

21. van Iersel MB, Munneke M, Esselink RA, Benraad CE, Olde Rikkert MG. Gait velocity and the Timed-Up-and-Go test were sensitive to changes in mobility in frail elderly patients. *J Clin Epidemiol* 2008; 61: 186–91.
22. Lin JH, Hsu MJ, Sheu CF *et al.* Psychometric comparisons of 4 measures for assessing upper-extremity function in people with stroke. *Phys Ther* 2009; 89: 840–50.
23. Wright AA, Hegedus EJ, David Baxter G, Abbott JH. Measurement of function in hip osteoarthritis: developing a standardized approach for physical performance measures. *Physiother Theory Pract* 2011; 27: 253–62.
24. Collin C, Wade DT, Davies S, Horne V. The Barthel ADL Index: a reliability study. *Int Disabil Stud* 1988; 10: 61–3.
25. The EuroQol Group. EuroQol—a new facility for the measurement of health-related quality of life. *Health Policy* 1990; 16: 199–208.
26. Sheikh JI, Yesavage JA, Brooks JO III *et al.* Proposed factor structure of the Geriatric Depression Scale. *Int Psychogeriatr* 1991; 3: 23–8.
27. Vickers AJ, Altman DG. Statistics notes: analysing controlled trials with baseline and follow up measurements. *Br Med J* 2001; 323: 1123–4.
28. Allison P. Missing Data. London: Sage Publications Ltd, 2002.
29. White IR, Horton NJ, Carpenter J, Pocock SJ. Strategy for intention to treat analysis in randomised trials with missing outcome data. *Br Med J* 2011; 342: d40.
30. Eurich DT, Johnson JA, Reid KJ, Spertus JA. Assessing responsiveness of generic and specific health related quality of life measures in heart failure. *Health Qual Life Outcomes* 2006; 4: 89.
31. Hocking C, Williams M, Broad J, Baskett J. Sensitivity of Shah, Vanclay and Cooper's modified Barthel Index. *Clin Rehabil* 1999; 13: 141–7.

Received 7 September 2013; accepted in revised form 4 January 2014

*Age and Ageing* 2014; 43: 695–702  
doi: 10.1093/ageing/afu019  
Published electronically 5 March 2014

© The Author 2014. Published by Oxford University Press on behalf of the British Geriatrics Society.  
This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact [journals.permissions@oup.com](mailto:journals.permissions@oup.com)

## European undergraduate curriculum in geriatric medicine developed using an international modified Delphi technique

TAHIR MASUD<sup>1,2</sup>, ADRIAN BLUNDELL<sup>1</sup>, ADAM LEE GORDON<sup>1</sup>, KEN MULPETER<sup>3</sup>, REGINA ROLLER<sup>4</sup>, KATRIN SINGLER<sup>5</sup>, ADRIAN GOELDIN<sup>6</sup>, ANDREAS STUCK<sup>7</sup>

<sup>1</sup>Healthcare for Older People, Nottingham University Hospitals NHS Trust, Nottingham, Notts, UK

<sup>2</sup>University of Southern Denmark, Odense, Denmark

<sup>3</sup>Department of Geriatric Medicine, Letterkenny General Hospital, Letterkenny, Donegal, Ireland

<sup>4</sup>Internal Medicine, Medical University Graz, Graz, Austria

<sup>5</sup>Institute for Biomedicine of Aging, Friedrich-Alexander University, Erlangen-Nuremberg, Germany

<sup>6</sup>Institute of Primary Care at the University of Berne (BIHAM), University of Berne, Berne, Switzerland

<sup>7</sup>Division of Geriatrics, Department of General Internal Medicine, Inselspital and University of Bern, Switzerland

Address correspondence to: T. Masud. Tel: +44 115 924 9924; Fax: +44 115 970 9947. Email: [tahir.masud@nuh.nhs.uk](mailto:tahir.masud@nuh.nhs.uk)

### Abstract

**Introduction:** the rise in the number of older, frail adults necessitates that future doctors are adequately trained in the skills of geriatric medicine. Few countries have dedicated curricula in geriatric medicine at the undergraduate level. The aim of this project was to develop a consensus among geriatricians on a curriculum with the minimal requirements that a medical student should achieve by the end of medical school.

**Methods:** a modified Delphi process was used. First, educational experts and geriatricians proposed a set of learning objectives based on a literature review. Second, three Delphi rounds involving a panel with 49 experts representing

29 countries affiliated to the European Union of Medical Specialists (UEMS) was used to gain consensus for a final curriculum.

