Reforming medical education to enhance the management of chronic disease

Balakrishnan R Nair and Paul M Finucane

ABSTRACT

- Medical education must adapt to change if it is to remain relevant to the needs of doctors, patients and society. Ideally, it should anticipate and lead change.
- Undergraduate education remains rooted in urban medical schools where the focus is on acute disease, while most graduates spend their working lives in the community, dealing mainly with chronic health problems.
- Medical graduates need to acquire specific knowledge, skills and attitudes if they are to effectively manage people with chronic disease.
- Strategies that create a better balance between education in acute and chronic disease are being developed. These include a transfer of clinical teaching to community and nursing home settings and the development of interdisciplinary teaching.

MJA 2003; 179: 257–259

MODERN MEDICAL PRACTICE increasingly deals with the management of chronic disease, predominantly in older people.[1] Medical education has to adapt to this change if it is to remain relevant to the needs of doctors, patients and society, and ideally it should anticipate and lead change. In this regard, our report card for medical schools reads "could do better". At a global level, the educational response to a changing healthcare environment is decidedly sluggish. In recent decades, Australian medical schools have been to the fore in promoting change and have contributed many important innovations in medical education. But more remains to be done.

Here, we explore the educational challenges in preparing tomorrow's doctors to better manage people with chronic diseases, and suggest ways to accomplish this. Many of the issues we explore relate also to postgraduate and continuing medical education.

The challenges

As an educational principle, it is best to learn in the context and environment in which such learning will subsequently be applied.[2] Unfortunately, many medical educators have tended to ignore this fundamental.[3] For largely historical and political reasons, undergraduate education remains rooted in urban medical schools and their affiliated teaching hospitals, where the focus is on acute disease. Most graduates emerge to spend most of their working lives in primary care or in other community settings, where the focus is on people with chronic diseases.[4] This patent mismatch is a universal problem. In the United Kingdom, just 9% of the medical curriculum is delivered in general practice.[5] There are no published comparative figures for Australia, but it is estimated that some 13% of Australian undergraduate teaching occurs in general practice (I Wilson, Senior Lecturer, Department of General Practice, University of Adelaide, personal communication). While all Australian medical schools provide some exposure to general practice, our undergraduates spend too little time in the community settings where many will later work.

It might be possible to overlook this paradox if the knowledge, skills and attitudes acquired in the acute setting could be applied to the assessment and management of chronic disease. However, this is not always the case. There are fundamental differences in the approach to patients with chronic disease as against those who are acutely ill. For one thing, the acute setting emphasises "the disease in the patient" and the importance of "diagnosis" and "treatment". By contrast, the chronic setting emphasises "the patient with the disease" and centres on "assessment" and "management".

Assessment is a much broader concept than diagnosis and involves an integration of the complex amalgam of physical, mental, social and other factors that characterise chronic ill-health. The term "management" also implies a more holistic approach to patient care than the mere treatment of a disease process. If educational processes fail to provide training in assessment and management rather than in diagnosis and treatment, our graduates will be professionally frustrated and their patients poorly served. This applies as much to hospital doctors as to those working in the community. Nowadays, because of our ageing population, acute illness is generally superimposed on chronic disease. Emergency care doctors, intensivists, orthopaedic surgeons and gynaecologists alike must be able to look past the acute presenting problem to the assessment and management of underlying chronic disease.

There are other arguments for striking a better balance in the undergraduate curriculum between a "curing approach" to acute disease and a "caring approach" to people with chronic disease. It has been shown that students acquire increasingly negative attitudes to people with chronic disease

Division of Geriatric Medicine, John Hunter Hospital, New Lambton, NSW.

Balakrishnan R Nair, FRACP, FRCP, Director; and Conjoint Professor of Medicine.

Medical Council of Ireland, Dublin 6, Republic of Ireland.

Paul M Finucane, FRACP, FRCPI, Director of Competence Assurance.

