Seminars in Neonatology (2004) **9**, 155–165

SAUNDERS

Seminars in NEONATOLOGY

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REVIEW ARTICLE

Regionalized perinatal education

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KEYWORDS
Education;
Continuing education;
Education evaluation;
Neonatology;
Obstetrics;
Outreach education;
Perinatal education;
Perinatology;
Regionalization;
Perinatal care;
Neonatal care;
Organization

Summary Despite changes in the organization and financing of healthcare delivery, and dramatic increases in the number and distribution of perinatal facilities and professionals over the past three decades, there remains a continuing need for effective and efficient regionalized perinatal outreach education programmes. Both the organizers and the participants should be multidisciplinary and include both inpatient and outpatient providers. Content should be restricted to issues relevant to participants' practice, and include topics ranging from preconception to postpartum and early infant care. There are various effective formats, but consideration should be given to reaching as many providers as possible simultaneously within a given facility, minimizing expense and economizing on participants' time. Evaluation strategies range from assessment of immediate outcomes, which generally examine programme process, to ultimate outcomes, which measure changes in patient care and patient health.

When the subspecialties of maternal–fetal medicine and neonatology evolved in the 1960s and 1970s, nearly all of the few critically ill newborns who survived were managed in a small number of academic centres. Since the vast majority of babies were delivered outside those centres, outreach education and neonatal transport naturally became integral to the foundation principles of the original plan of perinatal regionalization.[1,2] The subject matter to be covered included not only the cognitive concepts associated with the new specialties, but also the knowledge and skills required to prevent crises, resuscitate newborns, and prepare patients for transport to regional medical centres.

Over the last three to four decades, the numbers of neonatal and maternal–fetal specialists have increased dramatically and, at least in metropolitan areas, the number of facilities to care for high-risk pregnant women and newborns has burgeoned. However, the vast majority of newborns continue to be delivered outside of major teaching centres. Therefore, although the structure of the regional perinatal system may have changed significantly, the need for outreach education continues as dissemination of new knowledge and skills must be provided to an increasing number of providers in a large number of diverse facilities. This article will focus on the educational needs of perinatal healthcare providers at the primary care level, recognizing that such care may be provided in a variety of settings. The authors have gained much of their experience through the development and

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doi:10.1016/j.siny.2003.08.005