**Results:** the number of disagreements following Delphi Rounds 1 and 2 were 81 and 53, respectively. Complete agreement was reached following the third round. The final curriculum consisted of detailed objectives grouped under 10 overarching learning outcomes.

**Discussion:** a consensus on the minimum requirements of geriatric learning objectives for medical students has been agreed by European geriatricians. Major efforts will be needed to implement these requirements, given the large variation in the quality of geriatric teaching in medical schools. This curriculum is a first step to help improve teaching of geriatrics in medical schools, and will also serve as a basis for advancing postgraduate training in geriatrics across Europe.

**Keywords:** European, undergraduate curriculum, geriatric medicine, consensus, Delphi

## Introduction

The number of people older than 60 years is expected to rise worldwide in the next decade, reaching 1.2 billion by 2025. Between 2000 and 2050, the proportion of the world's population over 60 years is expected to double from ~11 to 22% [1]. The global population over 85 years ('oldest old') is projected to increase by 351% between 2010 and 2050 compared with a 188% increase for the population aged over 65 years during the same time period [2]. A recent report on health in Europe concluded that the workforce providing care for older people should be expanded and that health workers should be trained appropriately [3]. In the United States, a recent Institute of Medicine Report concluded that the overall healthcare workforce is inadequately trained to care for older adults [4].

Older people will increasingly use the healthcare services in all countries and future doctors will need to be knowledgeable and skilled in their management. It is widely recognised that adequate education of undergraduates should be provided so that all doctors of the future should have a better and more positive approach to older people and geriatric medicine [1, 5]. However, there are concerns that teaching of physicians in geriatric medicine may be in decline [6]. One study found that learning outcomes in geriatric medicine and ageing are inadequately assessed in UK medical schools [7]. Another report suggested a highly variable quality in geriatric undergraduate training in German and Austrian universities [8]. Physician trainees themselves have identified gaps in skills and knowledge leading to trainee frustration and potentially adverse outcomes in caring for elderly patients [9].

The research literature suggests that support for geriatrics in national undergraduate curricula is key to effective delivery of teaching in the specialty [10]. However, there is a lack of such curricula. On a European level, the European Union of Medical Specialists-Geriatric Medicine Section (UEMS-GMS) developed an undergraduate curriculum in geriatric medicine [11]. This curriculum, dating from 2003, had become outdated in terms of both content and educational style, and the UEMS-GMS felt an update was appropriate. On a national level, only a few countries have published curricula detailing learning objectives in geriatrics for undergraduate training. The aim of this project was therefore to develop a consensus

among geriatricians in European countries on a curriculum for undergraduate training for geriatric medicine.

## Methods

A modified Delphi process was used. The Delphi technique is a well-recognised consensus method used to determine the extent of agreement on an issue [12–14]. The process involves a literature review, and a panel of experts undertaking a series of 'rounds' to identify, clarify, refine and finally to gain consensus. As the process is undertaken remotely, individuals can express their opinion without being influenced by others.

### Literature review and expert group

An initial draft curriculum was proposed following a literature review of curricula for undergraduate training in geriatric medicine published since 2003 [15]. This literature review, performed by two members of the expert group (A.B., A.L.G.), identified three published national undergraduate curricula and one international curriculum statement: the American Geriatrics Society (AGS), the Australia and New Zealand Society of Geriatric Medicine (ANZSGM), the British Geriatrics Society (BGS) and the International Association of Gerontology and Geriatrics (IAGG) [16–20]. Using the information gained from these four curricula and other publications identified from the literature review, the expert group, via email discussion, formulated the pre-Delphi curriculum consisting of 12 paragraphs.

### Delphi rounds

#### Delphi panel

All delegates and/or observers of the UEMS-GMS as of December 2012 were invited to participate as panel members in the first Delphi round (49 UEMS delegates/observers representing 29 countries).

#### First Delphi round

Invited panel members received an e-mail with the pre-Delphi curriculum version, a documentation of the literature

review, and a link to an internet-based questionnaire in December 2012. Members were asked to respond to each of the 12 paragraphs of the pre-Delphi curriculum by stating whether they either fully agreed with the learning outcome or not (two choices only). If they did not agree, they were provided with a free text field and were asked to specify why they did not agree and what changes they would suggest, if any, that would make the learning outcome acceptable to them. Additionally, in the first Delphi round members were asked to give general comments for improvement of the suggested curriculum. An important instruction posed was: 'Please take into account that the curriculum contains a list of minimal requirements a medical student should meet at the end of medical school'.