Reprints will not be available from the authors. Correspondence: Professor B R Nair, Division of Geriatric Medicine, John Hunter Hospital, Locked Bag 1, New Lambton, NSW 2305. knair@mail.newcastle.edu.au

as they progress through medical school and early postgraduate training.[6] This ultimately influences career choices. Either overtly or through the benign neglect of chronic disease in the curriculum, students get the message that people with chronic disease are less worthy than the acutely ill.[7] The stigma of chronic disease, particularly in older patients, that was so vividly portrayed in Samuel Shem's novel *The house of God* needs to be challenged and counteracted.[8]

In dealing with the complexities of chronic disease, doctors now work as members of interdisciplinary teams.[9] Undergraduates not only need to gain an understanding and an appreciation of their future colleagues' roles, they need to see teamwork in actual practice. They also need to acquire the interpersonal skills to become effective team members. We also need to counteract the traditional discipline-specific approaches to education and training, which tend to exaggerate interprofessional differences rather than promote teamwork and cohesion.[10]

However, the role of the modern doctor extends far beyond the narrow confines of providing direct patient care. A population health perspective includes a doctor's involvement in:

- the social and environmental factors that impact on health and illness;
- disease prevention and health promotion;
- strategies that empower patients;
- the development of better healthcare delivery systems;
- participation in health service management; and
- information management and critical evaluation.[11]

Longer community attachments at undergraduate level help to provide such a perspective[12] and further strengthen the argument for their provision.

Some solutions

Although the solutions to many of these problems might seem obvious, the difficulties in implementing them should not be underestimated. For example, it is clearly desirable to include greater exposure to chronic disease in the curriculum, and at an early stage, when positive attitudes are most likely to be fostered. To a large extent, this could be achieved by transferring more of the teaching activity from the hospital to the community setting.[13] However, this transfer of activity must be matched by a transfer of resources if primary-care clinicians are to be protected from teacher "burn out". Better funding models for undergraduate teaching in private settings (eg, general practices and specialists' rooms) also need to be developed. Furthermore, the changing demographics of the medical-student population must be considered. With the emergence of graduate-entry medical programs in Australia and the increasing tendency among students to undertake paid work, there are family and financial constraints on placing students in community settings, particularly in rural and remote areas.

One example of what can be achieved is the University of Newcastle medical course, in which students are provided with early clinical experience in a variety of primary care settings. This approach has been shown to foster positive attitudes to people with chronic disease and is well received by students and the community alike.[14] In other countries, education in a variety of ambulatory care settings has also proven to be both feasible and effective,[15,16] and there have been attempts to define a core curriculum for undergraduate education in general practice.[17]

Exposure to chronic disease should continue throughout the course and, as far as possible, should be integrated with the rest of the curriculum. For example, there should be a proper balance between problem-based learning cases that focus on chronic disease and those that focus on the acute.[7] To reflect what will be encountered in the real world, teaching of clinical skills should foster an ability to communicate with people who are deaf, dysarthric or demented, not just the able and articulate. Proficiency in skills such as the assessment of cognitive function needs to be put on a par with the assessment of coma. Educational programs that deal with such issues have been described,[18] and many medical schools have introduced aspects of professional development, including dealing with clinical uncertainty, the importance of teamwork and the management of personal stress in undergraduate education.[19]

Clinical apprenticeships, on which the later undergraduate years are based, provide great opportunities for exposure to chronic disease in community settings. Following a successful pilot program, Flinders University now places selected students in a community setting, far removed from any university teaching hospital, for an entire year of its 4-year medical course.[20] Similar developments are in place or are being planned for universities in at least four Australian states or territories (D Prideaux, Professor and Head of the Office of Medical Education, Flinders University, Adelaide, personal communication).

For several reasons, the development of rural clinical schools in Australia, such as the School of Medicine at James Cook University, Townsville,[21] is another step in the right direction. Here the aim is to teach students about the appropriate delivery of healthcare to rural communities. Such schools are expected to produce doctors who are sensitive to the needs of rural communities, and who will choose to spend at least part of their working lives in a rural setting.[22,23]

Simpler options

All the above initiatives need time, commitment and resources, and therefore have limited applicability. We also need some simpler initiatives that are within the scope of every teaching institution. One option would be to refocus clinical teaching in the acute hospital environment, so that there is a greater emphasis on the chronic diseases on which acute medical breakdown is so often superimposed. Within

the acute hospital setting, there are opportunities to learn about the role of the doctor in interdisciplinary teams, the role of carers and the doctor–patient–carer relationship, discharge planning and liaison with primary care doctors. Some working models of interdisciplinary education, including one at the University of Newcastle, have been shown to be effective.[1,24,25]