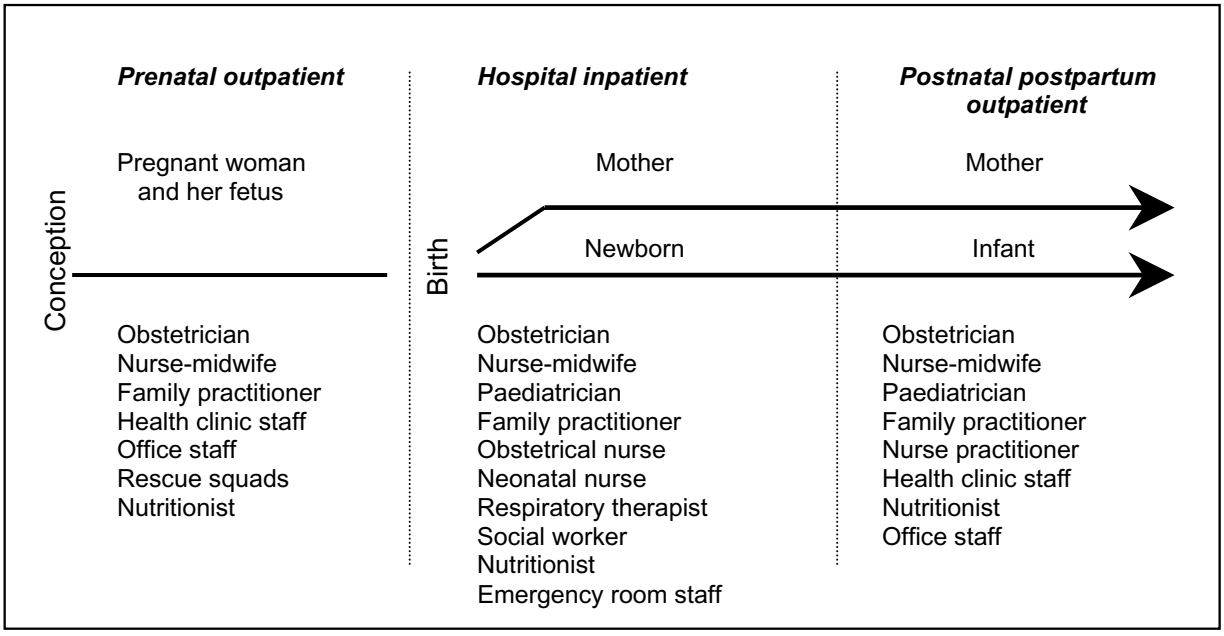

Figure 1 The spectrum of perinatal healthcare providers that serve as the target population for comprehensive perinatal education.

implementation of the Perinatal Continuing Education Program (PCEP)[3] and the Outpatient Perinatal Education Program (OPEP), both originally developed at the University of Virginia.

Target populations

Most traditional education of health professionals has been designed for and delivered to individual disciplines. Nursing students seldom study the same courses taken by medical students. Similarly, obstetricians, paediatricians and family practitioners generally have their own independent journals, textbooks and continuing education courses. In contrast, we have found that perinatal education is most effective when directed at the multidisciplinary team that has become so successful in managing the high-risk pregnant woman and baby.[3] When the various specialties of physicians, nurses, respiratory therapists and other professionals who care for perinatal patients learn from the same educational materials at the same time, many of the practical impediments to optimum patient care are addressed and resolved. The original perinatal regionalization scheme focused on the inpatient population, where high-risk deliveries occurred and critically ill neonates were first identified. The educational target population followed the same focus: inpatient providers. As the discipline of perinatology has matured, the additional importance of decreasing pregnancy risk, managing high-risk pregnancies pro-actively, and managing illnesses of newborn intensive care graduates has become evident, and the target population has widened to include outpatient healthcare providers (Fig. 1).[4]

Inpatient providers

In the past, nurses in community hospitals had either obstetrical or neonatal responsibilities. The advent of labour–delivery–recovery and labour–delivery–recovery–postpartum rooms, often with continuous rooming-in of the baby, brought a new perinatal orientation that requires broader expertise to care for both mother and baby. Certified nurse midwives are active in many locales and are integral members of the perinatal team. Physicians may have a focused (obstetricians and paediatricians) or more general expertise (family physicians). Other personnel such as respiratory therapists, social workers and nursing aides will be involved with the mother and infant at various points, depending on the size of the hospital and degree of care required. Communication and interaction among the disciplines throughout the labour, delivery, resuscitation, and immediate newborn and postpartum periods have become essential for optimum care and should be reflected in the educational experience.

Outpatient providers

Although critically important for good perinatal outcomes, outpatient providers can be difficult to

include in continuing education. Educational planners and speakers are often located at academic tertiary centres, and both content and format of programmes often address the needs of inpatient practitioners. While inpatient providers have a perinatal focus, outpatient providers need to be skilled in multiple care areas. In addition, physicians may care for both inpatients and outpatients, but nurses and other professionals in public health, home health and provider offices do not. However, their impact on the quality of perinatal care is significant.[5,6] Thus, identifying these practitioners, addressing issues of specific importance to them, and providing education in a convenient format are worthwhile and require innovative strategies. An ongoing relationship with key community providers is necessary to identify all practitioners in a referral region. Public health personnel can be both recipients of education, and good resources for identifying other providers of primary perinatal care in the area.

