Genetics education in the nursing profession: literature review

Sarah Burke BA MA
Research Fellow, Centre for Research in Medical and Dental Education, University of Birmingham, Birmingham, UK

Maggie Kirk BSc PhD RGN
Professor, School of Care Sciences, National NHS Genetics Education and Development Centre, School of Care Sciences, University of Glamorgan, Pontypridd, UK

Accepted for publication 13 October 2005

Correspondence:
Sarah Burke,
Centre for Research in Medical and Dental Education,
University of Birmingham,
Birmingham,
Edgbaston B15 2TT,
UK.
E-mail: s.e.burke@bham.ac.uk

**Aim.** This paper reports a literature review exploring genetics education for nursing professionals. The aim was to contribute to the debate about the future direction of such education.

**Background.** Advances in genetics science and technology have profound implications for health care and the growing importance and relevance of genetics for everyday nursing practice is increasingly recognized.

**Method.** A search was conducted in February 2005 using the CINAHL and Google Scholar databases and the keywords *nurse, midwife, health visitor, education and genetics*. Papers were included if they were published in English between 1994 and 2005 and included empirical data about genetics education in nursing. In addition, attempts were made to access the grey literature, with requests for information on research, for example, to members of the Association of Genetic Nurses and Counsellors and searches of relevant websites.

**Findings.** Agreement on the relevance of genetics for nursing practice is extensive. Empirical evidence of the learning needs of practitioners highlights widespread deficits in knowledge and skills, and low confidence levels. Provision of nursing education in genetics is patchy and insubstantial across a number of countries, further hampered by lack of strategic development. Significant progress has been made in the identification of learning outcomes for nurses. Research on the delivery of genetics education is limited, but the role of skills-based training, use of clinical scenarios, and importance of assessment have all been identified as factors that can promote learning.

**Conclusion.** Whilst areas of good performance were revealed, many studies identified gaps in professional competence and/or education. New initiatives are underway to support genetics education and its integration into professional practice, but further research is needed on the most effective forms of educational delivery, and an international collaborative approach to this should be considered.

**Keywords:** curriculum development, genetics, literature review, nurse education
Introduction

It is almost 30 years since the publication in the United Kingdom (UK) of the first paper focusing on genetics in everyday nursing practice and its implications for education (Maclean 1976). The steady increase internationally in publications since then reflects the growing recognition of the relevance of genetics to all areas of nursing practice and the need for education to prepare nurses accordingly. More recent publications, however, are beginning to extend the call to raise competence and confidence in genetics beyond geographical boundaries, adopting a multi-professional and multi-national approach to consensus on standards of competence (Challen et al. 2005, Julian-Reynier et al. 2005). It is argued that a coordinated international effort needs to be made to identify and address common challenges in genetics research and education ‘because we have such a long way to go, first in producing knowledgeable practitioners, and then in conducting research into the integration of new knowledge and skills into new roles’ (Kirk 2004a, p. 167).

As a contribution to that effort, the UK National Health Service’s National Genetics Education and Development Centre (NGEDC) was established in 2004 by the Department of Health to provide a focal point for genetics education and development in the UK. Midwives, nurses and health visitors (nursing professions) have been selected as a key group for the initial work of NGEDC, representing as they do the major element of the health professional workforce. A vital activity within the work programme for nursing professions is a review of the published literature on genetics education for nurses, so that activity can build on the lessons previously learnt. This paper presents the outcome of the literature review.

Search methods

A search of the published literature on genetics education for the nursing professions was conducted in February 2005 using the electronic reference libraries Cumulative Index of Nursing and Allied Health Literature (CINAHL) and Google Scholar using the following search terms: ‘nurse’, ‘midwife’, ‘health visitor’, ‘education’ and ‘genetics’. The search was restricted to literature published in English between 1994 and 2005. In addition, attempts were made to access the grey literature, with requests for information for example to members of the Association of Genetic Nurses and Counsellors (AGNC) and searches of relevant websites. This process yielded 1922 references. Titles and abstracts were read (when available) and 121 items were considered relevant for follow-up. This selection was based on two key factors: literature that included empirical data about genetics education in the nursing professions and literature considered highly relevant to the field of enquiry.