Another simple initiative, which is long overdue, is the development of undergraduate teaching within community and residential care. In the United States, it has been shown that teaching in this environment is not only effective, but results in improved healthcare delivery to residents.[26] There are about 140 000 residents in nursing homes and hostels in Australia in both urban and non-urban settings. Undergraduate education in this setting would benefit students and residents alike, with a rich exposure to challenging medicine on the one hand and the likelihood of enhanced medical care for residents on the other.

Bearing in mind the educational tenet that assessment processes drive learning, another relatively simple initiative would be to place a greater focus on chronic disease whenever students are being assessed.

Finally, the "social acceptability" of medical schools is now receiving due attention. This is defined as the obligation on schools to "direct education, research and service activities towards addressing the priority health concerns of the community, region and/or nation that they have a mandate to serve".[27] A greater focus on chronic disease in the undergraduate curriculum would go a long way to enhancing the social acceptability of any medical school. The "hidden curriculum" rampant in many hospitals may undermine the teaching of professionalism and patient-centred care. Clinicians should lead by example and be good role models for students. More schools are now tackling this issue.[28]

Conclusion

We live in a society where interest in acute disease borders on fascination. Television soaps are set in emergency departments but not in dementia units. We successfully raise funds for heroic cancer battles and organ transplants while "non-glamorous" causes like arthritis, incontinence and depression have fewer champions. For too long, these societal attitudes have been reflected in our approach to undergraduate and postgraduate teaching. The imbalance between acute and chronic disease in the curricula must be addressed if medical education is to remain relevant to the actual needs of tomorrow's doctors, patients and society.

Competing interests

None identified.

References

1. Ebrahim S. Demographic shifts and medical training. *BMJ* 1999; 319: 1358-1360.
2. Hutchinson L. Educational environment. *BMJ* 2003; 326: 810-812.
3. Hart JT. The world turned upside down: proposals for community based undergraduate medical education. *J R Coll General Pract* 1985; 35: 63-68.
4. General Medical Council. Tomorrow's doctors. Recommendations on undergraduate medical education. 2002. Available at: www.gmc-uk.org/med_ed/tom-doc.htm (accessed Jul 2003).
5. Morrison J, Watt G. New century, new challenges for community based medical education. *Med Educ* 2003; 37: 1-2.
6. Edwards M. Modern medicine and the pursuit of cure. *Med Educ* 1999; 33: 704-706.
7. Finucane P, Nair B. Is there a problem with the problems in problem-based learning? *Med Educ* 2002; 36: 279-281.
8. Shem S. The house of God. London: Bodley Head, 1978.
9. Shine K. Health care quality and how to achieve it. *Acad Med* 2002; 77: 91-99.
10. Hall P, Weaver L. Interdisciplinary education and teamwork: a long and winding road. *Med Educ* 2001; 35: 867-875.
11. Royal College of Physicians and Surgeons of Canada. Skills for the new millennium. Report of the Societal Needs Working Group. Ottawa: RCPSC, 1996.
12. Edwards R, White M, Chappel D, Gray J. Teaching public health to medical students in the United Kingdom — are the GMC's recommendations being implemented? *J Public Health Med* 1999; 21: 150-157.
13. Howe A, Billingham K, Walters C. Helping tomorrow's doctors to gain a population health perspective — good news for community stakeholders. *Med Educ* 2002; 36: 325-333.
14. Povea-Pacci H, Nair BK, Sanson-Fisher R, Batey R. Teaching of equity in an undergraduate medical curriculum: change imposed and desired. Proceedings of the Australasian and New Zealand Association for Medical Education; 2002 Jul 5–8; Sydney.
15. Reagan-Smith M, Young WW, Keller AM. An efficient and effective teaching model for ambulatory education. *Acad Med* 2002; 77: 593-599.
16. Whitcomb M. Ambulatory care education; what we know and what we don't. *Acad Med* 2002; 77: 591-592.
17. Martens FM, van der Vlueten CP, Grol RP, et al. Educational objectives and requirements of an undergraduate clerkship in general practice: the outcome of a consensus procedure. *Fam Pract* 1997; 14: 153-159.
18. Crotty M, Finucane P, Ahern M. Teaching medical students about disability and rehabilitation: methods and student feedback. *Med Educ* 2000; 34: 659-664.
19. Wilson H, Egan T, Friend R. Teaching professional development in undergraduate medical education. *Med Educ* 2003; 37: 482-483.
20. Worley P, Silagy C, Prideaux D, et al. The parallel rural community curriculum: an integrated clinical curriculum based in rural general practice. *Med Educ* 2000; 34: 558-565.
21. Hays R, Gupta TS. Ruralising medical curricula: the importance of context in problem design. *Aust J Rural Health* 2003; 11: 15-17.
22. Laurence C, Newbury J, Wilkinson D. Increasing rural activity and curriculum content in the Adelaide University Medical School. *Aust J Rural Health* 2002; 10: 220-228.
23. Lawson K, Chew M, Van Der Weyden M. A revolution in rural and remote Australia: bringing health education to the bush. *Med J Aust* 2000; 173: 618-624.
24. Nair B, Perkins J, Sanson-Fisher R. Multidisciplinary learning: a unit in Newcastle, Australia. *Focus on Health Professional Education* 2000; 2: 53-58.
25. Parsell G, Bligh J. Interprofessional learning. *Postgrad Med J* 1998; 74: 89-95.
26. Rubenstein LZ, Werland D, Pearlman RA, et al. Growth of the teaching nursing home: the Veterans Administration experience. *J Am Geriatr Soc* 1990; 38: 72-78.
27. Boelen C, Heck JE. Defining and measuring the social accountability of medical schools. Geneva: World Health Organization, 1995.
28. Haidet P, Kelly P, Kuebeler M, et al. Measuring the hidden curriculum of medical schools. *J Gen Intern Med* 2003; 18: 243-244.