### *Analysis of first Delphi round*

Responses were counted and tabulated and were copied in full length to an anonymised internal report of the first Delphi round. The expert group coordinators (A.S., T.M.) evaluated these feedback responses and, where there was any ambiguity, contacted panel members personally for clarification. As a next step, based on this information, the expert group, with support of the Delphi co-ordinators, developed a first revision of the curriculum.

They used the following guiding principles: (i) requests for improving the clarity or wording were checked, and taken into account if considered relevant; (ii) requests for adding a new aspect, or for increasing the difficulty level of an existing objective were only taken into account, if this was most likely an unintentional omission, and would likely be accepted by all experts from all countries; (iii) requests for deleting an aspect, or for lowering the difficulty level of an existing objective, were evaluated, and if required, personally discussed (by phone or individual email) with the panel member, with the intention of better understanding the request and finding consensus on an acceptable modification. The expert group ensured that any modification did not result in the omission of an objective that was considered relevant by the majority of the Delphi panel.

### *Second Delphi round*

Panel members were sent an e-mail with the invitation to the second Delphi round. For information, they received the full detailed internal report of the first Delphi round, and the suggested first revision of the curriculum. The same procedure of rating and analysis was used as in the first Delphi round.

### *Third Delphi round*

Panel members were sent an e-mail with the invitation to the third Delphi round. They received the full detailed internal report of the second Delphi round, and the suggested updated revision of the curriculum. In this round, panel members were informed that the expert group had attempted to produce a

version which might be acceptable for all panel members. Panel members were therefore asked whether they agreed with the proposed version, or whether they had a remaining disagreement. Panel members were informed that, in case of any remaining disagreements, an additional round would be conducted.

## Results

### **Participation of panel members**

Thirty-nine of the 49 UEMS-GMS delegates/observers invited (representing 27 countries), responded and completed the first Delphi round. For the second Delphi round, the 39 panel members who participated in the first round were invited again, and all participated. In addition, for the second Delphi round, one UEMS-GMS delegate from each of the two non-participating countries agreed to join the panel, resulting in 41 panel members representing 29 countries. All 41 members were invited for and participated in the third round. All panel members were trained geriatricians and were actively involved in medical care of older patients. Overall, 38 of the panel members were directly involved in teaching medical students as a staff member or affiliate of a University.

### **First Delphi round**

The number of disagreements for the paragraphs is shown in Table 1.

Requests for improving the clarity or wording: Many comments were related to how specific objectives were classified in the original 12 suggested paragraphs.

Requests for adding a new aspect, or for increasing the difficulty level: Many panel members suggested that additional chronic conditions should be listed among knowledge objectives. Also, more detailed objectives in the domains of interdisciplinary work, social and environmental factors and pharmacology in ageing were suggested.

Requests for deleting an aspect, or for lowering the difficulty level: These related to theories of ageing and knowledge on ethical and legal issues. Panel members suggested that these aspects should be covered in general terms, and more specific objectives should be a matter for national/regional aspects of healthcare in older people.

Discrepant comments occurred for two issues. For geriatric assessment, some panel members suggested that general knowledge about geriatric assessment would be sufficient, whereas others recommended a requirement to have detailed knowledge and skills in multiple subdomains of geriatric assessment. For ethical and legal issues, some members suggested deletion of outcomes to provide less detail, whereas others suggested higher level of detail.

In response to these requests identified in Round 1, the expert group condensed and re-ordered the paragraphs and combined three paragraphs related to ethical and legal issues

Table 1. Results of agreement/disagreement in three Delphi rounds.<sup>a</sup>

Paragraph	No. of disagreements Delphi Round 1 (N = 39)	No. of disagreements Delphi Round 2 (N = 41)	No. of disagreements Delphi Round 3 (N = 41)
1. Patient respect	0	3	0
2. Ageing principles	4	8	0
3. Common medical conditions	11	9	0
4. Performance of geriatric assessment	14	7	0
5. Medication use	3	3	0
6. Multiple co-morbidities and social factors	4	8	0
7. Ethical/legal issues <sup>a</sup>	10	5	0
8. Role of other health professions	4	3	0
9. Healthcare in different settings	5	2	0
10. Regional health and social care aspects	7	5	0
General comments	19	n.a.	n.a.

n.a., not applicable.