Incentives for implementation and participation

Aside from the obvious altruistic reasons to improve patient care, there are a variety of legislative, political and financial drives for regional centres to develop and deliver outreach education and for the recipient populations to participate. The American Academy of Pediatrics and American College of Obstetrics and Gynecology have published *Guidelines for Perinatal Care* that identify regional education programmes as a responsibility of regional subspecialty perinatal healthcare centres.[7] The *Guidelines* note, however, that not all subspecialty perinatal healthcare hospitals act as regional centres, and further state that regional organization of perinatal health care requires, among other things, co-ordination of professional continuing education. Some experts recommend that perinatal outreach education programmes be designed as co-operative ventures between academic medical centres and public health departments.[8]

While consultants from regional centres may provide valuable advice, we believe that the recipient providers must participate actively in the process of identifying their own goals and resources if changes are to be fully embraced and integrated into patient care by bedside providers.

Over the past several decades, responsibility for co-ordination of outreach education has evolved, and continues to do so. In some regions, particularly in rural areas, the classical tertiary-level academic medical centre located at the centre of a defined geographic region continues to function as the organizer and implementer of the educational process. Where highly organized and managed-care networks exist, co-ordination of education for network facilities may come from within the network administration. Competition for patients and marketing of a centre also propels some institutions into providing educational programmes to community hospitals and healthcare facilities within referral distance of the centre.

Motivating factors for centres to provide regional perinatal education include:

- altruism to improve the quality of care provided;
- accepted role of academic institutions to teach;
- marketing of a centre to gain more patient referrals by providing educational programmes and establishing consultation links;
- managed care and corporate networks seeking risk reduction and economy by fostering consistent, safe care and cost-efficient programmes throughout the network;
- state mandates with goals of consistent education for all providers and improved care for all patients.

Motivations for community hospitals to participate in regional educational programmes include:

- educational opportunities for staff to help ensure quality perinatal care;
- marketing strategy for the hospital to attract staff and to draw patients;
- mandate from the hospital's corporate and/or managed care parent organization;
- mandate from the state;
- requirement to meet Joint Commission on Accreditation of Healthcare Organizations (JCAHO) standards;
- requirement to meet quality improvement targets.

Incentives for individuals to seek and participate in regional educational programmes include:

- increased knowledge and skill to provide quality perinatal care;
- continuing nursing education (CNE) and continuing medical education (CME) credit;
- economy of travel time and expense when compared with national programme(s);
- career advancement, particularly for nurses;
- employer requirement, particularly for nurses;
- hospital requirement for medical staff privileges to admit and care for patients in that facility;

Table 1 Content of a comprehensive outreach education programme

For inpatient providers	For outpatient providers
Maternal and fetal evaluation	Prenatal care
High-risk pregnancies	High-risk pregnancies
Medical conditions complicating pregnancy	Medical conditions complicating pregnancy
Fetal age, growth and maturity	Maternal nutrition and substance use
Fetal well-being	Fetal age, growth and maturity
Preterm delivery risks and recognition	Fetal well-being
High-risk deliveries	Preterm delivery risks and recognition
	Perinatal infections
Maternal and fetal care	Diabetes in pregnancy
Peripartum hypertension	Hypertension in pregnancy
Obstetric haemorrhage	Bereavement counselling
Perinatal infections	
Obstetric complications of pregnancy	Postdischarge care of previously sick infants
Abnormal rupture of membranes	Assessment of healthy, at-risk and sick infants
Preterm labour	Infant resuscitation
Induction and augmentation of labour	Early postnatal discharge and follow-up care
Abnormal labour progression	Hyperbilirubinaemia
Difficult deliveries	Nutritional disorders
Postpartum care	Neonatal infections
Bereavement counselling	Congenital heart disease
	Neurologic disease (seizures)
Immediate newborn assessment	
Resuscitation	Postdischarge care of preterm infants
Gestational age and size assessment	Well-child care
	Development and growth
Newborn care	Common complications of prematurity
Temperature control	Apnoea
Oxygen therapy and monitoring	Chronic lung disease
Respiratory distress	
Apnoea	
Umbilical catheters	Family assessment
Blood pressure	Ability to provide necessary care
Hypoglycaemia	Home environment safety
Intravenous therapy	
Feeding	
Hyperbilirubinaemia	
Infections	
Preparation for transport	
Continuing care for at-risk infants	
Family assessment	
Ability to provide necessary care	
Safety and support in home environment	

- group activity with fellow perinatal care team members.