Results and discussion

Limitations

Whilst a rigorous approach was taken in conducting this literature review, its limitations must be acknowledged. The restriction to English literature inevitably means that some papers will have been overlooked, and the search of grey literature was restricted to the UK only, and relied on our networks of contacts. Furthermore, in some instances where an abstract was unavailable, a judgement was made on the basis of title and publication source only, and thus relied on our awareness of work in this field. Nonetheless, a considerable amount of data was retrieved and reviewed. This has been organized into five thematic categories, as set out below.

Relevance of genetics to professional practice

It is widely acknowledged that advances in genetic science will have a major impact on healthcare delivery, transforming health care from diagnosis and treatment to prediction and prevention (International Council of Nurses 2005). The UK Department of Health also recognizes the many potential benefits that genetics knowledge and technology could offer patients, stating that ‘the Human Genome Project will pave the way for a revolution in healthcare’ (Department of Health 2003, p. 7). Such advances will affect all healthcare professionals, to the extent that ‘an understanding of genetics needs to become a fundamental component of the scientific knowledge and practical competence of our healthcare workforce’ (Burton 2003, p. 1).

Anticipated changes in clinical practice will have a profound effect on the roles of nursing professionals:

As more is learned about the contribution of genetics to health and disease, nursing roles will expand in the delivery of genetic health care in all settings. (Jenkins 2000, p. 2)

Consensus on this view is apparent throughout the literature, although some authors argue for greater immediacy because this ‘is not something that can be left to future practitioners, but is upon us now’ (Skirton & Patch 2000, p. 46).

All nurses, at every level of practice and in every practice setting, will be affected (Lea 2002, Lea et al. 2002). The International Society of Nurses in Genetics (ISONG) has identified the role of nurses in assessing risk factors, providing information or services and evaluating patients for referral
(ISONG 1998), facilitating informed decision-making (ISONG 2000), supporting access to genetic counselling for vulnerable populations (ISONG 2002), and supporting access to genomic health care (ISONG 2003). Genetic advances will have specific implications for a number of nursing professional groups, including oncology nurses (MacDonald 1997), gastroenterology nurses (Rieger & Tinley 2000), advanced practice nurses (Zawacki & Phillips 2002), perioperative nurses (Lea & Tinley 1998), paediatric nurses (Lessick & Anderson 2000) and midwives and other nursing professionals involved in prenatal and neonatal screening (Grant 2000, Lloyd-Puryear & Forsman 2002, Burton & Shuttleworth 2003).

Nursing professionals will need relevant skills and knowledge if they are to meet the increased demands placed on them by these changes:

As developments in genetics become incorporated into everyday practice, so nurses, as members of the multi-disciplinary team, will need to understand its relevance and become knowledgeable and skilled in its application to their own clinical practice. (Burton & Stewart 2003, p. 380)

Professional competence and confidence in genetics

Empirical evidence identifies genetics as a learning need for nursing professionals. Research in this area stretches back over 20 years, reflecting the concern earlier expressed by Maclean (1976). In her literature review, Anderson (1996) summarized genetics education research in nursing in the USA between 1983 and 1995. In the small number of studies conducted in this period, low levels of genetics education and indicated inadequate levels of genetics knowledge were found. In the UK, studies of maternal serum screening in antenatal care in the early 1990s revealed learning needs for midwives. Marteau et al. (1992) found that, in routine screening for foetal abnormalities by midwives and obstetricians, information given before the test was limited, and screening was presented in such a way as to encourage women to undergo the test. Khalid et al. (1994) surveyed midwives responsible for counselling antenatal patients about maternal serum screening for Down syndrome. In responses from 188 midwives, 16% indicated that they had not received any training on prenatal testing, 46% did not think they had received adequate information, and 40% indicated that they did not feel confident counselling for this test.

