

Educational needs of Australian rural and remote doctors for intermediate obstetric ultrasound and emergency medicine ultrasound

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Introduction: The aim of this research was to determine the educational needs of Australian rural and remote doctors for intermediate obstetric ultrasound and emergency medicine ultrasound. The main research questions were: what educational topics would rural and remote doctors prefer to learn about in intermediate obstetric ultrasound and emergency medicine ultrasound, and what were those doctors' preferred methods of delivery for an ultrasound education program.
Method: A self-administered postal questionnaire containing a pre-paid return envelope was mailed to 344 Australian rural and remote doctors in December 2003.
Results: 107 completed questionnaires were returned, giving a response rate of 32.7%. This was after the denominator was adjusted for the 17 doctors whose letters were returned to sender. The respondents included 23 (21.5%) female and 84 (78.5%) male doctors. Eighty doctors (74.8%) stated that they used ultrasound, and 27 (25.2%) said they did not. Seventy-seven (72%) indicated they had previously participated in some ultrasound education and training.

The respondents stated that their main areas of educational need in intermediate obstetric ultrasound were ectopic pregnancy (76.6%), miscarriage (72%), intrauterine growth restriction (65.4%), transvaginal scanning (47.7%), detecting fetal abnormalities (47.7%) and morphology scanning at 18–20 weeks (41.1%).

The main areas of educational need in emergency medicine ultrasound were focused abdominal sonography in trauma (63.5%), detecting foreign bodies (40.2%), gynecological ultrasound (39.2%), gall bladder and biliary tract (37.4%), abdominal aortic aneurysm (32.7%) and trauma bleeding (31.7%).
Conclusion: Australian rural and remote doctors are using ultrasound technology to improve the clinical investigation and diagnosis of a large variety of clinical conditions in their family medical practices. This paper describes the results of research into the educational needs of this target group of doctors.

Introduction : Cette recherche visait à déterminer, chez les médecins des régions rurales et éloignées de l'Australie, les besoins de formation de niveau intermédiaire en échographie obstétrique et échographie médicale d'urgence. Les principales questions de recherche étaient les suivantes : Quels sujets les médecins des régions rurales et éloignées préféreraient-ils apprendre en échographie obstétrique et échographie médicale d'urgence au niveau intermédiaire, et quelles méthodes de présentation d'un programme de formation en échographie ces médecins préfèrent-ils?
Méthode : On a envoyé par la poste un questionnaire postal autoadministré contenant une enveloppe de retour préaffranchie à 344 médecins des régions rurales et éloignées de l'Australie en décembre 2003.
Résultats : Les répondants ont renvoyé 107 questionnaires remplis, ce qui représente un taux de réponse de 32,7 %, une fois le dénominateur rajusté pour tenir compte des 17 médecins dont la lettre a été renvoyée à l'expéditeur. Les répondants incluaient 23 (21,5 %) femmes et 84 (78,5 %) hommes. Parmi les répondants, 80 médecins (74,8 %)

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ont déclaré utiliser l'échographie et 27 (25,2 %) ont déclaré ne pas s'en servir; 77 (72 %) ont indiqué qu'ils avaient déjà participé à des séances d'éducation et de formation en échographie.

Les répondants ont déclaré que la formation de niveau intermédiaire en échographie obstétrique devrait porter principalement sur les sujets suivants : grossesse ectopique (76,6 %), fausse couche (72 %), restriction de la croissance intra-utérine (65,4 %), échographie transvaginale (47,7 %), détection des anomalies chez le fœtus (47,7 %) et analyse de la morphologie à 18–20 semaines (41,1 %).

Les principaux sujets de la formation nécessaire en échographie médicale d'urgence étaient les suivants : échographie abdominale en traumatologie (63,5 %), détection de corps étrangers (40,2 %), échographie gynécologique (39,2 %), vésicule biliaire et canal biliaire (37,4 %), anévrisme de l'aorte abdominale (32,7 %) et saignement à la suite d'un traumatisme (31,7 %).

Conclusion : Les médecins des régions rurales et éloignées de l'Australie utilisent l'échographie pour améliorer l'investigation clinique et le diagnostic d'un vaste éventail de problèmes cliniques dans leur pratique de médecine familiale. Ce document décrit les résultats de la recherche sur les besoins en formation de ce groupe cible de médecins.

Introduction

This paper describes the results of a December 2003 survey that investigated the educational needs of rural and remote Australian doctors for intermediate obstetric ultrasound and emergency medicine (EM) ultrasound. Our research builds from research conducted by the Australian College of Rural and Remote Medicine (ACRRM) in 2001 that investigated the educational needs of Australian rural and remote medical practitioners for basic obstetric ultrasound education. The College developed a basic obstetric ultrasound education program based on the results of that research. The results from the previous study and an evaluation of the outcome of 9 basic obstetric ultrasound education workshops has been published elsewhere.[1,2] We felt it was a logical step to combine EM ultrasound education with obstetric ultrasound training. We also felt many rural and remote doctors would find these 2 types of ultrasound useful in their under-serviced rural communities, where they often practise in isolation from sonographers, radiologists, obstetricians, EM physicians and surgeons.