<sup>a</sup>The first Delphi round was based on the pre-Delphi curriculum with 12 paragraphs. In subsequent rounds, three of these paragraphs on ethical and legal issues were combined into one single paragraph (paragraph 7), resulting in 10 paragraphs overall for subsequent rounds. Results for paragraph 7 in Delphi Round 1 are therefore the cumulative disagreements of the three paragraphs on ethical and legal issues. "Disagreement" was defined as the panel members answering 'not fully agree' to their response to the questions on if they fully agreed or not with the learning outcomes'.

into one. All specific comments were addressed, and paragraphs clarified or modified based on a consensus of the expert group.

### Second Delphi round

The number of disagreements for the paragraphs is shown in Table 1.

In general, the comments did not identify any major or conceptual disagreements, but related to improving clarity or adapting the difficulty level for specific outcomes. Further suggestions were given relating to the selection of chronic conditions, performance of geriatric assessments, organisation of healthcare and ethical and legal issues. Following this second Delphi round, the sequence and main content of each paragraph were maintained for the third version. Changes were made within paragraphs, mostly by adding/deleting/modifying individual words or sentences, without changing the overall purpose of the paragraph.

### Third Delphi round

Full agreement was obtained. The final European undergraduate curriculum in geriatric medicine resulting from the three stage modified Delphi process is shown in Table 2. The curriculum contains a core set of statements consisting of what the Delphi panel members propose to be the minimum level of essential knowledge, skills and attitudes which students must have gained by graduation. The first column of the table lists the overarching learning outcomes and the second column the associated specific learning objectives.

### Discussion

This European undergraduate curriculum in geriatric medicine reflects the desired requirements as recommended by UEMS delegates and observers representing 29 countries. The World Health Organisation (WHO), concerned about

the lack of progress in improving undergraduate geriatric medicine teaching, surveyed 64 countries and found that the most common reason stated for not including geriatric medicine in medical undergraduate curricula was either lack of specific direction to teach the specialty in the country's national curriculum or the absence of a national curriculum altogether [1]. This consensus-derived curriculum will allow medical schools to benchmark their teaching in geriatric medicine and to expand and modify the content of their teaching programmes to a minimum level recommended by a panel of international experts.

A remarkable finding of this consensus process is the fact that there was full consensus on this curriculum from the perspective of 29 countries, despite highly variable health care systems. This finding suggests that it is feasible to propose internationally acceptable curricula for medical training. In fact, most learning objectives of the proposed curriculum do not involve country or region-specific issues. Only in two paragraphs (paragraph 7 on ethical and legal issues, and paragraph 10 on specific aspects of health and social care) does the curriculum propose region- or country-specific objectives. Taking these aspects into account, this curriculum can also be modified, as necessary, to meet local requirements for those countries with no current national specialty undergraduate curriculum for geriatric medicine. Those countries with existing curricula will be able to map their content to this gold standard and use this mapping as the basis for modification if desired. Through appropriate alignment this curriculum could also help to standardise teaching, learning and assessment of geriatric medicine for medical students across countries, and will benefit older patients considering the movement around Europe of trainee doctors. The curriculum will also be relevant to countries outside Europe in the same way as the American Geriatrics Society and the Australia and New Zealand Society of Geriatric Medicine curricula were useful in the development phase of our Delphi process.