More recent studies also conclude that levels of genetics knowledge amongst nursing professionals are inadequate. A study in England by Dyson et al. (1996) used multiple-choice questionnaires to explore midwives’ and senior student midwives’ knowledge of sickle-cell anaemia and beta-thalassemia (n = 850). The majority of respondents underestimated the number of ethnic groups affected by haemoglobinopathies and failed to answer basic questions on inheritance correctly. Fewer than one third of respondents answered two simple genetics questions correctly. Respondents who had received training on the haemoglobinopathies had higher levels of knowledge.

A small scale study in England (Chorley & MacDermot 1997) investigated how healthcare professionals respond to patients’ enquiries about familial cancer. Questionnaires from 10 doctors and 10 nurses indicated that they wanted to provide information but felt unable to do so. Family history of cancer was not discussed routinely, criteria for genetic testing or screening were not used, and staff did not appreciate the associated issues surrounding genetic testing. Whilst a small-scale study of this nature cannot be considered generalizable, it does support other findings.

Bernhardt et al. (1998) in the USA audiotaped discussions between obstetric care providers (21 obstetricians and 19 certified nurse-midwives) and 169 pregnant women at the first prenatal visit. They found that discussions of genetic testing generally were not comprehensive, that full family histories were not taken, and that when family history or ethnicity data were collected, interpretation was sometimes incorrect and erroneous recommendations were given. The report does not distinguish clearly between the performance of obstetricians and nurse-midwives, although it does indicate that nurse-midwives were more likely to discuss screening and to mention the voluntary nature of prenatal genetic testing. The authors recommend additional education in genetics for all obstetric care providers.

Another USA study explored nurses’ and nurse-midwives’ knowledge about the maternal serum triple screen, as part of an evaluation of training interventions (Kennedy et al. 1998). Prior to training, a multiple-choice questionnaire completed by 47 participants revealed certain knowledge gaps. Respondents tended to interpret a negative screen too favourably: estimates of the likelihood of a woman who screened negative on the triple screen having a child with Down syndrome were generally lower than the actual risk. In addition, they did not know a number of maternal conditions that need to be reported to the laboratory performing the triple screen analysis. At the start of the study, only 15% of participants ranked their knowledge about the maternal serum triple screen as sufficient. Swank et al. (2001) also measured baseline knowledge as part of an evaluation of the effectiveness of a teaching intervention. In
responses from 65 nurses involved in egg donor screening in the USA, nearly half (49%) rated their ability to identify genetic risk in an egg donor as poor or inadequate prior to training.

Midwives’ and obstetricians’ knowledge of genetic screening in pregnancy was studied in North West England in the late 1990s (Bramwell & Carter 2001). Knowledge relevant to genetic screening and attitudes to counselling were explored by questionnaires completed by 81 midwives and obstetricians. To protect anonymity, respondents were not asked to indicate their professional group, but it was assumed that midwives formed the majority of respondents. The study found that knowledge about testing procedures was generally good but knowledge about the risks of various genetic conditions and the accuracy of available tests was relatively poor. Responses to a counselling scenario suggested that this lack of knowledge might affect information-giving and counselling practice:

Given respondents’ own lack of knowledge about the risks of genetic abnormality and the accuracy of available tests, the admitted unwillingness of at least some respondents to discuss risks and test accuracy with expectant mothers is very understandable. (Bramwell & Carter 2001, p. 139)

Again, increased education for healthcare professionals is recommended.

Bankhead et al. (2001) conducted a large-scale survey of 600 general practice nurses in England and Scotland to explore their roles in recording family history information, and their knowledge of genetics and educational needs. The findings indicate considerable activity in this area: 96% of respondents reported that they collected family history information as a matter of routine, and 62% reported that at least one patient had consulted them in the previous three months with a concern about cancer in the family. Knowledge of the importance of family history in a range of conditions was good. However, only 26% of respondents felt confident about collecting the relevant details about a family history of familial colorectal cancer, although more (61%) felt confident about collecting this information for breast cancer. They were also unsure how to proceed, with over a third indicating that they would refer patients to the GP even if they thought the patient was at population risk and, conversely, over a third would not refer those whom they thought were at considerably higher risk. As in the study by Dyson et al. (1996), education had an impact, as nurses who had attended a training session about genetic issues in the previous 12 months performed statistically significantly better in several areas. However, only 12% of respondents had attended such training, and there was overwhelming support for further information or education, with 98% reporting that this would be useful or very useful.