Matching content to practitioners

Programme content should match the complexity of care anticipated. There are certain basic topics, such as resuscitation of the newborn, that are appropriate for all perinatal professionals. A suggested list of perinatal outreach education topics is shown in Table 1.

Overall, content should be flexible to meet specific community patient care goals. For example, if it is hospital practice and consistent with the regional plan for very-low-birthweight babies or babies requiring long-term mechanical ventilation to be referred to another centre, then topics regarding these issues should be omitted from the programme for that specific hospital. In some regions, patient care goals will have been determined by the regionalization planning process. In others, a process of identification of goals and resources should precede the educational programme.

Multidisciplinary approach

For reasons of relevance, credibility and professional acceptance, the educational implementation

team should reflect the interdisciplinary structure of the perinatal healthcare teams in both the regional centre and community hospital. While physicians and nurses may be the core of a regional outreach team, participating instructors may logically include all disciplines that provide care to child-bearing women and newborns, including social workers, nutritionists, respiratory therapists, developmentalists and others.

Individuals responsible for co-ordinating programme(s) within the target institution should also be part of a multidisciplinary team. Community hospital physicians have great ability to enact changes, but mainly in their respective private practices. Nurses, nurse practitioners, nurse midwives, respiratory therapists and other perinatal providers typically have less ability to effect service-wide change in how care is provided. While nurses are often the focus of educational programmes, targeting them alone may do little more than creating frustration by providing information but not facilitating change in the organization in which they work. Joint participation by all disciplines in the implementation and learning process will encourage involvement, and facilitate the translation of new knowledge into patient care practices.

In addition to facilitating change, participation of providers from all disciplines in the same educational programme promotes consistency of care. Multiple care practices employed to achieve the same end may be reviewed, with the most effective retained and the others eliminated. Once group review and determination of the best practice(s) for a specific hospital or group practice is established, following the same approach by all practitioners is likely to reduce errors. For example, multiple schemes for the use of oxytocin to induce or augment labour may be used in a hospital, with each medical practitioner having a preferred way. If all practitioners jointly decided on one or two dilution formulae as well as a standard protocol to advance oxytocin administration, errors with mixing the medication and setting intravenous pumps could be largely eliminated. The regional centre's role in this process is to present national practice guidelines and to help establish a forum for discussion and debate by the local staff to decide what works best for their facility, and not to dictate what the regional centre believes the solution should be. To become truly effective, change must come from within the organization.

Optimal perinatal care delivery requires a team approach, within hospitals and within regions, with team members having different but equally important responsibilities and roles. Perinatal education requires the same team approach. Further, the participants' perceived value of a programme is strengthened by their observation of the regional centre team's investment in offering the programme.[9]

Educational design

Principles

Perhaps the two most important design principles for perinatal continuing education programmes are the following:

- target all of the appropriate participants (physicians, nurses, etc.);
- identify the relevant instructional objectives and content that are needed by participants to deliver optimum perinatal care in real world settings.[10]

These principles usually require that initial resources be devoted to interviewing and observing representative members of perinatal care teams in their work settings before any educational materials are prepared. Review of initial care provided to patients subsequently transported to the regional centre may also provide useful information. The result of these efforts will be to focus the design of educational materials on the appropriate participants and the relevant content needed for effective job performance.

