急性期病院と在宅医療・介護を担当する職種間で

表2 退院支援に関わる要件
健康長寿診療ハンドブック p111より引用¹⁾

①医療的要因	疾患、病態、医療処置（注射点滴、経管栄養、呼吸器、気切吸引、酸素、尿道カテーテル、ストーマ、創処置、疼痛管理、透析など）
②身体機能	ADLの低下（原因疾患；脳血管障害、骨折、脳・神経疾患、末期癌など）
③精神機能	認知機能障害、うつ、意欲低下、周辺症状（特に暴力行為、不潔行為、徘徊、火の不始末など）
④社会的要因	住居の有無・居住地、住宅環境、経済的問題、入院前の生活状況、自宅以外からの入院かどうか
⑤医療福祉制度要因	介護保険、難病認定、身体障害者などの状況
⑥家族環境要因	キーパーソン、同居家族、介護者と介護力

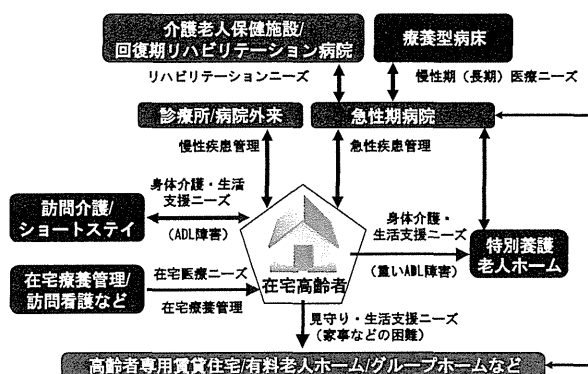


図1 多職種連携に関わる関係機関と関係サービス
健康長寿診療ハンドブック p11より引用¹⁾

ケアの柱となる。在宅で高齢者をみる上で医療ニーズが高ければ在宅療養管理や訪問看護が導入されるし、身体介護・生活支援ニーズが高ければ訪問介護やショートステイが利用される（図1）。また、在宅での療養が困難であれば様々な施設や高齢者専用賃貸住宅に居住の場を移すことになる。また、時に急性疾患を発症し、急性期病院に入院することもあり、その後、療養病床を含めて療養の場は変わっていく。このような流れのなかでは医療と介護サービスは変わっていくので、その都度、医療・看護・介護の情報を確認、共有することが必要である。

まとめ

共有する必要がある、これが退院後の有効な医療・看護・介護のプランを立てることにつながる。

介護保険申請のための主治医意見書にも医療、看護、介護の面から必要な情報が記載されるようになっていく。たとえば、医療的要因は他科受診の有無、傷病に関する意見、特別な医療に反映され、身体機能と精神機能に関しては心身の状態に関する意見や身体の状態などに反映される。主治医意見書は医療情報源として他の職種にとって重要なものである。

総合機能評価ではADLを手段的ADLと基本的ADLで評価することを説明したが、主治医意見書ではそのかわりに「障害高齢者の日常生活自立度」や「認知症高齢者の日常生活自立度」が用いられる。認知症高齢者の日常生活自立度の評価尺度に用いられる買物、金銭管理、服薬管理、電話の対応は手段的ADLの項目であり、着替え、食事、排便、排尿は基本的ADLの項目である。

機能障害のある高齢者を地域でみていくためには、医師同士の連携、医師と看護師との連携、医師とケアマネジャー等の連携が必要である。これによって、効果的な医療・看護・介護プランを提供することができる。このような体制をチーム医療やチームケアと呼び、地域包括

1. 総合機能評価は、医療や高齢者の生活機能を多面的に評価するためのツールである。

2. 介護予防マニュアル基本チェックリストは地域在住高齢者の簡易総合機能評価と考えることができ、問題がある領域があることが分かった場合、地域包括支援センターで介護予防プログラムを受けるように促す必要がある。

3. CGA7は総合機能評価の最も簡易なスクリーニング検査で、いずれかの項目で“問題あり”と判断された場合、詳細な総合機能評価を実施する。

4. 総合機能評価を行うことによって、生活上の問題を抽出することができ、それによって疾患の管理や生活介助の具体策、リスクマネジメントを講じることができる。

5. 高齢者の病状や居住場所によって連携の対象となる職種や共有する情報が異なってくる。

6. 急性期医療が一段落したときや今後の見通しが立った後は、高齢者本人の希望や家族の要望などを把握して、病院内、あるいは地域の退院支援に関わる専門職に連絡をとる。

7. 慢性疾患をもつ在宅高齢者においては、キーパーソンの把握に努めるとともに、緊急時の対応、体制を日

ごろから互いに確認しておく必要がある。

付記：本原稿に関連し、開示すべきCOI関係にある
企業などはありません。

文 献

- 1) 日本老年医学会編：健康長寿診療ハンドブック，メジカルビュー社，2011.
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〈原 著〉

特発性正常圧水頭症とアルツハイマー型認知症の定量的画像指標の比較

小林 義雄¹⁾ 長谷川 浩¹⁾ 守屋佑貴子¹⁾ 輪千安希子¹⁾
 中居 龍平¹⁾ 神崎 恒一¹⁾ 鳥羽 研二²⁾

要 約 目的：本邦の特発性正常圧水頭症（以下 iNPH）診療ガイドラインでは、possible iNPH の診断基準を満たす症例に対して髄液排除試験を行うよう推奨されている。しかし頭部 MRI 所見が類似したアルツハイマー型認知症（以下 AD）例が possible iNPH の診断基準を満たすことも多いため、髄液排除試験の奏功率はあまり高くない。そのため AD と iNPH の鑑別、および possible iNPH における髄液排除試験の有効性を予測できる簡便な定量的画像指標の探索を行った。**方法：**臨床的に possible iNPH と診断され髄液排除試験を施行した 18 例（髄液排除試験有効 12 例、無効 6 例）と、外来通院中の probable AD 症例 19 例を対象とし、頭部 MRI 画像の VSRAD の Z スコア、Evans Index、側脳室前角脳幅比、鈎回間距離、内側側頭葉最小厚、海馬高、脈絡膜裂高、側脳室下角横径と縦径、シルビウス裂最大高の左右平均値を測定し、probable AD 症例と possible iNPH 症例、および possible iNPH 症例の髄液排除試験有効例と無効例で、それぞれ比較した。**結果：**probable AD 症例に比べて possible iNPH 症例で、VSRAD の Z スコア、Evans Index、側脳室前角脳幅比、側脳室下角横径と縦径、シルビウス裂最大高が有意に高値であり、VSRAD の Z スコア、Evans Index を除くカットオフ値はそれぞれ、0.31、6.0 mm、3.13 mm、7.6 mm であった。また possible iNPH 症例に対する髄液排除試験無効例に比べて有効例では、内側側頭葉最小厚が高値であり、そのカットオフ値は 11.0 mm であった。**結論：**頭部 MRI を用いた簡易な定量評価を行うことにより possible iNPH と probable AD の鑑別、possible iNPH 症例に対する髄液排除試験の有効性の予測ができる可能性が示された。