In her survey of 605 practice nurses, midwives and health visitors in Wales, McGregor (2005) used vignettes to assess genetics knowledge applied to practice and found that just 0.8% (n = 5) of her sample answered four questions correctly. She also identified some confusion and lack of confidence about the practitioner’s role in relation to genetics.

More recent studies of genetics education have focused on training for the successful delivery of screening programmes. As part of the development process of a national implementation plan for haemoglobinopathy screening, a survey of haemoglobinopathy screening policy and practice in England was conducted by Sedgwick and Streetly (2001). Only 38% of districts reported that written policies existed. Methods used to select individuals for screening varied widely, and there was great variation in the way ethnic group/origin was determined, with 24% of midwives reporting that it was determined by the midwife using government census categories (i.e. inappropriately). More recently, studies of haemoglobinopathy screening programmes and services have been conducted in the West Midlands (Augustine et al. 2005), East Midlands (Gill & Cryer 2004) and South Western (Howlett-Shipley & Appleby 2004) regions in England. Inconsistencies were found in the screening and counselling of ‘at risk’ individuals, and the information given to pregnant women before the screening test. All three reports identify a need for education of healthcare professionals involved in antenatal and neonatal screening, including midwives and health visitors. In the West Midlands region, a number of training initiatives have been devised to address this need, and longer-term evaluation of the impact of such training will be of interest (Augustine et al. 2005).

In their questionnaire survey of midwives in four maternity units in the English West Midlands (n = 416), Bennett et al. (2004) found that, whilst respondents recognized genetics as important to their role, they lacked confidence in their own competence. They felt more confident in dealing with the psychosocial aspects of their role, rather than with the biological or clinical aspects. This issue of confidence was also explored by Julian-Reynier et al. (2005) in their multi-national study. They reported statistically significant differences in confidence levels in midwives across several countries, with confidence being lowest in Sweden and Germany, compared with Britain, the Netherlands and France.

There have been relatively few empirical studies exploring the specific genetics educational needs of nursing professionals. Those that have been carried out have mainly focused on learning needs in relation to prenatal screening. It is
noteworthy, however, that all have identified knowledge gaps and have recommended additional education. Thus, the evidence available indicates a learning need for nursing professionals. This may reflect broader concerns about nursing education in biosciences and a lack of confidence expressed by nurses in their understanding of bioscience subjects (Clancy et al. 2000). However, this issue does not only affect nursing professionals: genetics has been identified as a learning need for a range of other healthcare professionals, including specialist registrars in medical specialties (Burke et al. 2005) and general medical practitioners (Emery et al. 1999, Watson et al. 1999, Hayflick & Eiff 2002).

Genetics education provision

Research has also been conducted to explore the provision of genetics education in the nursing professions. A study in 1997 (Kirk 1999a) surveyed all UK establishments offering diploma-level preregistration nurse education programmes and gathered information on 201 programmes (84% of total). The majority (73%) of these incorporated 10 hours or fewer of genetics, and only 11% taught more than 15 hours. Variation was evident in the genetics content and clinical genetics services were rarely involved in such teaching. Only 25% of respondents indicated that compulsory assessment of genetics took place, with such assessment mainly forming part of a multiple choice examination. Whilst the majority of respondents agreed that genetics advances would have an impact on health care and that genetics education would become an increasingly important issue for nursing, 68% indicated that genetics teaching within their departments was appropriate to the health needs of patients. In the majority of programmes (61%), genetics teaching was placed solely within the bioscience curriculum, which may contribute to genetics being seen as inaccessible and fail to promote its clinical relevance. A similar picture emerged in a survey of direct-entry midwifery programmes in the UK (Kirk 2000). An expert panel convened to consider this and other findings concluded that ‘nurses were not being prepared adequately to meet existing or future needs of patients, and that there was an urgent need to address this’ (Kirk 1999b, p. 11).