(Received 9 May 2003, accepted 22 Jul 2003) ❑

Reforming medical education to enhance the management of chronic disease

Balakrishnan R Nair and Paul M Finucane

ABSTRACT

- Medical education must adapt to change if it is to remain relevant to the needs of doctors, patients and society. Ideally, it should anticipate and lead change.
- Undergraduate education remains rooted in urban medical schools where the focus is on acute disease, while most graduates spend their working lives in the community, dealing mainly with chronic health problems.
- Medical graduates need to acquire specific knowledge, skills and attitudes if they are to effectively manage people with chronic disease.
- Strategies that create a better balance between education in acute and chronic disease are being developed. These include a transfer of clinical teaching to community and nursing home settings and the development of interdisciplinary teaching.

MJA 2003; 179: 257–259

MODERN MEDICAL PRACTICE increasingly deals with the management of chronic disease, predominantly in older people.[1] Medical education has to adapt to this change if it is to remain relevant to the needs of doctors, patients and society, and ideally it should anticipate and lead change. In this regard, our report card for medical schools reads "could do better". At a global level, the educational response to a changing healthcare environment is decidedly sluggish. In recent decades, Australian medical schools have been to the fore in promoting change and have contributed many important innovations in medical education. But more remains to be done.

Here, we explore the educational challenges in preparing tomorrow's doctors to better manage people with chronic diseases, and suggest ways to accomplish this. Many of the issues we explore relate also to postgraduate and continuing medical education.

The challenges

As an educational principle, it is best to learn in the context and environment in which such learning will subsequently be applied.[2] Unfortunately, many medical educators have tended to ignore this fundamental.[3] For largely historical and political reasons, undergraduate education remains rooted in urban medical schools and their affiliated teaching hospitals, where the focus is on acute disease. Most graduates emerge to spend most of their working lives in primary care or in other community settings, where the focus is on people with chronic diseases.[4] This patent mismatch is a universal problem. In the United Kingdom, just 9% of the medical curriculum is delivered in general practice.[5] There are no published comparative figures for Australia, but it is estimated that some 13% of Australian undergraduate teaching occurs in general practice (I Wilson, Senior Lecturer, Department of General Practice, University of Adelaide, personal communication). While all Australian medical schools provide some exposure to general practice, our undergraduates spend too little time in the community settings where many will later work.