Key words：特発性正常圧水頭症、アルツハイマー型認知症、MRI

（日老医誌 2012；49：731-739）

緒 言

2004 年に本邦で特発性正常圧水頭症 (idiopathic normal pressure hydrocephalus: 以下 iNPH) 診療ガイドライン¹⁾が発表され、それに基づく新たな知見が近年報告されつつある。本ガイドラインでは possible iNPH の診断基準に基づき「高齢発症」、「三徴（歩行障害、認知障害および尿失禁）のうち一つでも症状がある」、「画像上の脳室拡大 (Evans Index > 0.3)」を満たす症例に髄液排除試験の実施が推奨されている。しかしながら臨床所見も頭部 MRI 所見も類似したアルツハイマー型認知症 (Alzheimer's disease: 以下 AD) が髄液排除試験対象になることが少なくないため、iNPH の髄液排除試験の有効率は一定しない²⁾⁻⁴⁾。

また AD と iNPH を鑑別するための頭部 MRI 上の画

像的特徴として、Evans Index 以外に高位円蓋部脳溝の狭小化、くも膜下腔の狭小化などが挙げられており⁵⁾⁻⁸⁾、voxel-based morphometry (VBM) を用いてこれを定量化する手段も報告されている⁹⁾が、現時点でこの方法は一般には普及しておらずアーチファクトの問題も解決されていない。このことより、頭部 MRI 所見から両者を簡易に鑑別する方法は未だに確立されていない。

今回我々は、AD と iNPH の鑑別、および possible iNPH における髄液排除試験の有効性を予測しうる、頭部 MRI による簡易な定量的画像指標の探索を行った。

方 法

[対象]

もの忘れを主訴に杏林大学医学部付属病院もの忘れセンターを受診し、面接、診察、神経心理検査、血液検査、頭部 MRI、99mTc-ECD 脳血流シンチ検査を施行し、複数名の医師の合議により診断名が確定された患者 37 名 (男性 19 例、女性 18 例) を対象とした。そのうち

1) 本邦の特発性正常圧水頭症診療ガイドラインの診

1) Y. Kobayashi, H. Hasegawa, Y. Moriya, A. Wachi, R. Nakai, K. Kozaki: 杏林大学高齢医学もの忘れセンター

2) K. Toba: 国立長寿医療研究センター

受付日: 2011. 9. 12, 採用日: 2012. 7. 10

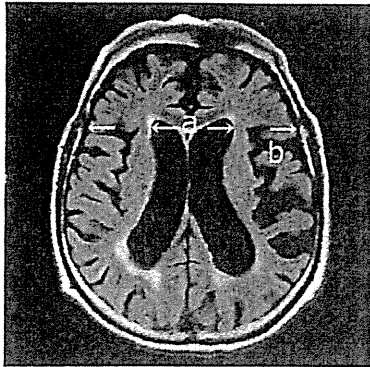


図1 側脳室前角脳幅比 (bifrontal index)
側脳室前角の先端間の距離 (a) を同位置の脳の幅 (b) で除した数値 (a/b)

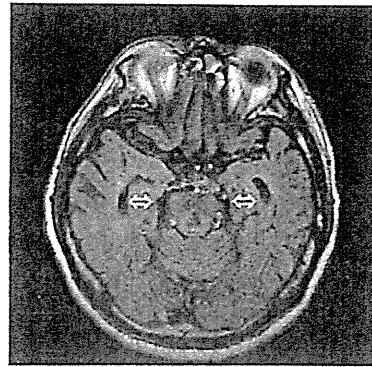


図3 内側側頭葉最小厚 (minimum thickness of the medial temporal lobe)
水平断で測定される内側側頭葉の最小厚

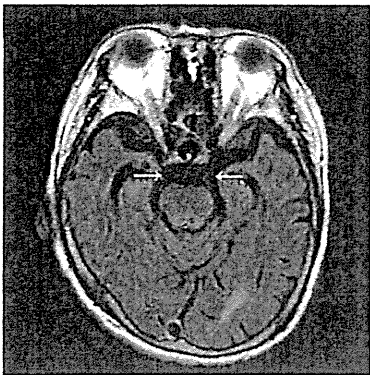


図2 鈎回間距離 (interuncal distance)
鞍上槽レベルで測定した鈎回間距離

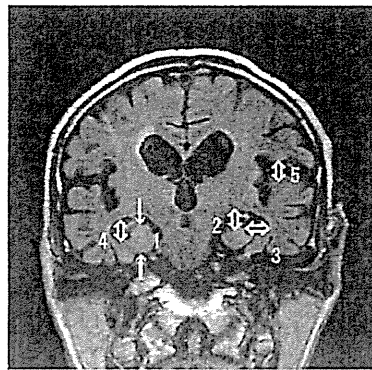


図 4

1. 海馬高 (hippocampal height)
海馬体 (歯状回, 本来の海馬, 海馬傍回と海馬台を含めた) の最大高
2. 脈絡膜裂高 (choroidal fissure height)
海馬高と同軸で測定される脈絡膜裂の高さ
3. 側脳室下角横径 (width of the temporal horn)
海馬高と同軸で測定される側脳室下角の幅
4. 側脳室下角縦径 (height of the temporal horn)
海馬高と同軸で測定される側脳室下角の高さ
5. シルビウス裂最大高 (maximum height of Sylvian fissure)
海馬高と同平面で測定されるシルビウス裂の最大高

断基準で possible iNPH と診断された後, 3日間の検査入院で腰椎穿刺を行い 30 ml の髄液排除を達成できた 18 例. このうち同ガイドラインの臨床症状重症度基準 JNPHGS-R の歩行障害, 認知障害, 排尿障害のいずれかの項目で 1 点以上の改善, もしくは 3 m Up & Go テストで 10% 以上の短縮, MMSE で 3 点以上の改善のいずれかを認めた髄液排除試験有効例が 12 例, いずれも認められなかった無効例が 6 例.