Metcalfe and Burton (2003) investigated the provision of genetics education for postregistration nurses, midwives and health visitors in the UK. A sample of 38 higher education institutions was surveyed in 2002 by telephone interview and email, and generally a low level of genetics education was found. Of the 38 institutions, 19 said that genetics was not included in any of their postregistration programmes. Of the remaining 19, 14 gave some teaching on genetics in the nursing curriculum, and 16 did so in the midwifery curriculum. Only three institutions offered programmes with whole modules on genetics. The amount of time spent on genetics in both nursing and midwifery programmes varied greatly, from 2 to 75 hours, and the topics covered were also variable, often based on the expertise of individual lecturers. Genetics was rarely included in postregistration curricula at both undergraduate and postgraduate levels within the same institution, indicating a lack of coherence between different levels of education. Many course leaders said that genetics topics needed to be further developed within the curriculum, but the majority thought that the importance and impact of genetics was not widely recognized by more senior lecturers, which resulted in limited time for the subject.

Education for nursing professionals in specific areas of genetics services has also been explored. A review of the resources available to support haemoglobinopathy screening programmes found that, whilst learning materials and courses on haemoglobinopathies are available for healthcare professional education, there is a lack of national coordination and the development of additional learning resources is recommended (Gill 2004). Harcombe and Fairgrieve (2004) presented a training needs analysis for antenatal screening services across England, which maps existing provision of training and explores training needs of key staff directly involved in antenatal care. Questionnaires from 129 maternity units revealed that under a third had a structured education programme for antenatal screening. Less than a third offered preparation in laboratory techniques for diagnostic tests; genetics (patterns of inheritance, chromosome abnormalities, referral mechanisms); and haemoglobinopathies (screening, genetic and medical characteristics, tests available). The majority of respondents indicated that education is required in these areas but time, staff shortages and funding were identified as key barriers.

Recently, educational initiatives in haemoglobinopathies have been reported in the West Midlands region of England (Augustine et al. 2005). In addition to regional courses on haemoglobinopathy and genetics, 2-hour seminars were held in all maternity units in the region, covering diagnosis, clinical significance, treatment, antenatal and neonatal screening of sickle cell and thalassaemia. Nationally, the PEGASUS (Professional Education for Genetic Assessment and Screening) network has been commissioned by the NHS Sickle Cell and Thalassaemia Screening Programme to facilitate education in basic genetics for healthcare professionals involved in antenatal and newborn screening in England (PEGASUS 2005). This will include education for
front-line professionals involved in screening, through a national ‘training the trainers’ initiative.

Low levels of genetics education are also reported in other countries. A study in the USA (Monsen et al. 2000) found a lack of genetics content in nursing texts and in State Boards of Nursing requirements for basic nursing curricula. Similarly, research in New Zealand investigating the genetics content of the 3-year Bachelor of Nursing degree found that fewer than 10 hours were devoted to genetics at two-thirds of institutes, and one institute did not teach any aspect of genetics (Nicol 2002). None of the institutes involved in the study taught more than 20 hours of genetics, and ‘curriculum crowding’ was identified as a major barrier. In their review of medical and midwifery curricula across 12 European countries, Challen et al. (2005) commented on the wide variation in genetics content and the number of different organizations within each country responsible for setting, assessing and delivering professional education.

In summary, studies of genetics education for the nursing professions have revealed low levels of teaching time allocated to this area. Whilst the importance of genetics is increasingly acknowledged, a lack of strategic development is evident.