It might be possible to overlook this paradox if the knowledge, skills and attitudes acquired in the acute setting could be applied to the assessment and management of chronic disease. However, this is not always the case. There are fundamental differences in the approach to patients with chronic disease as against those who are acutely ill. For one thing, the acute setting emphasises "the disease in the patient" and the importance of "diagnosis" and "treatment". By contrast, the chronic setting emphasises "the patient with the disease" and centres on "assessment" and "management".

Assessment is a much broader concept than diagnosis and involves an integration of the complex amalgam of physical, mental, social and other factors that characterise chronic ill-health. The term "management" also implies a more holistic approach to patient care than the mere treatment of a disease process. If educational processes fail to provide training in assessment and management rather than in diagnosis and treatment, our graduates will be professionally frustrated and their patients poorly served. This applies as much to hospital doctors as to those working in the community. Nowadays, because of our ageing population, acute illness is generally superimposed on chronic disease. Emergency care doctors, intensivists, orthopaedic surgeons and gynaecologists alike must be able to look past the acute presenting problem to the assessment and management of underlying chronic disease.

There are other arguments for striking a better balance in the undergraduate curriculum between a "curing approach" to acute disease and a "caring approach" to people with chronic disease. It has been shown that students acquire increasingly negative attitudes to people with chronic disease

Division of Geriatric Medicine, John Hunter Hospital, New Lambton, NSW.

Balakrishnan R Nair, FRACP, FRCP, Director; and Conjoint Professor of Medicine.

Medical Council of Ireland, Dublin 6, Republic of Ireland.

Paul M Finucane, FRACP, FRCPI, Director of Competence Assurance.

Reprints will not be available from the authors. Correspondence: Professor B R Nair, Division of Geriatric Medicine, John Hunter Hospital, Locked Bag 1, New Lambton, NSW 2305. knair@mail.newcastle.edu.au

as they progress through medical school and early postgraduate training.[6] This ultimately influences career choices. Either overtly or through the benign neglect of chronic disease in the curriculum, students get the message that people with chronic disease are less worthy than the acutely ill.[7] The stigma of chronic disease, particularly in older patients, that was so vividly portrayed in Samuel Shem's novel *The house of God* needs to be challenged and counteracted.[8]

In dealing with the complexities of chronic disease, doctors now work as members of interdisciplinary teams.[9] Undergraduates not only need to gain an understanding and an appreciation of their future colleagues' roles, they need to see teamwork in actual practice. They also need to acquire the interpersonal skills to become effective team members. We also need to counteract the traditional discipline-specific approaches to education and training, which tend to exaggerate interprofessional differences rather than promote teamwork and cohesion.[10]

However, the role of the modern doctor extends far beyond the narrow confines of providing direct patient care. A population health perspective includes a doctor's involvement in:

- the social and environmental factors that impact on health and illness;
- disease prevention and health promotion;
- strategies that empower patients;
- the development of better healthcare delivery systems;
- participation in health service management; and
- information management and critical evaluation.[11]

Longer community attachments at undergraduate level help to provide such a perspective[12] and further strengthen the argument for their provision.

Some solutions

Although the solutions to many of these problems might seem obvious, the difficulties in implementing them should not be underestimated. For example, it is clearly desirable to include greater exposure to chronic disease in the curriculum, and at an early stage, when positive attitudes are most likely to be fostered. To a large extent, this could be achieved by transferring more of the teaching activity from the hospital to the community setting.[13] However, this transfer of activity must be matched by a transfer of resources if primary-care clinicians are to be protected from teacher "burn out". Better funding models for undergraduate teaching in private settings (eg, general practices and specialists' rooms) also need to be developed. Furthermore, the changing demographics of the medical-student population must be considered. With the emergence of graduate-entry medical programs in Australia and the increasing tendency among students to undertake paid work, there are family and financial constraints on placing students in community settings, particularly in rural and remote areas.