Table 2. European undergraduate curriculum in geriatric medicine

<p>1. Graduates should respect patients regardless of their age</p>	<p>Graduates should be able to:</p> <ul style="list-style-type: none"> <li>• Maintain a professional approach to the older person</li> <li>• Give consideration to various myths and stereotypes related to older people</li> <li>• Respect the dignity of individuals, regardless of age, race, colour, religion, disease or illness</li> <li>• Recognise that ageism can affect the optimal care of older people</li> <li>• Recognise the heterogeneity of older people and that each person needs to be viewed as an individual</li> <li>• Communicate appropriately with older people, including those with cognitive or sensory impairments</li> </ul>
<p>2. Graduates should know about and understand normal and abnormal structure and function, including the natural history of human diseases, the body's defence mechanisms, disease presentation and responses to illness</p>	<p>Graduates should be able to describe:</p> <ul style="list-style-type: none"> <li>• Biochemical, molecular, cellular, genetic and psychosocial theories of ageing</li> <li>• The anatomical, histological and physiological changes associated with ageing</li> <li>• The pathology associated with normal ageing and age associated disease processes</li> <li>• The atypical (non-specific) presentation of disease in older patients (i.e. presentations are not the "typical" presentations taught elsewhere in medical curriculum)</li> <li>• The principles of evidence-based medicine and use of guidelines in the care of old and very old people, taking into account multimorbidity and lack of research data</li> </ul>
<p>3. Graduates should know about common medical conditions in older people</p>	<p>Graduates should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the pathophysiology, diagnosis, assessment, management and preventive strategies for common geriatric syndromes in older people, including:             <ul style="list-style-type: none"> <li>• Chronic pain</li> <li>• Dementia and delirium</li> <li>• Elder abuse: physical, psychological, financial and sexual</li> <li>• Falls and movement disorders</li> <li>• Hearing and vision disorders</li> <li>• Malnutrition and sarcopenia</li> <li>• Pressure ulcers</li> <li>• Urinary and faecal incontinence</li> </ul> </li> <li>• Describe relevant aspects of pathophysiology, diagnosis, management and preventative strategies for common problems in older people, such as:             <ul style="list-style-type: none"> <li>• Cardiovascular disease (including heart failure and hypertension)</li> <li>• Cerebrovascular disease and stroke</li> <li>• Chronic obstructive pulmonary disease and pneumonia</li> <li>• Depression</li> <li>• Diabetes</li> <li>• Disorders of fluid balance</li> <li>• Osteoporosis</li> <li>• Renal failure</li> </ul> </li> </ul>
<p>4. Graduates should have the special skills needed to conduct a history and perform an assessment in an older patient</p>	<p>Graduates should be able to:</p> <ul style="list-style-type: none"> <li>• Obtain a history from an older patient, including from a proxy person</li> <li>• Perform a geriatric assessment using a standardised approach of:             <ul style="list-style-type: none"> <li>• Basic and instrumental activities of daily living</li> <li>• Cognition</li> <li>• Gait and balance</li> <li>• Hearing</li> <li>• Mood</li> <li>• Nutrition</li> <li>• Vision</li> </ul> </li> </ul>
<p>5. Graduates should know about and understand the principles of treatment including the effective and safe use of medicines as a basis for prescribing</p>	<p>Graduates should be able to describe the following concepts:</p> <ul style="list-style-type: none"> <li>• The effect of ageing upon pharmacodynamics and pharmacokinetics in older people</li> <li>• Adherence to medication and factors affecting adherence in older people</li> <li>• The practice of safe and adequate prescribing in older people, taking account of differing physiology, drug interactions and multiple pathologies and adverse drug reactions</li> <li>• Detection and management of drug underuse, overuse (including inappropriate medication use) and polypharmacy in older people</li> <li>• Integration of patient preferences and values into decisions about drug therapy</li> </ul>
<p>6. Graduates should recognise the importance of responses to illness, providing help towards recovery and reducing or managing impairments, disabilities and handicaps</p>	<p>Graduates should be able to:</p> <ul style="list-style-type: none"> <li>• Define the concept of the International Classification of Functioning, Disability and Health (ICF)</li> <li>• Define the concept of frailty in older people</li> <li>• Define comprehensive geriatric assessment and list its components</li> <li>• Interpret findings of geriatric assessment, and suggest diagnostic, therapeutic and management steps as a result of abnormal findings</li> <li>• Recognise the role of social and environmental factors and life experience in caring for older patients</li> <li>• Recognise the role of aids (e.g. hearing aids, toileting aids, transfer aids, walking aids) in the management of older people with functional limitation</li> </ul>