Identifying learning outcomes

The identification of genetics as a learning need for nursing professionals has prompted research to establish the content of a genetics curriculum and to identify the associated learning outcomes. Jenkins et al. (2001a) conducted a study in the USA to explore nurses’ recommendations about content to be included in genetics education for practising nurses. In 1999, 162 nurses identified as genetics experts or users of genetics education responded to a survey which identified priorities for curriculum content by asking them to rate a series of items on a visual analogue scale (10 cm line). The items had been identified through the consensus development work of a genetics expert group at an earlier meeting. Further work outlined by Jenkins et al. (2001b) included a 2-day consensus workshop conducted in 1999 to identify expected genetics-based clinical outcomes and curriculum content for graduating nursing students and newly-qualified nurses. In another US study, Calzone et al. (2002) developed a list of core competencies in cancer genetics for advanced practice oncology nurses. A Delphi technique involving 37 experts was used to identify skills, attitudes and competencies specific to cancer genetics and then rank their importance.

In a highly influential piece of work, the USA-based National Coalition for Health Professional Education in Genetics (NCHPEG 2001) developed a list of core competences using a consensus process which drew on current programmes, papers and draft educational materials submitted to and refined by a multi-disciplinary working group. The competences identified represent the minimum knowledge, skills and attitudes necessary for healthcare professionals from all disciplines. In response to requests for additional guidance on the content of genetics education, NCHPEG (2004) has also published more detailed principles of genetics for healthcare professionals. In 2002 the American Academy of Nursing published a position statement which recognized the need for integration of genetics knowledge and skills at all levels of nursing education, and affirmed that the knowledge and skills for nurses were the same as those recommended by NCHPEG (Lea 2002).

The NCHPEG competence statements were used as a template for discussion to identify the competences appropriate for all nurses, midwives and health visitors practising in the UK (Kirk et al. 2003). Using a nominal group approach, a UK-wide expert panel of 40 stakeholders contributed over 2 days to discussion and voting in iterative rounds to produce a draft set of competence statements. Following wider consultation, seven core competence standards were identified, and learning outcomes and practice indicators developed for each.

Delivery of genetics education

Very little research has explored preferred forms of learning about genetics. Surveys of nurses and midwives in the USA have indicated that respondents mainly obtained information on genetics or screening from on-the-job training, informal discussions with colleagues, journal reading, workshops and conferences (Kennedy et al. 1998, Swank et al. 2001). Kennedy et al. (1998) found that seminars, pamphlets and articles in nursing journals were preferred modes of education for the maternal triple screen.

Information is available to direct nursing professionals and teaching staff to appropriate educational materials. The ISONG provides information on available teaching resources, including reviews of textbooks, information on academic programmes for nurses wishing to specialize in genetics and links to genetics curricula (ISONG 2005). One such teaching resource produced by the Foundation for Blood Research includes PowerPoint presentations, handouts, case studies and questions for discussion (Lea 2000, Lea & Thomas-Lawson 2001, Foundation for Blood Research 2005). In the UK, the NGEDC provides information on courses and events in genetics for nursing professionals, and plans to give more comprehensive information on learning resources in the
What is already known about this topic

- The implications of advances in genetics for health care, and for nursing practice have been widely acknowledged.
- There is a growing body of evidence highlighting the role and importance of education in promoting competent practice that incorporates genetics.

What this paper adds

- Deficits in education provision, and a lack of competence and confidence in dealing with genetics are common across many countries.
- New initiatives are underway to support genetics education and its integration into professional practice, and significant progress has been made in the identification of learning outcomes.
- Further research is needed on the most effective forms of educational delivery, and an international collaborative approach to this should be considered.

future (NGEDC 2005). Leaflets and journal articles are also widely available (for example, Lea 2003, Whitelaw 2003, NHS Sickle Cell and Thalassaemia Screening Programme 2004).

There has also been limited research into the most effective forms of educational delivery. An evaluation in the UK by Smith et al. (1995) into the impact of two brief training interventions to improve obstetricians’ and midwives’ explanations to patients of a routine prenatal screening test concluded that even a 1-hour session achieved important improvements in communication skills, whilst a training session plus feedback on performance improved both communication skills and information-giving. In the USA, Kennedy et al. (1998) compared the effects of two brief interventions designed to improve nurses’ and nurse-midwives’ knowledge about the maternal serum triple screen: written information and written information plus a 1-hour oral presentation. Both interventions resulted in an increase in participants’ knowledge, but those in the second group scored higher on the knowledge questionnaire one month after the training. The authors concluded that even brief education interventions can enhance healthcare professionals’ knowledge.