2) 特発性正常圧水頭症診療ガイドラインの診断基準で possible iNPH の診断基準を満たさず NINCDS-ADRDA¹⁰⁾ 診断基準にて probable AD と診断された 19 例.

なお本研究に参加した被験者全員には, 臨床情報の利用について文書で同意を得ている.

[神経心理検査]

認知機能検査として Mini-Mental State Examination (以下 MMSE)¹¹⁾ を施行した.

[頭部 MRI]

頭部 MRI は杏林大学医学部附属病院放射線科で使用している東芝メディカルシステムズ社製 1.5T の standard head coil を使用した. 撮像条件は T1 強調画像 (repetition time [TR] = 496 msec, echo time [TE] = 12 msec) とし, 水平断は前交連と後交連を結ぶ平面, 冠状断は水平断に直交する平面にてそれぞれスライス厚 5 mm で撮影した. また本邦の特発性正常圧水頭症診療ガイドラインより両側側脳室前角間最大幅をその部位に

表1 probable AD 症例と possible iNPH 症例の比較

	probable AD (n=19)	possible iNPH (n=18)	P
年齢	81.9 ± 4.1	80.5 ± 6.7	n.s.
性別	男 6, 女 13	男 12, 女 6	0.033
MMSE	18.6 ± 4.7	17.6 ± 6.2	n.s.
VSRAD の Z スコア	2.6 ± 1.1	5.1 ± 2.7 (4.4 ± 2.0) ^{#1}	0.0005 (0.002) ^{#1}
Evans Index	0.27 ± 0.02	0.35 ± 0.05	>0.0001

^{#1}, segmentation が適正にされていない 3 例を除いた値

^{#2}, 年齢, MMSE, VSRAD の Z スコア, Evans Index は unpaired-t 検定, 性別は χ^2 乗検定で比較.

表2 probable AD 症例と possible iNPH 症例の MRI 画像測定値の比較

測定項目	probable AD (n=19)	possible iNPH (n=18)	p
側脳室前角脳幅比	0.28 ± 0.03	0.32 ± 0.03	0.001
鈎回間距離	29.32 ± 3.89	31.11 ± 4.30	n.s.
内側側頭葉最小厚	9.45 ± 2.72	11.53 ± 2.18	n.s.
海馬高	14.60 ± 1.90	14.36 ± 2.03	n.s.
脈絡膜裂高	6.58 ± 2.00	7.74 ± 1.79	n.s.
側脳室下角横径	5.02 ± 1.89	8.67 ± 3.77	0.006
側脳室下角縦径	2.16 ± 1.43	4.20 ± 2.36	0.009
シルビウス裂最大高	6.30 ± 2.03	8.73 ± 3.23	0.009

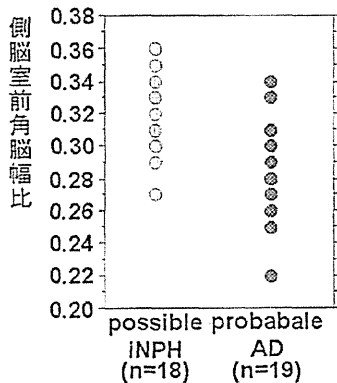


図5 probable AD 例と possible iNPH を判別するために有効な側脳室前角脳幅比の分布

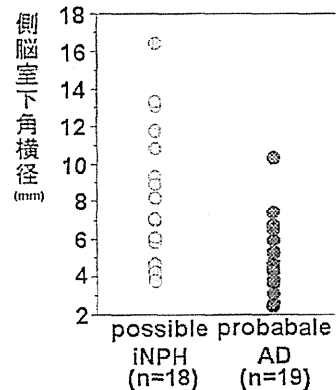


図6 probable AD 例と possible iNPH を判別するために有効な側脳室下角横径の分布

おける頭蓋内腔幅で除した Evans Index¹²⁾を測定した。加えて VSRAD¹³⁾で内側側頭葉の萎縮の程度を Z スコアで算出した。過去の AD の頭部 MRI 上の特徴を検討した文献^{14)~16)}から、頭部 MRI T1 強調画像における側脳室前角脳幅比 (bifrontal index), 鈎回間距離 (interuncal distance), 内側側頭葉最小厚 (minimum thickness of the medial temporal lobe), 海馬高 (hippocampal height), 脈絡膜裂高 (choroidal fissure height), 側脳室下角横径 (width of the temporal horn), 側脳室下角縦径 (height of the temporal horn), シルビウス裂最大高 (maximum height of Sylvian fissure) を同一者が測定し、それらの

左右を平均した値を統計解析に用いた。なお測定は診察医が臨床診断名を知った上で行った。測定部位を図 1~4 に示す。

各測定部位の定義を以下に示す。側脳室前角脳幅比は、側脳室前角の先端間の距離が最大となる水平断で測定し、同測定値を同レベルの脳幅で除したものと定義した。鈎回間距離は鞍上槽のレベルの前後交連平面に平行な平面で、両側側頭葉鈎間の距離として定義した。内側側頭葉最小厚は内側側頭葉の厚さが最も狭くなる水平断で測定した数値と定義した。

海馬高は、海馬体が最も高く描出される脳幹を含んだ

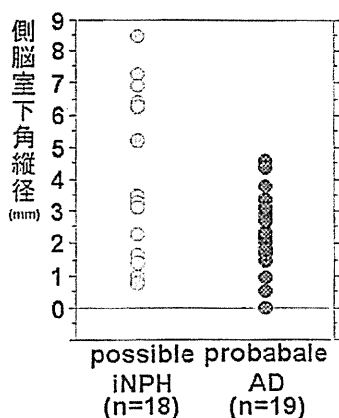


図7 probable AD例とpossible iNPHを判別するために有効な側脳室下角縦径の分布

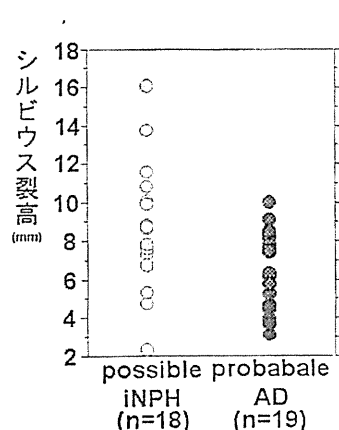


図8 probable AD例とpossible iNPHを判別するために有効なシルビウス裂最大高の分布

冠状断で測定した数値と定義した。同様の断面で測定した海馬体と脈絡膜の垂直幅を脈絡膜裂高、側脳室下角の垂直幅と水平幅を側脳室下角縦径と側脳室下角横径と定義した。またシルビウス裂最大高は冠状断に平行な断面で最大幅となる数値と定義した。