Continued

Table 2. Continued

7. Graduates should know about and understand the main ethical and legal issues in the international and national context they will come across	<p>Graduates should be able to describe ethical and legal issues relevant in the care of older people, including:</p> <ul style="list-style-type: none"> <li>• Decision making in patients with impaired mental capacity to make decisions, including the concept of best interests and advance directives</li> <li>• Ethical concepts as a basis for medical decision making, such as the concept of the four principles of autonomy, beneficence, non-maleficence and justice</li> <li>• Ethical and country-specific legal issues related to               <ul style="list-style-type: none"> <li>• Artificial nutrition and feeding</li> <li>• Cardiopulmonary resuscitation decisions</li> <li>• Withdrawal and withholding of medical treatment</li> <li>• Euthanasia and assisted dying (practiced in some countries, and illegal in many countries)</li> </ul> </li> </ul>
8. Graduates should know about, understand and respect the roles and expertise of other health and social care professionals	<p>Graduates should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the roles of the professions involved in the care of older people, for example, nurses, occupational therapists, physiotherapists, social workers, clinical pharmacists, dieticians, psychologists, speech &amp; language therapists and spiritual support workers</li> <li>• Discuss the importance and role of multidisciplinary team working and meetings in the care of older people</li> </ul>
9. Graduates should know about care of older patients in different settings	<p>Graduates should be able to describe concepts of geriatric assessment and management of older patients in various settings, including:</p> <ul style="list-style-type: none"> <li>• Primary and community care</li> <li>• Acute hospital care and emergency care</li> <li>• Inpatient and outpatient rehabilitation care</li> <li>• Institutional and non-institutional long-term care</li> <li>• Palliative and end-of-life care</li> </ul>
10. Graduates should know about specific aspects relevant for health and social care for older persons in their region/country.	<p>Graduates should be able to describe in outline:</p> <ul style="list-style-type: none"> <li>• Regional/ national organisation of inpatient and outpatient medical and social care for older people, including transitions between care settings and continuity of care</li> <li>• Define important relevant services and relate their contribution to elderly care in the regional/national context, for example: continence services, falls services, intermediate care, old age psychiatry, orthogeriatrics, palliative care, stroke medicine</li> <li>• Define the interaction between health and social services in the provision of long-term elderly care and describe regionally available services, for example: continuing care, residential home care, nursing home care, community care at home, community nursing care, intermediate care (rehabilitation at home or in residential care home or in community hospital), respite care</li> <li>• Describe specific regional/ national and international aspects of demography, epidemiology and healthcare costs related to ageing</li> <li>• Regional/national ethnic minority issues in ageing</li> <li>• Describe specific regional/ national and public/private financial aids and allowances for older patients</li> </ul>

The largest number of disagreements in the first two Delphi rounds related to the three areas of ‘common medical conditions’ (section 3), ‘geriatric assessment’ (section 4) and ‘ethical/legal issues’ (section 7). Not surprisingly, there was early consensus on inclusion of the ‘geriatric giants’: impaired intellect and memory (dementia and delirium), immobility, instability (falls) and incontinence [21]. However, the extent to which other general medical conditions should be included specifically in a geriatric medicine curriculum was more contentious. For geriatric assessment one major area of discussion related to assessment tools. As several validated tools can be employed for the same purpose (e.g. Hodkinson Abbreviated Mental Test Score, Folstein Mini-Mental Test Score and Montreal Cognitive Assessment for assessment of cognition), consensus was achieved by not endorsing any particular indices but by allowing each educational establishment to decide which to use via a local process [22–24]. The disagreements in the ethical and legal section related mainly to differing positions across countries in the areas of euthanasia and assisted dying. The addition of the statement ‘practiced in some countries, and illegal in many countries’ helped to allay concerns.

Another area of contention was whether or not to specify the use of the International Classification of Functioning, Disability and Health (ICF) and some panel members initially suggested alternative classifications [25]. The expert group justified keeping the ICF classification on the basis that firstly it is recommended by the WHO, secondly because respondents reported that an increasing number of teaching institutions have employed it recently and thirdly because it was felt that a standardised approach would be helpful in developing this area in the future. Consensus on a suitable wording to incorporate the classification was achieved in Round 3 of the Delphi process.

A strength of this curriculum is that we used the Delphi technique to achieve consensus. The anonymity of the panel members, made possible by online computer communication, avoided issues of group conformity and prevented influences of dominant personalities, prestige and politics. The iteration of the Delphi process is another advantage. Since a number of rounds are employed, it allows the panel members to reflect upon and adapt their opinions over time, facilitating consensus. The use of controlled feedback, in which the individual panel members receive a summary of the results of a previous round, is a way to reduce noise in

the results and help the process of convergence towards consensus. Another strength of the curriculum is that it is consistent with the findings of a multi-method study which found 25 geriatric core competencies needed by a new intern to adequately care for older adults [26].

A potential limitation of the Delphi technique is researcher influence on the formulation of the initial statements. However, to minimise this risk we based our initial statements on a review of the previous literature as well as opinion from the educational experts from multiple countries. Reassuringly, although there were differences in the precision of the terminology employed in the four previous national and international curricula identified, there were no substantive differences between the subject areas covered in the AGS, ANZSGM, BGS and IAGG curricula [15].

Given the demographic ageing population trend, particularly in the ‘oldest old’, many of whom are frail and have multiple comorbidity, it is vital that healthcare professionals of the future are fully trained and confident in practising geriatric medicine. This international European undergraduate curriculum should help prepare future doctors for the challenges ahead.