One example of what can be achieved is the University of Newcastle medical course, in which students are provided with early clinical experience in a variety of primary care settings. This approach has been shown to foster positive attitudes to people with chronic disease and is well received by students and the community alike.[14] In other countries, education in a variety of ambulatory care settings has also proven to be both feasible and effective,[15,16] and there have been attempts to define a core curriculum for undergraduate education in general practice.[17]

Exposure to chronic disease should continue throughout the course and, as far as possible, should be integrated with the rest of the curriculum. For example, there should be a proper balance between problem-based learning cases that focus on chronic disease and those that focus on the acute.[7] To reflect what will be encountered in the real world, teaching of clinical skills should foster an ability to communicate with people who are deaf, dysarthric or demented, not just the able and articulate. Proficiency in skills such as the assessment of cognitive function needs to be put on a par with the assessment of coma. Educational programs that deal with such issues have been described,[18] and many medical schools have introduced aspects of professional development, including dealing with clinical uncertainty, the importance of teamwork and the management of personal stress in undergraduate education.[19]

Clinical apprenticeships, on which the later undergraduate years are based, provide great opportunities for exposure to chronic disease in community settings. Following a successful pilot program, Flinders University now places selected students in a community setting, far removed from any university teaching hospital, for an entire year of its 4-year medical course.[20] Similar developments are in place or are being planned for universities in at least four Australian states or territories (D Prideaux, Professor and Head of the Office of Medical Education, Flinders University, Adelaide, personal communication).

For several reasons, the development of rural clinical schools in Australia, such as the School of Medicine at James Cook University, Townsville,[21] is another step in the right direction. Here the aim is to teach students about the appropriate delivery of healthcare to rural communities. Such schools are expected to produce doctors who are sensitive to the needs of rural communities, and who will choose to spend at least part of their working lives in a rural setting.[22,23]

Simpler options

All the above initiatives need time, commitment and resources, and therefore have limited applicability. We also need some simpler initiatives that are within the scope of every teaching institution. One option would be to refocus clinical teaching in the acute hospital environment, so that there is a greater emphasis on the chronic diseases on which acute medical breakdown is so often superimposed. Within

the acute hospital setting, there are opportunities to learn about the role of the doctor in interdisciplinary teams, the role of carers and the doctor–patient–carer relationship, discharge planning and liaison with primary care doctors. Some working models of interdisciplinary education, including one at the University of Newcastle, have been shown to be effective.[1,24,25]

Another simple initiative, which is long overdue, is the development of undergraduate teaching within community and residential care. In the United States, it has been shown that teaching in this environment is not only effective, but results in improved healthcare delivery to residents.[26] There are about 140 000 residents in nursing homes and hostels in Australia in both urban and non-urban settings. Undergraduate education in this setting would benefit students and residents alike, with a rich exposure to challenging medicine on the one hand and the likelihood of enhanced medical care for residents on the other.

Bearing in mind the educational tenet that assessment processes drive learning, another relatively simple initiative would be to place a greater focus on chronic disease whenever students are being assessed.

Finally, the "social acceptability" of medical schools is now receiving due attention. This is defined as the obligation on schools to "direct education, research and service activities towards addressing the priority health concerns of the community, region and/or nation that they have a mandate to serve".[27] A greater focus on chronic disease in the undergraduate curriculum would go a long way to enhancing the social acceptability of any medical school. The "hidden curriculum" rampant in many hospitals may undermine the teaching of professionalism and patient-centred care. Clinicians should lead by example and be good role models for students. More schools are now tackling this issue.[28]

Conclusion

We live in a society where interest in acute disease borders on fascination. Television soaps are set in emergency departments but not in dementia units. We successfully raise funds for heroic cancer battles and organ transplants while "non-glamorous" causes like arthritis, incontinence and depression have fewer champions. For too long, these societal attitudes have been reflected in our approach to undergraduate and postgraduate teaching. The imbalance between acute and chronic disease in the curricula must be addressed if medical education is to remain relevant to the actual needs of tomorrow's doctors, patients and society.

Competing interests

None identified.