【統計解析】

統計解析はMicrosoft Windows XP上で動作するStatView5.0パッケージで行い、ROC曲線の作成はPASW Statistics 18パッケージで行った。

probable AD群とpossible iNPH群で、前述のMRI画像測定値、VSRADのZスコア、Evans Indexについてunpaired-t検定で比較を行った。次にpossible iNPH群の髄液排除試験有効例と無効例の2群で、同様にMRI画像測定値、VSRADのZスコア、Evans Indexについてunpaired-t検定を行った。

表3 probable AD症例とpossible iNPH症例のMRI画像測定値のカットオフ値と感度および特異度

側脳室前角幅比	感度	特異度	偽陽性率
0.30	83.3%	63.2%	36.8%
0.31	61.1%	77.8%	38.9%
0.32	44.4%	89.5%	10.5%

脳室下角横径	感度	特異度	偽陽性率
5.5 mm	77.8%	68.4%	31.6%
6.0 mm	72.2%	78.9%	21.1%
6.5 mm	66.7%	78.9%	21.1%

脳室下角縦径	感度	特異度	偽陽性率
3.00 mm	72.2%	68.4%	31.6%
3.13 mm	72.2%	73.7%	26.3%
3.14 mm	66.7%	78.9%	21.1%

シルビウス裂高	感度	特異度	偽陽性率
7.5 mm	66.7%	63.2%	36.8%
7.6 mm	66.7%	68.4%	36.8%
7.7 mm	61.1%	68.4%	31.6%

結 果

1) probable AD症例とpossible iNPH症例の年齢、性別、MMSE、VSRADのZスコア、Evans Indexの比較を表1に示す。

probable ADとpossible iNPH群において平均年齢、MMSEに有意差は見られなかった。男女比についてはprobable AD群で女性が多く、iNPH群では男性が多かった。VSRADのZスコアはprobable AD群が平均2.6に対して、possible iNPH群では平均5.1と有意に高かったが、3例で灰白質、白質、脳脊髄液とそれ以外の成分への分割(segmentation)が適正に行われていなかった。それらを除外したpossible iNPH群のZスコアは平均4.4でやはりprobable AD群より有意に高かった。またEvans IndexはiNPH群で有意に高値であった。

2) probable AD症例とpossible iNPH症例のMRI画像測定値の比較を表2に示す。

unpaired-t検定を行った結果、各測定項目のうち側脳室前角幅比、側脳室下角横径および縦径、シルビウス裂最大高においてiNPH群で有意に高値であった。

3) probable AD症例とpossible iNPH症例の側脳室前角幅比、側脳室下角横径および縦径、シルビウス裂最大高の分布を図5~8に示す。

次にこれらの値を独立変数としpossible iNPHの診断を説明変数とした場合の感度及び特異度を表3に示す。

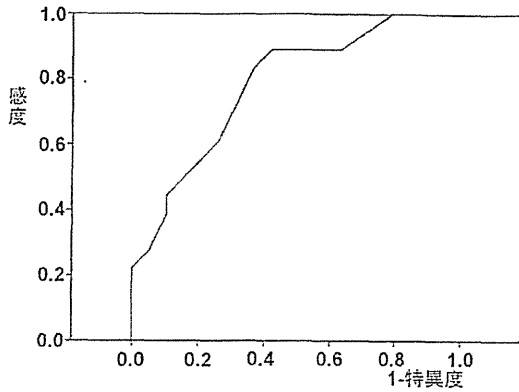


図9 probable AD例と possible iNPHを判別するために有効な側脳室前角幅比のROC曲線

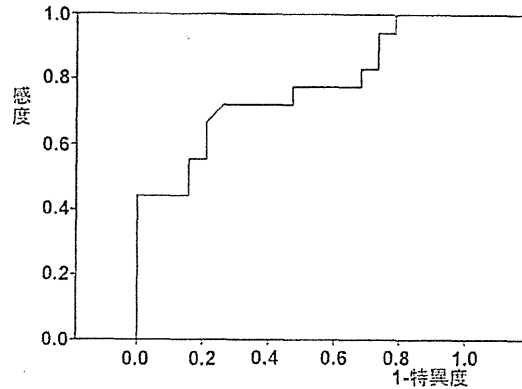


図11 probable AD例と possible iNPHを判別するために有効な側脳室下角縦径のROC曲線

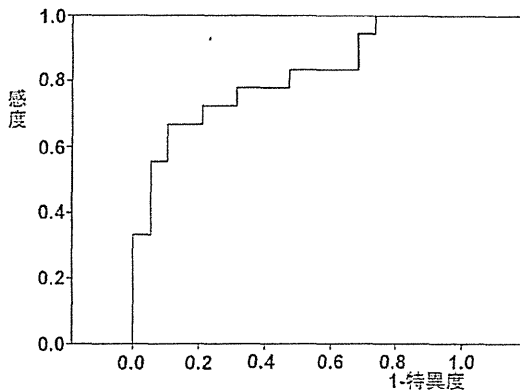


図10 probable AD例と possible iNPHを判別するために有効な側脳室下角横径のROC曲線

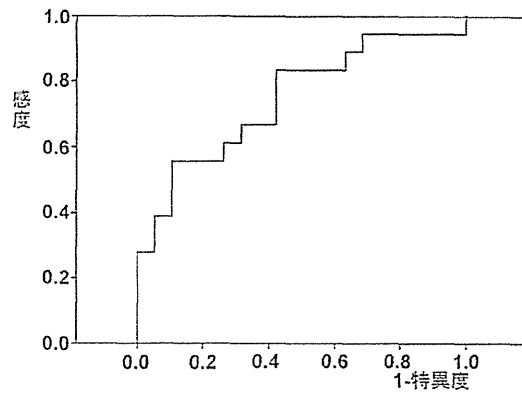


図12 probable AD例と possible iNPHを判別するために有効なシルビウス裂最大高のROC曲線

以上より probable AD と possible iNPH を判別するために有効な側脳室前角幅比、側脳室下角横径および縦径、シルビウス裂高、のカットオフ値は、それぞれ 0.30～0.31、5.5 mm～6.5 mm、3.00 mm～3.14 mm、7.5 mm～7.7 mm、の間に存在すると考えられた。以下の図9～12に示すROC曲線を作成してカットオフ値を算出した結果、有効な側脳室前角幅比、側脳室下角横径および縦径、シルビウス裂高、のカットオフ値は、それぞれ0.31、6.0 mm、3.13 mm、7.6 mmが最も適当であることが示された。