Educational research suggests two other design principles that are important in preparing successful perinatal continuing education programmes:

- initiate the programme at a level consistent with participants' current knowledge and skills;
- maximize the participants' time-on-task, especially their practice of skills and decision making that will be useful in the delivery of perinatal care.[11]

Some educational programmes are ineffective because they overestimate the participants' initial skills and cognitive knowledge; if students do not have the prerequisite skills and concepts, they will have difficulty in learning new ideas and behaviours. Other programmes are ineffective because they devote most of the students' time-on-task to activities that do not match the ultimate educational objectives. For example, a course may devote too much time to what is easiest to teach (facts), and too little time to what is needed for effective performance in the real world (decisions and behaviours).

In summary, effective perinatal continuing education programmes target the necessary range of participants, identify objectives and content that are relevant to the real world, and allow time and opportunities for participants to become skilled in performing procedures and making critical decisions.

Strategies of comprehensive outreach programmes

The ultimate goal of an effective outreach education programme is to improve patient outcome in a particular region. Accomplishment of this goal will require acquisition of knowledge and skills, and creation of an environment that fosters effective implementation of new knowledge and skills in the clinical setting. The following are some suggested strategies for accomplishing these objectives.

Educational process

- *Encourage multidisciplinary, multispecialty implementation and participation*. Participation by all perinatal healthcare team members fosters communication among team members, both within a given hospital and between community hospital and regional centre providers, promotes consistency of care, and facilitates translation of cognitive information bedside care practices.
- *Economize on participant time*. Recent financial pressures have limited the availability of professional time for continuing education. Hospital nurses are given minimal non-patient care time, and physicians, advanced practice nurses and nurse midwives cannot spare substantial time away from office practice.
- *Tailor programmes to participant needs*. As noted above, a basic principle of education is to teach what the student needs to know. Different perinatal professionals and organizations have different goals and roles in the regional system. It is valuable to conduct a survey of the organization's patient care goals before defining the specific content of a programme.[3]
- *Be sure that resources are adequate to achieve patient care goals*. Teaching new knowledge and skills will be ineffective if there are inadequate resources to implement them. Deficiencies may be identified through a pre-programme inventory of the available equipment, support services and personnel, and then returning the findings to the participants. As a result, resources may be improved or patient care goals modified.

Educational programme

- *Convey current information*. Information about optimum care practices changes frequently. Be certain that cognitive information is up-to-date and consistent with national recommendations.
- *Include necessary skills*. Optimum patient care requires hands-on skills as well as knowledge of when to use the skills.

Translation of knowledge into care practices

- *Encourage ownership of the educational process*. Educational programmes delivered entirely by outside instructors often do not change local care practices unless a local clinician with sufficient authority chooses to teach the new concept(s) to other local practitioners. Involvement of local personnel as co-ordinators and teachers early in the process helps to establish a local interest in programme success and continued teaching after completion of the initial programme.
- *Assess changes in care practices*. This may be accomplished as part of the programme evaluation process as described below. It may be valuable for community hospital staff to conduct a self-inventory of care practices during and following the educational programme. For example, participants could be asked whether or not a given care practice (e.g. neonatal blood glucose screening for high-risk babies) is part of their institution's routine and, if not, how they might implement such a routine.
- *Maintain involvement*. A single educational effort will frequently have an initial effect on care practices, but then the institution or individual may gradually revert to previous practices. This tendency can be intensified by trained staff leaving and new staff arriving. In our experience, there is a 30–50% staff turnover in the average community hospital over a three-year period. Strategies to maintain involvement include repeating formal educational programmes on a regular basis (e.g. every three years)[12] and conducting periodic multidisciplinary reviews of cases selected by the participants.

Perinatal education resources

Existing perinatal educational programmes have undergone varying degrees of evaluation, with some having no published evaluation data and others having extensive published results. Some programmes are structured to support multidisciplinary participation; others target only nurses. Some programmes limit regional centre travel time

to key steps in the educational process; others require considerable travel and lecture time. Different programmes or a combination of programmes will be appropriate for different patient care settings.

AWHONN Fetal Heart Monitoring Program principles and practice (http://www.awhonn.org)

Developed by the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) to give nurses the opportunity to develop, improve and enhance their fetal assessment skills. The programme consists of three courses, each one or two days in length, taught by AWHONN-approved instructors.