In conclusion, a three round-modified Delphi process was employed to achieve consensus in developing a European Undergraduate Curriculum in Geriatric Medicine. This curriculum should help to further develop the teaching of geriatrics in medical schools and also serve as a basis for advancing postgraduate training in geriatrics across Europe [27]. New didactic approaches might help in the development of teaching modules that can be used across countries [28, 29].

## Key points

- The ageing population requires that future doctors are adequately trained in geriatric medicine.
- Few countries have dedicated undergraduate curricula in geriatric medicine.
- A Delphi process has derived a European undergraduate curriculum in geriatric medicine with minimum training requirements.

## Acknowledgements

The panel members who participated in the Delphi process and agree with the final version of the curriculum are as follows: Fruwald T, Pinter G (Austria), Lambert M, Petermans J (Belgium), Staykova T (Bulgaria), Topinkova E (Czech Republic), Holm E, Van der Mark S (Denmark), Kolk H (Estonia), Nuotio M, Valvanne J (Finland), Franco A (France), Luttje D (Germany), Spatharakis G (Greece), Bako G (Hungary), Jonsson P (Iceland), Mulpeter K (Ireland), Clarfield M (Israel), Barbagallo M, Rozzini R (Italy), Macijauskiene J (Lithuania), Fiorini A, Vassallo M (Malta), Krulder J, Mattace-Raco F (Netherlands), Svendsen T (Norway), Wieczorowska-Tobis K (Poland), Clara G (Portugal), Prada G (Romania), Davidovic M, Erceg P (Serbia), Krajcik S (Slovakia), Veninsek G (Slovenia), Arino-

Blasco S (Spain), Ekdahl A, Eriksdotter M (Sweden), Bula C, Stuck A (Switzerland), Cankurtan M, Curgunlu A (Turkey), Masud T (United Kingdom), Vilches-Moraga A (Teaching Expert, Spain). Participating panel members expressed their personal opinions which might not reflect the position of the institutions or organisations they represent. All panel members (delegates and observers of the UEMS-GMS) are listed in alphabetical order of the countries they represent. The expert group consisted of three UEMS-GMS delegates (KM, AES, TM) and six additional experts who were asked to participate for their teaching experience (AB, ALG, RR, KS, AG, AVM). We also acknowledge Olav Sletvold (Norway) and Leo Boelaarts (Netherlands) who were involved in development planning but left the UEMS-GMS before the Delphi process commenced. We also thank the Department of Geriatrics, University of Bern for financial support for the Delphi process.

## Supplementary data

A full list of contributors can be found at *Age and Ageing* online.

## Conflicts of interest

None declared.

## References

1. Keller I, Makipaa A, Kalenscher T, Kalache A. Global Survey on Geriatrics in the Medical Curriculum. Geneva, Switzerland: World Health Organization, 2000.
2. National Institute on Aging, National Institute of Health, World Health Organisation. Joint report, “Global Health and Aging”, 2011. NIH publication number 11-7737.
3. Rechel B, Grundy E, Robine JM, Cylus J, Mackenbach JP, Knai C, McKee M. Ageing in the European Union. *Lancet* 2013; 381: 1312–22.
4. Institute of Medicine. Retooling for an ageing America: building the healthcare workforce. Report April 2008. *J Am Geriatr Soc* 2011; 59: 1537–9.
5. Hubbard RE, OMahony MS, Cross E, Morgan A, Hortop H, Morse RE, Topham L. The ageing of the population: implications for multidisciplinary care in hospital. *Age Ageing* 2004; 33: 479–82.
6. Michel JP, Huber P, Cruz-Jentoft AJ. Europe-Wide Survey of teaching in geriatric medicine. *J Am Geriatr Soc* 2008; 56: 1536–42.
7. Gordon AL, Blundell AG, Gladman JR, Masud T. Are we teaching our students what they need to know about ageing? Results from the UK national survey of undergraduate teaching in ageing and geriatric medicine. *Age Ageing* 2010; 39: 385–8.
8. Singler K, Sieber CC, Biber R, Roller RE. Considerations for the development of an undergraduate curriculum in geriatric medicine. *Gerontology* 2013; 59: 385–91.
9. Drickamer MA, Levy B, Irwin KS, Rohrbaugh RM. Perceived needs for geriatric education by medical students, internal medical residents and faculty. *J Gen Intern Med* 2006; 21: 1230–4.
10. Cruz-Jentoft AJ, Franco A, Sommer P, Baeyens JP, Jankowska E, Maggi A, Ponikowski P, Rys A, Szczerbinska K, Michel JP, Milewicz A. Silver paper: the future of health promotion and preventive actions, basic research, and clinical aspects of