4) possible iNPH 症例の髄液排除試験有効例と無効例の比較を表4に示す。

髄液排除試験有効例と無効例とも平均年齢、MMSE、VSRADのZスコア、Evans Indexに有意な差は見られなかった。VSRADについては灰白質、白質、脳脊髄液とそれ以外の成分への分割(segmentation)が適正に行われていなかった有効1例と無効2例を除外しても優

位な差は見られなかった。性別において有効例は男性が多く、無効例は女性が多かった。

5) possible iNPH 症例の髄液排除試験有効例と無効例のMRI画像測定値の比較を表5に示す。unpaired-t検定を行った結果、各測定項目のうち内側側頭葉最小厚のみ髄液排除試験有効例のiNPH群で有意に高値であった。

6) 髄液排除試験有効例と無効例の内側側頭葉最小厚の分布を図13に示す。

髄液排除試験有効例と無効例の内側側頭葉最小厚のカットオフ値の算出を行い、内側側頭葉最小厚を独立変数とし髄液排除試験有効を説明変数とした場合の感度及び特異度を表6に示す。

この結果より possible iNPH の髄液排除試験有効例と無効例を判別するために有効な内側側頭葉最小厚のカットオフ値は8 mm～12 mmの間に存在すると考えられた。次に髄液排除試験有効例と無効例を判別するための

表4 possible iNPH 症例における髄液排除試験有効例と無効例の比較

	髄液排除試験有効例 (n=12)	髄液排除試験無効例 (n=6)	p
年齢	81.1±4.7	79.7±7.6	n.s.
性別	男10,女2	男2,女4	0.033
MMSE	17.3±5.6	18.1±8.0	n.s.
VSRAD の Zスコア	4.6±2.0 (4.5±2.1) ^{※1}	6.3±3.6 (4.2±2.3) ^{※1}	n.s. (n.s.) ^{※1}
Evans Index	0.35±0.06	0.34±0.04	n.s.

^{※1}: segmentation が適正にされていない3例を除いた値

^{※2}: 年齢, MMSE, VSRAD の Zスコア, Evans Index は unpaired-t 検定, 性別は χ^2 乗検定で比較.

表5 possible iNPH 症例における髄液排除試験有効例と無効例の MRI 画像測定値の比較

測定項目	髄液排除試験有効例 (n=12)	髄液排除試験無効例 (n=6)	p
側脳室前角/脳幅比	0.32±0.03	0.31±0.03	n.s.
鈎回間距離	30.87±3.91	31.59±5.35	n.s.
内側側頭葉最小厚	12.43±1.90	9.74±1.56	0.009
海馬高	14.41±2.19	14.25±1.84	n.s.
脈絡膜裂高	7.36±1.74	8.51±1.78	n.s.
側脳室下角横径	8.63±3.92	8.75±3.80	n.s.
側脳室下角縦径	4.17±2.62	4.26±1.96	n.s.
シルビウス裂最大高	9.34±3.83	7.52±0.77	n.s.

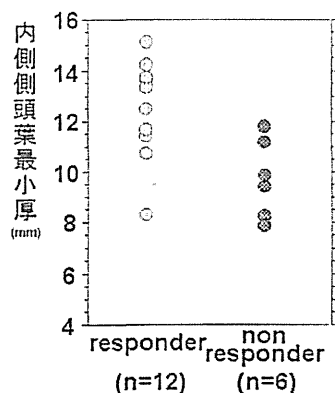


図13 髄液排除試験有効例と無効例を判別するために有効な内側側頭葉最小厚の分布

内側側頭葉最小厚のカットオフ値を, 図14に示すROC曲線を作成し算出した結果, 11.0 mmがカットオフ値として最も適当であることが示された.

考 察

possible iNPH と probable AD を鑑別する画像的指標として従来 Evans Index が広く用いられてきた¹²が, 本試験の結果からはこれに加えて VSRAD の Zスコアや

表6 possible iNPH 症例における髄液排除試験有効例と無効例の MRI 画像測定値のカットオフ値と感度および特異度

内側側頭葉最小厚	感度	特異度	偽陽性率
8.3 mm	100%	33.3%	66.7%
10.0 mm	91.7%	66.7%	33.3%
11.0 mm	66.7%	75%	25%
12.0 mm	58.3%	100%	0%

側脳室前角脳幅比, 側脳室下角横径および縦径, シルビウス裂最大高の値によって両疾患を鑑別することが可能と考えられる. しかし特に possible iNPH に対して VSRAD を行った場合 segmentation を適切に行えないことがあるため, 解析過程を確認した上で用いる必要がある. 側脳室前角脳幅比は測定部位が Evans Index とほぼ同一であるため, 脳室の体積変化を表していると考えられる. possible iNPH 症例では選択的に Evans Index の高い例を抽出しているため, 側脳室前角脳幅比も probable AD より有意に高値であったと解釈できる. また側脳室下角横径と縦径の拡大については, CT における肉眼所見や MRI による VBM 等で側脳室下角の体積を測定した結果から, possible iNPH の方が probable AD