References

1. Ebrahim S. Demographic shifts and medical training. *BMJ* 1999; 319: 1358-1360.
2. Hutchinson L. Educational environment. *BMJ* 2003; 326: 810-812.
3. Hart JT. The world turned upside down: proposals for community based undergraduate medical education. *J R Coll General Pract* 1985; 35: 63-68.
4. General Medical Council. Tomorrow's doctors. Recommendations on undergraduate medical education. 2002. Available at: www.gmc-uk.org/med_ed/tomdoc.htm (accessed Jul 2003).
5. Morrison J, Watt G. New century, new challenges for community based medical education. *Med Educ* 2003; 37: 1-2.
6. Edwards M. Modern medicine and the pursuit of cure. *Med Educ* 1999; 33: 704-706.
7. Finucane P, Nair B. Is there a problem with the problems in problem-based learning? *Med Educ* 2002; 36: 279-281.
8. Shem S. The house of God. London: Bodley Head, 1978.
9. Shine K. Health care quality and how to achieve it. *Acad Med* 2002; 77: 91-99.
10. Hall P, Weaver L. Interdisciplinary education and teamwork: a long and winding road. *Med Educ* 2001; 35: 867-875.
11. Royal College of Physicians and Surgeons of Canada. Skills for the new millennium. Report of the Societal Needs Working Group. Ottawa: RCPSC, 1996.
12. Edwards R, White M, Chappel D, Gray J. Teaching public health to medical students in the United Kingdom — are the GMC's recommendations being implemented? *J Public Health Med* 1999; 21: 150-157.
13. Howe A, Billingham K, Walters C. Helping tomorrow's doctors to gain a population health perspective — good news for community stakeholders. *Med Educ* 2002; 36: 325-333.
14. Povea-Pacci H, Nair BK, Sanson-Fisher R, Batey R. Teaching of equity in an undergraduate medical curriculum: change imposed and desired. Proceedings of the Australasian and New Zealand Association for Medical Education; 2002 Jul 5–8; Sydney.
15. Reagan-Smith M, Young WW, Keller AM. An efficient and effective teaching model for ambulatory education. *Acad Med* 2002; 77: 593-599.
16. Whitcomb M. Ambulatory care education; what we know and what we don't. *Acad Med* 2002; 77: 591-592.
17. Martens FM, van der Vlueten CP, Grol RP, et al. Educational objectives and requirements of an undergraduate clerkship in general practice: the outcome of a consensus procedure. *Fam Pract* 1997; 14: 153-159.
18. Crotty M, Finucane P, Ahern M. Teaching medical students about disability and rehabilitation: methods and student feedback. *Med Educ* 2000; 34: 659-664.
19. Wilson H, Egan T, Friend R. Teaching professional development in undergraduate medical education. *Med Educ* 2003; 37: 482-483.
20. Worley P, Silagy C, Prideaux D, et al. The parallel rural community curriculum: an integrated clinical curriculum based in rural general practice. *Med Educ* 2000; 34: 558-565.
21. Hays R, Gupta TS. Ruralising medical curricula: the importance of context in problem design. *Aust J Rural Health* 2003; 11: 15-17.
22. Laurence C, Newbury J, Wilkinson D. Increasing rural activity and curriculum content in the Adelaide University Medical School. *Aust J Rural Health* 2002; 10: 220-228.
23. Lawson K, Chew M, Van Der Weyden M. A revolution in rural and remote Australia: bringing health education to the bush. *Med J Aust* 2000; 173: 618-624.
24. Nair B, Perkins J, Sanson-Fisher R. Multidisciplinary learning: a unit in Newcastle, Australia. *Focus on Health Professional Education* 2000; 2: 53-58.
25. Parsell G, Bligh J. Interprofessional learning. *Postgrad Med J* 1998; 74: 89-95.
26. Rubenstein LZ, Werland D, Pearlman RA, et al. Growth of the teaching nursing home: the Veterans Administration experience. *J Am Geriatr Soc* 1990; 38: 72-78.
27. Boelen C, Heck JE. Defining and measuring the social accountability of medical schools. Geneva: World Health Organization, 1995.
28. Haidet P, Kelly P, Kuebeler M, et al. Measuring the hidden curriculum of medical schools. *J Gen Intern Med* 2003; 18: 243-244.

(Received 9 May 2003, accepted 22 Jul 2003) ❑