March of Dimes modules (http://www.marchofdimes.com/professionals)

Printed cognitive knowledge material designed to help perinatal nurses and nurse midwives integrate scientific and clinical advances into the care of mothers and babies. Modules are available for purchase individually, and may be used for independent or group study.

Neonatal Resuscitation Program (NRP) (http://www.aap.org/nrp)

Evidence-based approach to newborn resuscitation with an instructional textbook and interactive CD-ROM designed for nurses, physicians and respiratory therapists providing inpatient perinatal care. NRP includes a system of train-the-trainer teaching established by the American Academy of Pediatrics (AAP) and American Heart Association (AHA) to provide hands-on skill instructors and a national process for registration of participants.

Outpatient Perinatal Education Program (OPEP) (http://www.healthsystem.virginia.edu/neonatology)

Designed for multidisciplinary outpatient providers of prenatal obstetrical care and postdischarge paediatric care of high-risk neonates. The programme consists of three self-instructional books supplemented by on-site skill sessions and group interactions organized by both regional outreach personnel and local co-ordinators.

Paediatric advanced life support (PALS) (http://www.americanheart.org)

A defined curriculum of 16 h duration, designed for paediatricians, hospital house staff, emergency physicians, family physicians, nurses, paramedical personnel, respiratory therapists and others. Course includes a textbook and lectures, a system of train-the-trainer teaching, and a national process for registration maintained by AAP and AHA.

Paediatric education for prehospital professionals (PEPP) (http://www.aap.org or http://www.peppsite.com)

Sponsored by the AAP, with defined curriculum of 20 h duration. Programme consists of a textbook and lectures, and is designed for EMT's, paramedics and other healthcare professionals working in the prehospital setting.

Perinatal Continuing Education Program (PCEP)[3,12–14] (http://www.pcep.org)

Designed for inpatient physicians, nurses, nurse-midwives and practitioners, respiratory therapists and all others who care for pregnant women or newborn babies. This programme addresses several steps in the educational process, including community hospital self-inventory, self-instructional books, survey of recommended routines to assess routine perinatal care practices, and written skill instruction with demonstration and practice sessions organized by community hospital co-ordinators who have been trained at a workshop held at the regional centre. Nearly all activities take place within each participating hospital, but are co-ordinated by an outreach team from the regional centre.

S.T.A.B.L.E. (http://www.stableprogram.org)

Booklet and accompanying classroom lecture format for inpatient maternal/child healthcare providers with content that addresses neonatal care during the postresuscitation/pretransport stabilization period. Utilizes conferences to teach the programme directly and to train the trainers to teach in their home regions.

Strong PeriFax (http://www.urmc.rochester.edu/perifax)

Targeted for obstetric inpatient nurses, but may include physicians, with obstetric case studies and

reading materials sent weekly via Internet, e-mail or fax to subscribing hospitals or individuals. This programme may be used by community hospitals with or without the involvement of a regional centre.

Additional perinatal education resources include the following.

- Case review of patients transported from the community hospital to the regional centre, with feedback by the regional centre team given at a community hospital team meeting in the community hospital.[9,15]
- Case review of non-transported patients, selected by the community hospital staff, and/or selected by the regional centre to highlight particular topics and care interventions, with multidisciplinary discussion of all aspects of care.
- Conferences organized for perinatal physicians and nurses in the region.
- Newsletter on topics of interest, new information and/or common care problems.
- Meetings of perinatal nurse managers working at hospitals within the region.
- Lending library of videos, manikins and other materials for skill practice.
- Video conferencing to provide lectures and/or specialty consultation.
- Mortality review of fetal, neonatal and maternal deaths.[8,16]
- Clinical traineeships, sometimes called mini-fellowships or mini-residencies, at the regional centre during which community hospital nurses[17] and/or physicians spend a limited time (typically three to five days) participating in an organized course of didactic information and skill training or refresher practice.