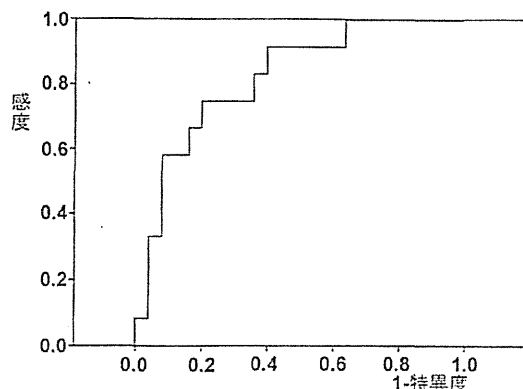


図 14 髄液排除試験有効例と無効例を判別するために有効な内側側頭葉最小厚の ROC 曲線

よりも高い値を示すことが報告されている⁵⁾⁶⁾⁹⁾¹³⁾¹⁷⁾。本研究の結果はこれらの報告に一致する。しかしながら、本研究で用いた指標は、前述の報告で用いられている特殊な画像処理ツールを必要とせず、簡易な距離測定のみで鑑別ができる点で汎用性が高い。またシルビウス裂最大高も possible iNPH が probable AD より高値であり、本邦のガイドラインにおける possible iNPH 診断基準のシルビウス裂の開大を裏付ける結果である。これについては、iNPH に特徴的な disproportionate enlarged subarachnoid-space hydrocephalus : DESH[®] を構成する要素の一つであるにもかかわらず過去に直接定量化を行った報告はなく、今後簡易な診断基準として有用性が期待できる。

今回の結果から、possible iNPH と probable AD を鑑別する画像指標として、側脳室前角幅比で 0.31 以上、側脳室下角横径および縦径が 6.0 mm および 3.13 mm 以上、シルビウス裂が 7.6 mm 以上でより iNPH の可能性が高いことが示された。

possible iNPH 症例に対する髄液排除試験の有効性を予測する画像指標については、内側側頭葉最小厚の高値が有用である可能性が示され、内側側頭葉最小厚 11 mm 以上の possible iNPH 症例では髄液排除試験が有効である可能性が高いと考えられる。過去の研究⁷⁾では内側側頭葉厚と高位円蓋部の髄液腔狭小化やシルビウス裂開大との関連は指摘されているが、放射線科医による肉眼的評価のみで定量化されておらず、定量化を行った上でのカットオフ値の算出は本研究が初めてである。ただし 1 人の測定医が臨床診断を知った上で測定しているため、機械的に算出される VBM 等に比較して評価者内変動が大きい可能性がある。また今回の報告は症例数が十分とは言えず、また VP シャント術後の変化まで追跡してい

ないため、今後これらを検討していく必要がある。

また possible iNPH 診断基準を満たす髄液排除試験無効例については、AD 症例や、iNPH の変化が不可逆的となった症例が含まれている可能性があり、AD と iNPH は合併し得ることを考慮しなければならない。

近年では MRI 拡散テンソル画像における海馬の微細構造の差異¹⁸⁾や後頭頭頂葉境界の帯状溝狭小化¹⁹⁾、VBM における髄液腔の体積の差²⁰⁾で iNPH と AD を鑑別できるとする報告もあるが、有病率の高い AD 患者に普及度の低い機器を用いて診断を行うことは現実的とは言えない。また比較的普及している VSRAD のような解析ソフトウェアも、iNPH では segmentation を適正に行えない問題があり、Z スコアをそのまま鑑別に用いることは難しい。特に頭部 MRI 所見の類似性と有病率の高さから AD 症例が髄液排除試験無効例に多く含まれている可能性を考えれば、無用な侵襲を避けるためにも本研究結果で示される汎用性の高い画像指標は実臨床において有用と考えられる。

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Comparison of quantitative image indexes of brain MRI between differentiates idiopathic normal pressure hydrocephalus and Alzheimer disease, predict positive response of the CSF drainage in possible idiopathic normal pressure hydrocephalus

Yoshio Kobayashi¹⁾, Hiroshi Hasegawa¹⁾, Yukiko Moriya¹⁾, Akiko Wachi¹⁾, Ryuhei Nakai¹⁾, Koichi Kozaki¹⁾ and Kenji Toba²⁾

Abstract

Aim: The clinical guidelines for idiopathic normal pressure hydrocephalus (iNPH) in Japan recommend cerebrospinal fluid (CSF) drainage. The positive response rate of the diagnostic CSF drainage is not very high because brain MRI findings of Alzheimer disease (AD) are similar to those of iNPH. Therefore, we sought to determine simple, quantitative indexes of head MRI to differentiate iNPH from AD and to predict positive response of the CSF drainage in possible iNPH.

Methods: Eighteen patients with the clinical criteria of possible iNPH who had undergone diagnostic CSF drainage were evaluated. Nineteen patients with the clinical criteria of probable AD were used as controls. VSRAD, Evans index, and previously reported indicators were measured on brain MRI in all patients. These parameters were compared between AD and iNPH, and between iNPH responders and non-responders.

Results: VSRAD, Evans index, bifrontal index, width and height of the temporal horn, and the maximum height of the Sylvian fissure were higher in iNPH than AD. The cutoff value of the bifrontal index, width and height of the temporal horn, and maximum height of the Sylvian fissure were 0.31, 6.0 mm, 3.13 mm, and 7.6 mm, respectively. The minimum thickness of the medial temporal lobe was higher in the CSF drainage responders than the non-responders. The cutoff value of the minimum thickness of the medial temporal lobe was 11.0 mm.

Conclusions: Our results suggest that simple image indexes of brain MRI could distinguish iNPH from AD and predict positive response to CSF drainage in iNPH.

Key words: *Idiopathic normal pressure hydrocephalus, Alzheimer disease, Magnetic resonance imaging*
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1) Department of Geriatric Medicine, Kyorin University School of Medicine

2) National Center for Geriatrics and Gerontology



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Original Study

Priorities of Health Care Outcomes for the Elderly

Masahiro Akishita MD, PhD^{a,*}, Shinya Ishii MD^a, Taro Kojima MD^a, Koichi Kozaki MD, PhD^b, Masafumi Kuzuya MD, PhD^c, Hidenori Arai MD, PhD^d, Hiroyuki Arai MD, PhD^e, Masato Eto MD, PhD^a, Ryutaro Takahashi MD, PhD^f, Hidetoshi Endo MD, PhD^g, Shigeo Horie MD, PhD^h, Kazuhiko Ezawa MD, PhDⁱ, Shuji Kawai MD, PhDⁱ, Yoza Takehisa MD, PhD^j, Hiroshi Mikami MD, PhD^k, Shogo Takegawa MSc^l, Akira Morita BPS^m, Minoru Kamata DMEⁿ, Yasuyoshi Ouchi MD, PhD^a, Kenji Toba MD, PhD^g