- age-related disease – a report of the European Summit on Age-Related Disease. *Aging Clin Exp Res* 2009; 21: 376–85.
11. UEMS 2003. Medical Undergraduate Training in Geriatric Medicine in the European Union. [http://uemsgeriatricmedicine.org/UEMS1/dok/undergraduate\\_training\\_-\\_final\\_document\\_from\\_2003.pdf](http://uemsgeriatricmedicine.org/UEMS1/dok/undergraduate_training_-_final_document_from_2003.pdf) (27 December 2013, date last accessed).
  12. Jones J, Hunter D. Consensus methods for medical and health services research. *BMJ* 1995; 311: 376–80.
  13. Adler M, Ziglio E (Eds). *Gazing into the Oracle. The Delphi Method and Its Application to Social Policy and Public Health*. London: Jessica Kingsley Publishers, 1996.
  14. Vernon W. The Delphi technique: a review. *Int J Ther Rehabil* 2009; 16: 69–76.
  15. Blundell A, Gordon A, Gladman J, Masud T. Undergraduate teaching in geriatric medicine: the role of National Curricula. *Gerontol Geriatr Educ* 2009; 30: 75–88.
  16. American Geriatric Society. Core competencies for the care of older patients: recommendations of the American Geriatrics Society. *Acad Med* 2000; 75: 252–5.
  17. Anderson MB. A thematic summary of the geriatrics curricula at 40 US medical schools. *Acad Med* 2004; 79(7 Suppl.): S213–226.
  18. Naganathan V. Australian Society for Geriatric Medicine. Position Statement No. 4. Education and Training in Geriatric Medicine for Medical Students. *Aust J Ageing* 2006; 25: 218.
  19. British Geriatrics Society. Undergraduate Medical Curriculum, 2010. [http://www.bgs.org.uk/index.php?option=com\\_content&view=article&id=306:undergraduatecurriculum&catid=49:generalinfo&Itemid=171](http://www.bgs.org.uk/index.php?option=com_content&view=article&id=306:undergraduatecurriculum&catid=49:generalinfo&Itemid=171) (27 December 2013, date last accessed).
  20. International Association of Gerontology and Geriatrics. Geriatric medicine: basic contents for undergraduate medical students, 2006. <http://www.iagg.com.br/PdfNoticias/IAGG200831110919.pdf> (June 2008, date last accessed).
  21. Isaacs B. *Incontinence*. In *The Challenge of Geriatric Medicine*. Oxford: Oxford University Press, 1992; 101–22.
  22. Hodkinson HM. Evaluation of a mental test score for assessment of mental impairment in the elderly. *Age Ageing* 1972; 1: 233–8.
  23. Folstein MF, Folstein SE, McHugh PR. Mini-mental state. A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975; 12: 189–98.
  24. Nasreddine ZS, Phillips NA, Bédirian V, Charbonneau S, Whitehead V, Collin I, Cummings JL, Chertkow H. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *J Am Geriatr Soc* 2005; 53: 695–9.
  25. ICF. <http://www.who.int/classifications/icf/en/> (27 December 2013, date last accessed).
  26. Leipzig MR, Granville L, Simpson D, Anderson MB, Sauvigne K, Soriano RP. Keeping granny safe on July 1: a consensus on minimum geriatrics competencies for graduating medical students. *Acad Med* 2009; 84: 604–10.
  27. O'Neill D, Andersen-Ranberg K, Cherubini A, Strandberg T, Petermans J, Michel JP. New kind of hospital physician must be trained in geriatric medicine. *BMJ* 2012; 344: e2909.
  28. Daunt LA, Umeonusulu PI, Gladman JR, Blundell AG, Conroy SP, Gordon AL. Undergraduate teaching in geriatric medicine using computer-aided learning improves student performance in examinations. *Age Ageing* 2013; 42: 541–4.
  29. Robbins TD, Crocker-Buque T, Forrester-Paton C, Cantlay A, Gladman JR, Gordon AL. Geriatrics is rewarding but lacks earning potential and prestige: responses from the national medical student survey of attitudes to and perceptions of geriatric medicine. *Age Ageing* 2011; 40: 405–8.

Received 7 September 2013; accepted in revised form 4 January 2014