Implementation challenges

Funding

During difficult economic times, support of non-direct patient care activities is usually reduced, thus requiring a search for alternative resources. State funding, often associated with accompanying designation of regions and service mandates, exists in some states. State funding is often matched with federal funds. Community hospitals may be willing to pay for a share of educational expenses if the programme is determined to be useful and relevant to patient care; hospital accreditation agencies often require evidence of continuing staff education. Alternative funding sources include the hospital auxiliary, local March of Dimes or other private service groups, and joint sponsorship with professional organizations.[18] Regional centres may fund some outreach education or provide in-kind support as a marketing expense to recruit patient referrals, or because it is viewed as part of an academic institution's mission. Networks may fund the activity as a strategy for cost- and/or risk-reduction.

Outreach personnel

Outreach education requires the dedicated time of a co-ordinator. Time for outreach education needs to be protected from other demands and expectations that are sometimes allowed to encroach upon it. One outreach educator, however, cannot accomplish the work independently; effective perinatal education requires a multidisciplinary implementation team.

Infrequently used care activities

An educational programme may introduce skills that will be needed infrequently (e.g. endotracheal intubation). Meeting these needs, particularly in areas with low delivery rates, will often require expanding the traditional role of the nurse, identifying and training key personnel to perform skills that are required infrequently, and changing staffing patterns to permit immediate availability of appropriately trained personnel.[19,20]

Special problems for outpatient providers

Due to the generalist nature of most outpatient care, with providers often seeing all ages and a wide range of conditions, perinatal issues may not be a top educational priority. Also, private practices are often small, function independently and are widely scattered, especially in rural areas. Getting groups together to attend a skill session or participate in a course of study can be difficult. The local hospital remains a central and familiar meeting place for educational programmes, even for outpatient providers. Since office hours are long, often extending into evenings and weekends, and education budgets are minimal, programmes need to be inexpensive, on-site or nearby, and readily available to most of the staff. Self-paced, self-instructional units generally work well.

Evaluation of the programme and its effect

Evaluation of programme effectiveness can range from one extreme of simply achieving compliance

with mandates required by accreditation agencies to the other extreme of truly measuring changes in patient outcomes. The resources required to accomplish the former are minimal, while the latter can be expensive, time-consuming and difficult to achieve because of confounding variables. Many agencies approving programmes for continuing education credit require that participants simply answer questions such as: (1) did the programme meet your needs? (2) was the presentation well organized and understandable? and (3) were the stated objectives met? Outreach educators are encouraged to use more effective evaluation measures to determine the impact of their programme(s) more accurately so that appropriate revisions may be made.

Evaluation design

> 'Purpose is the controlling force in research. Decisions about design, measurement, analysis, and reporting all flow from purpose'. (Patton, 1990)[21]

Evaluation plans for perinatal outreach education should include the following components.

- A clear statement of the purpose or reason for conducting the perinatal outreach education programme. While there may be multiple benefits to the participants, there will be a primary reason for the sponsoring agency or group to have implemented the programme.
- Identification of the stakeholders interested in the evaluation results.
- Measures of process evaluation, or specific data on the process of implementation of the educational programme. These will include programme structure and delivery information, programme activities and participant characteristics.
- Measures of outcomes of the educational programme in terms of the changes that are expected to be observed if the programme is successful. The expected changes can be in the participants, healthcare systems or populations.

The following models will exemplify the application of these four components.

Model #1

A familiar model of continuing education is the discipline-specific programme of multiple didactic presentations with time for questions from the audience. The purpose of this type of programme is to present advances in the diagnosis and management of selected conditions. The programme design is from half day to two days of didactic presentations, panel discussions and breakout groups. The evaluation design is primarily a formative research. The stakeholder in the results of these programmes is the sponsoring organization. The process evaluation focuses on participant satisfaction, detailed documentation of programme logistics, and programme costs. The outcome evaluation of discipline-specific programs would determine if participants incorporate the medical advances into practice, but this evaluation is rarely conducted.