^a Department of Geriatric Medicine, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan

^b Department of Geriatric Medicine, Kyorin University School of Medicine, Mitaka, Japan

^c Department of Geriatric Medicine, Nagoya University Graduate School of Medicine, Nagoya, Japan

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

^e Department of Geriatric Medicine, Tohoku University Graduate School of Medicine, Sendai, Japan

^f Tokyo Metropolitan Geriatric Hospital and Institute of Gerontology, Tokyo, Japan

^g National Center for Geriatrics and Gerontology, Obu, Japan

^h Department of Urology, Teikyo University School of Medicine, Tokyo, Japan

ⁱ Japan Association of Geriatric Health Services Facilities, Tokyo, Japan

^j Japan Association of Medical and Care Facilities, Tokyo, Japan

^k Japan Medical Association, Tokyo, Japan

^l Graduate School of Humanities and Sociology, The University of Tokyo, Tokyo, Japan

^m Faculty of Law, Gakushuin University, Tokyo, Japan

ⁿ Institute of Gerontology, The University of Tokyo, Tokyo, Japan

ABSTRACT

Keyword:
Geriatrics
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Objectives: Physicians are uncertain about what medical services should be provided to older and/or disabled patients. Better understanding of health outcome prioritization among health care providers and recipients may help the process of decision- and policy-making. For this purpose, surveys were conducted on priorities of health care outcomes for the elderly.

Design: Survey research.

Setting: Four groups of health care providers and four groups of health care recipients.

Participants: A total of 2512 health care providers and 4277 recipients.

Measurements: Questionnaires were sent to more than 8000 health care providers and more than 9000 health care recipients: geriatricians, physicians who commonly see older patients or work in long term care facilities, staff members and participants in adult day care, patients in outpatient geriatric clinics, family members of patients with dementia, and community-dwelling older adults. The questionnaire asked the subjects to rank 12 measures of health care outcomes.

Results: The mean response rate was 49%. All health care provider groups considered “improvement of quality of life” the most important. In contrast, in health care recipient groups, “effective treatment of illness,” “improvement of physical function,” and “reduction of carer burden” were given high priority, whereas “improvement of quality of life” was perceived as less important. All the groups, including health care providers and recipients, ranked “reduction of mortality” the least important, followed by “avoiding institutional care.” Stratification analysis showed that the results did not differ by sex, nursing care level, or the existence of relatives who required nursing care, whereas age slightly influenced the order of high-ranked measures.

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* Address correspondence to Masahiro Akishita, MD, PhD, Department of Geriatric Medicine, Graduate School of Medicine, The University of Tokyo; 7–3–1 Hongo, Bunkyo-ku, Tokyo 113–8655, Japan.

E-mail address: akishita-ky@umin.ac.jp (M. Akishita).

Conclusion: Priorities of health care services and their differences between providers and recipients should be taken into account in the health care of older patients and the design of health care policies and research.
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Japanese society has been rapidly aging owing to long life expectancy and a low birth rate.¹ People older than 65 comprised 23.8% of the population in 2012, which is expected to rise to 31.8% in 2030² and will be by far the highest in the world. Japanese physicians have been exposed to a high load of older patients, and management of older patients remains a major challenge. There are several reasons for this difficulty. Evidence is still largely lacking for older patients, especially for those older than 75 years, who account for 11.8% of the Japanese population.^{2,3} Older patients are likely to have multimorbidities, or co-occurrence of two or more chronic conditions,⁴ but application of disease-specific guidelines to older patients with multimorbidities may result in polypharmacy, an increased risk of adverse drug reactions, and poor outcomes.^{5,6} At the same time, however, older patients are at increased risk of underuse of necessary medication, for fear of polypharmacy or complications.^{7,8}

In an attempt to help optimize prescribing for older patients, investigators have devised numerous tools to guide clinicians, such as lists of indicated, beneficial medication or medication with high potential for harm.^{9,10} Although these tools are helpful in reducing exposure of older patients to inappropriate medication and risk of adverse drug events,¹¹ they do not provide more general considerations, such as when or how to discontinue potentially inappropriate medications, how to balance risks and benefits of unlisted medication, or how to manage medication in special circumstances, such as palliative and hospice care where symptom control is of higher priority. Therefore, the process of determining the medication regimen is inevitably subjective and individualized, taking into account patients' cognitive, physical, and social function, remaining life expectancy, and the goals of care.

Unfortunately, few studies have examined the priorities of health care perceived by health care providers and recipients in geriatric medicine. One small study conducted in England more than 15 years ago showed that geriatricians and patients similarly gave high priority to reducing disability and improving quality of care, and low priority to reducing mortality.¹² However, the serious question of whether there may be a gap in priorities of health care between health care providers and recipients has been raised.^{13,14}

Better understanding of health outcome prioritization among health care providers and recipients in geriatric medicine is necessary

to help physicians, older patients, and their family members discuss the goals of care and to assist health policy makers in effectively using resources to address the needs of older patients. In this study, we aimed to obtain a comprehensive picture of the views of groups with an important stake in geriatric health care services (geriatricians, physicians who commonly see older patients or work in long term care facilities, staff members and participants in adult day care, patients in outpatient geriatric clinics, family members of patients with dementia, and community-dwelling older adults) on the relative priorities of different outcome measures that are relevant to geriatric clinical practice and health care policy.