Work by McGregor (2005) promotes the value of simulating clinical exposure to genetics in education settings to enhance learning. She found that practitioners who had experienced a critical incident in genetics were statistically significantly more likely to answer two out of three knowledge questions correctly, and to be more confident about their ability to support people with genetic conditions. She suggests that exposure to genetics can act as a catalyst for learning and that educators should consider how best to facilitate this.

Another USA study evaluated the effectiveness of a self-instructional booklet on genetic risk assessment, distributed by post to nurses involved in egg donor screening at reproductive health centres (Swank et al. 2001). Pre- and post-test scores of 65 respondents indicated a statistically significant increase of 21% in mean knowledge scores, and questionnaires revealed a rise from 17% to 60% of participants rating their own ability to identify genetic risk in an egg donor as ‘very good’ or ‘good’. In Australia, a 16-week (60-hour) course on cancer genetics was positively evaluated by the 10 oncology nurse participants (Gaff et al. 2001). Whilst low numbers limit the generalizability of the findings, the success of the course was indicated by the accuracy of participants’ family history assessment, and an increase in the number of participants facilitating referral.

The need for teaching staff to have sufficient genetics knowledge has been recognized as a key stage in the diffusion of genetics content into nursing curricula (Zamerowski 2000, Hetteberg & Prows 2004, Horner et al. 2004). An annual educational programme for nursing educators in the USA led to important improvements in their genetics knowledge and also increased amounts of genetics content in their curricula (Prows et al. 2003). Participants in this programme were asked to identify curriculum activities they planned to use to facilitate the integration of genetics content into their schools’ curricula, and these plans were used to develop a genetics curriculum checklist (Hetteberg & Prows 2004). Strategies were given for the four phases of development: determining existing genetics content; increasing teacher awareness of the need to include genetics; increasing faculty knowledge about genetics; and integrating genetics content into the nursing curriculum.

In the debate on the development of genetics education, the importance of assessment as a driver for learning has also been acknowledged (Kirk 1999a), with calls for the inclusion of genetics questions in both national certification and undergraduate course examinations (Lea et al. 2002, Lea & Monsen 2003). The need to demonstrate the relevance of genetics to everyday nursing practice has also been emphasized, through the use of scenarios to ground education in clinical reality (Association of Genetics Nurses and Counsellors (AGNC) Education Working Group 2002) and promotion of ‘three-dimensional learning’ that goes beyond the textbook (Kirk 2004b).
Conclusion

There is now a substantial – and surely sufficient – body of literature demonstrating the relevance and importance of genetics to nursing and midwifery practice, with widespread agreement that advances in genetics will have an impact on the practice of all nursing professionals. Improving genetics education for nursing professionals is vital if patients are to benefit fully from these advances, but the challenge of achieving this must not be underestimated. The core competences developed in the US (National Coalition for Health Professional Education in Genetics (NCHPEG) 2001) and UK (Kirk et al. 2003) need to be integrated into nursing curricula, and further research into the most effective forms of educational delivery is a key priority.

It is interesting to note a new call emerging from more recent literature – that for international collaboration. An international network would provide an effective means to identify common barriers to, and facilitators of, genetics education, sharing best practice and resources and minimizing duplication of effort in a discipline where research resources are scarce. The Genomics Policy Unit, University of Glamorgan, in collaboration with the NGEDC, and Instituto de Salud Carlos III, Spain, is currently establishing such a network.

Author contributions

SB and MK were responsible for the study conception and design and drafting of the manuscript. SB and MK performed the data collection and data analysis. MK made critical revisions to the paper. MK supervised the study.

References


Integrative literature reviews and meta-analyses

Genetics education in nursing