Model #2

Another model of continuing medical education programmes is to provide structured experiences to learn new medical knowledge or procedures in areas that are self-defined. An example of this is called Visiting Clinician Program and its purpose is to 'provide individualized continuing education to participants and to foster closer ties between academic health centre faculty and community practitioners'.[22] The programme is a one-day visit with a faculty member at the medical centre to accomplish self-identified goals by each participant. The evaluation design is a summative evaluation with data collected from many different sources, e.g. programme management systems, interviews with visiting clinicians, and follow-up surveys. The stakeholders in the success of the programme include a wide range from faculty hosts to funding agencies to advisory panel members. The process evaluation includes detailed documentation of the implementation and processes of the programme. The outcome evaluation data include self-report of changes in practitioners' care based on their participation in the programme.

Model #3

The PCEP is a model of a comprehensive continuing education programme for perinatal care providers from multidisciplinary specialties.[11] The purpose of the programme is to improve the knowledge and skill of perinatal healthcare providers in the identification and management of at-risk and sick newborns and high-risk pregnant women. The structure of the programme is a comprehensive 40-week intervention that includes cognitive instruction and psychomotor skills, and is conducted in community hospitals. The evaluation design is summative research with emphasis on quantifiable outcome measures. The stakeholders are variously defined

Table 2 Examples of measures of programme outcomes

Outcome	Evaluation measure
Programme use and acceptance	Participation rate
	Completion rate
	Evaluation forms
Knowledge change	Preprogramme vs postprogramme test scores
Facilities change	Preprogramme vs postprogramme inventory survey
Care practices change	Chart review
	Patient status at transport
	Referral patterns
Consistency of care change	Preprogramme vs postprogramme survey of practice routines
Patient outcome change	Morbidity
	Mortality

as the regional centres implementing the programme and the participating community hospitals, and include at least the hospital providers, administrators and funding agencies. The process evaluation includes documentation of perinatal healthcare providers in the hospital, programme participants and participant completion rates. Outcome evaluation includes changes in cognitive knowledge, participant satisfaction and changes in care practices.

The programme outcomes shown in Table 2 are ordered by the increasing degree of overall importance, from immediate measures of programme use to ultimate measures of patient outcome. The order also indicates an increasing likelihood of the presence of confounding variables. The outcomes of programme use and comprehension are direct, while mortality and morbidity could be influenced not only by the educational programme but also by other factors such as advances in perinatal care or changes in availability of, or access to, healthcare facilities. As one progresses down the list, the educational programme becomes less of a direct influence on the outcome, and the cost and complexity of collecting the necessary evaluation data also increases. The most cost-effective and practical outcomes used to evaluate most perinatal education programmes are programme use and acceptance, changes in cognitive knowledge, and changes in facilities or routine care practices. Measurable changes in morbidity and mortality generally cannot be expected from a single educational activity.

The frequent use of evaluation designs that rely primarily on measures of participant satisfaction have dampened the incentive to develop creative measures of other intended outcomes. Truly effective evaluation will provide sufficient information about the effect of the programme on participant performance and on patient outcome so that effective alterations can be made in the structure of the educational intervention.

Summary

Despite the proliferation of maternal–fetal medicine and neonatology personnel and facilities, outreach education remains an essential component of modern regional perinatal care. The target population has expanded from inpatient providers to include outpatient providers, and the time frame has expanded from the immediate perinatal period to include care from preconception through the postneonatal and postpartum periods.

Practice points

- Both the target population and the implementation team should be multidisciplinary.
- Content should be aimed at clearly defined care practices needed by the participants.
- The programme should be introduced at a level consistent with participants' current knowledge and skills.
- Translation of education into changed care practices requires learning new skills as well as new knowledge, and for participants to have ownership in implementing the programme.
- The evaluation component should measure the effect of the programme on care practices and outcome, rather than a simple evaluation of programme process and acceptance.

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