Methods

Between September 2010 and October 2011, surveys were conducted in the following eight groups:

- (1) All geriatricians (approximately 1500) board certified by the Japan Geriatrics Society
- (2) A total of 5000 physicians randomly selected from the list of board-certified physicians in five subspecialties (two internal medicine subspecialties, two surgical subspecialties, and one other) with high exposure to older patients
- (3) Physicians working in 800 long term care facilities that were randomly chosen from the nationwide list of long term care facilities
- (4) Staff members working in adult day care at 400 randomly chosen long term care facilities as mentioned previously
- (5) Participants in adult day care at the same 400 long term care facilities as mentioned previously
- (6) Patients in geriatric outpatient clinics at five university teaching hospitals (the University of Tokyo, Kyorin University, Nagoya University, Kyoto University, and Tohoku University)
- (7) Family members of patients with dementia who had been seen in geriatric outpatient clinics at four university teaching hospitals (Tohoku University was excluded because of the Tohoku Earthquake at the time of this survey)
- (8) A total of 6000 community-dwelling, functionally independent (ie, not requiring nursing care provided by long term care

Table 1
Survey Methods and Number of Valid Answers in 8 Groups

Groups	Time of Survey	Survey Methods	No. of Questionnaires Sent	No. (%) of Valid Answers*
Health care providers				
Geriatricians	2010, Sep	By post	1500	619 (41)
Physicians in 5 subspecialties	2011, Oct	By post	5000	1305 (26)
Physicians in long term care facilities	2011, Oct	By post	800	384 (48)
Adult day care staff	2010, Sep	By post for each facility	400 facilities (2 per facility)	204†
Health care recipients				
Adult day care participants	2010, Sep	By post for each facility	400 facilities (5–10 per facility)	795†
Patients in geriatric outpatient clinics	2010, Sep	Distributed by physicians and returned by post	950	512 (55)
Family members of patients with dementia	2011, Oct	Distributed by physicians and returned by post	542	333 (61)
Community-dwelling older adults	2010, Sep	By post	6000	2637 (44)

*Responses with missing items or invalid answers were excluded.

†For adult day care staff members and participants, questionnaires were sent to each facility by post, where 2 staff members and 5 to 10 participants were offered the questionnaire; 123 facilities (31%) returned the completed questionnaires.

insurance) older adults randomly drawn from the community registers of two target areas (Kashiwa, Chiba Prefecture, a city close to Tokyo, and Sabae, Fukui Prefecture, a provincial city), from which men and women, 65 to 74 years and older than 75 years, were equally selected

Postal questionnaires were sent to all groups of physicians and community-dwelling old adults. For adult day care staff members and participants, questionnaires were sent to each facility, where two staff members and 5 to 10 participants were offered the questionnaire, to be completed on a voluntary basis. The completed questionnaires were gathered at each facility and then returned to us. Patients and family members of patients with dementia received the questionnaires from their physicians (Table 1).

The questionnaire asked about the relative priorities of 12 health care measures that were derived from a literature review and a previous Internet-based survey conducted by the National Center for Geriatrics and Gerontology in 2009 (in Japanese; <http://www.ncgg.go.jp/pdf/itaku/21hokoku/20si-3.pdf>). Each item was expressed as several words so as to help health care recipients understand the meaning. The respondents were asked to rank the measures in order of priority from 1 (most importance) to 12 (least important). To facilitate ranking the outcomes in order, they were prompted to choose and rank the three most important outcomes, then the three least important outcomes, and last, the six middle outcomes. Ties, or the same ranks, were not allowed.

To examine whether variation in the question wording could affect the results, we devised another version of the questionnaire with different wording for four items and sent that version to a randomly selected subset of participants; however, the results were almost identical (data not shown). We also tested whether the order of health care measures that appeared in the questionnaire would affect the results in a random subset of participants, but the responses to the reverse order questionnaire were similar to those of the original version (data not shown). Therefore, we analyzed the responses from different versions (wording and order) together.

The following information was also collected using the questionnaire: age and sex for all participants; specialty (internal medicine, surgery, psychiatry, or others) and years of experience for physicians; qualification and years of experience for adult day care staff; nursing care level (level of required nursing care: relatively independent, limited impairment, needing extensive help, or severely dependent) for adult day care participants; nursing care level and the existence of relatives who required nursing care for patients in geriatric outpatient clinics; nursing care level, morbid conditions, and the existence of relatives who required nursing care for community-dwelling older adults.

The study protocol was approved by the Ethics Committee of the Graduate School of Medicine, The University of Tokyo. Ethical approval for the surveys on patients in geriatric outpatient clinics and family members of patients with dementia was also obtained from the participating institutions.

Results

The mean response rate for the eight groups was 49%, which varied from 28% for board-certified physicians to 68% for family members of patients with dementia (Table 1). The analytic sample included a total of 2512 health care providers and 4277 recipients.

Tables 2 and 3 show the relative priorities of 12 measures of health care services from the highest importance to the lowest, with mean and 95% CI, perceived by health care providers and recipients, respectively.

All physician groups considered “improvement of quality of life” the most important, and the low mean value for this item across physician

Table 2
Health Care Providers' Priorities for Health Care Outcome

Rank	Outcome	Geriatricians (n = 619)		Physicians from 5 Relevant Subspecialties (n = 1305)		Physicians in Long Term Care Facilities (n = 384)		Adult Day Care Staff (n = 204)	
		Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
1	Improvement of quality of life	2.62	2.45–2.80	3.09	2.96–3.22	2.88	2.62–3.14	4.29	3.88–4.71
2	Patient satisfaction with care	4.37	4.15–4.58	4.34	4.19–4.49	4.60	4.32–4.88	4.35	3.96–4.73
3	Effective treatment of illness	4.80	4.53–5.07	4.64	4.48–4.80	4.68	4.39–4.97	4.80	4.42–5.17
4	Maintaining a high level of activity	4.92	4.69–5.15	5.25	5.08–5.42	4.73	4.43–5.03	5.15	4.74–5.55
5	Improvement of physical function	4.94	4.71–5.18	5.32	5.13–5.52	5.50	5.29–5.71	5.26	4.86–5.65
6	Improvement of mental health	6.04	5.87–6.20	5.93	5.79–6.07	5.77	5.51–6.04	5.43	5.03–5.83
7	Resolution of assessed problems	6.39	6.17–6.61	6.12	5.97–6.27	6.10	5.84–6.37	5.83	5.42–6.25
8	Reduction of carer burden	6.45	6.27–6.64	6.39	6.26–6.52	6.22	5.87–6.57	7.17	6.79–7.55
9	Efficient use of resources	7.83	7.67–8.00	7.50	7.37–7.62	8.15	7.95–8.35	7.41	6.95–7.87
10	Improvement of social functioning	8.80	8.62–8.98	8.69	8.56–8.82	8.20	7.95–8.44	7.43	7.04–7.81
11	Avoiding institutional care	10.28	10.15–10.42	10.24	10.14–10.34	10.31	10.13–10.50	9.97	9.71–10.23
12	Reduction of mortality	10.56	10.37–10.76	10.49	10.36–10.62	10.85	10.67–11.04	10.92	10.66–11.17

CI, confidence interval.