The main research questions were: what educational topics would rural and remote doctors prefer to learn in intermediate obstetric ultrasound and EM ultrasound, and what would be their preferred methods of delivery for an ultrasound education program.

A literature review failed to identify any information on the ultrasound-related educational needs of rural and remote doctors. There were papers on teaching prenatal ultrasound to family physicians[3–7] and EM ultrasound for EM physicians and general practitioners.[8–11] A wide range of health professionals are now using ultrasound because the machines are becoming more portable, are cheaper and produce a higher quality picture than in the past. There has been a large increase in the numbers of EM doctors in the United States using bedside ultrasound: from 8.7% in 1997 to 20.5% in 2001.[12] A recent article stated that there had been little research on how to teach ultrasound to family physicians.[13] ACRRM has begun to address this issue by conducting educational needs assessment research and developing ultrasound education programs and resources to meet identified needs.

Method

A national Ultrasound Reference Group, consisting of 8 rural medical practitioners and the ACRRM Ultrasound Program Manager (R.G.), developed and piloted a self-administered postal questionnaire. This was used to determine the intermediate obstetric ultrasound and EM ultrasound educational needs of rural and remote medical practitioners.

The first draft of the questionnaire was developed by the Ultrasound Program Manager using information obtained from the previous basic obstetric ultrasound program and workshops, and from the literature review. It was then emailed to the ACRRM Ultrasound Reference Group and discussed during teleconferences. The changes suggested by group members were discussed, and final amendments were agreed by consensus.

The topics on intermediate obstetric ultrasound

in the questionnaire were developed by the Reference Group.

A distribution list for mailing the survey was compiled. It included: 1) doctors from a list provided by the Health Insurance Commission containing doctors who billed for ultrasound services over a 3-month period; 2) 141 doctors who attended one of the ACRRM basic obstetric ultrasound workshops; 3) doctors who had previously expressed an interest in ultrasound education; and 4) doctors who had enrolled in the ACRRM Ultrasound Online module on the ACRRM online education platform (i.e., Rural and Remote Medical Education Online). This research aimed to target doctors who were most likely to be interested in using ultrasound in their practices.

On Dec. 3, 2003, the survey, containing a prepaid return envelope, was posted to 344 rural and remote doctors, the number of physicians obtained from the distribution list. Data were analyzed using Excel (Microsoft Office, 2003) and SPSS (SPSS ver. 11.5, 2002).

Ethical approval for the project was obtained through the James Cook University Human Ethics Committee.

Results

One hundred and seven completed questionnaires were returned, giving a response rate of 32.7%. Seventeen questionnaires were returned because the doctors had moved. Twenty-three (21.5%) female doctors and 84 (78.5%) male doctors responded. The national percentage of female doctors in rural Australia is 28.4%.[14]

Table 1. Frequency distribution showing the time the 107 respondents had spent practising medicine and had spent in rural practice

	No. (and %) of doctors	
Range, yr	In practice	In rural practice
1–5	4 (3.8)	25 (23.4)
6–10	18 (16.8)	21 (19.6)
11–15	15 (14.0)	16 (14.9)
16–20	26 (24.3)	27 (25.2)
21–25	20 (18.7)	11 (10.3)
26–30	13 (12.1)	5 (4.7)
31–35	4 (3.7)	2 (1.9)
36–40	4 (3.7)	–
51–55	1 (0.9)	–
Not stated	2 (1.9)	–
Total	107	107

Eighty (74.8%) doctors stated they were currently using ultrasound in their practice, and 27 (25.2%) said they were not. One doctor stated he had done some ultrasound using a manual as a guide, and one said he had done a little bit of ultrasound. Although these doctors indicated they were not using ultrasound, they were categorized as using it. Seventy-seven (72%) doctors had some previous ultrasound education. These 77 doctors were experienced, with a mean length of time in medical practice of 13.5 years and a mean length of time in rural practice of 9 years (Table 1).

Respondents included general practitioners who work alone or in a group practice, hospital doctors, rural flying doctors, and doctors working in remote Aboriginal communities or as rural locums. Group practice general practitioners were the largest group of respondents (n = 48, 44.8%).

Participants were asked to indicate their 6 preferred intermediate obstetric ultrasound topics from a list of 16 (Table 2).

The main areas of educational need were ectopic pregnancy, miscarriage, intrauterine growth restriction (IUGR), transvaginal (TV) scanning, detecting fetal abnormalities and morphology scanning at 18–20 weeks. One doctor each mentioned the following topics not on the list: diagnosis of abruption placenta; measuring amniotic fluid; trans-abdominal scanning; assessing cervical length; assessing pla-

Table 2. Most preferred intermediate obstetric ultrasound topics for education,* as chosen by the 107 respondents

Preferred topics	No. (and %) of doctors
Ectopic pregnancy	82 (76.6)
Miscarriage	77 (72.0)
Intrauterine growth restriction	70 (65.4)
Transvaginal scanning	51 (47.7)
Detecting fetal abnormalities	51 (47.7)
Morphology scan 18–20 wk	44 (41.1)
Nuchal translucency	31 (29.0)
Measure SD ratio	25 (23.4)
Renal, cardiac assessment	19 (17.7)
Colour doppler	18 (16.8)
Documentation	18 (16.8)
Humeral and kidney length	16 (14.9)
Echocardiogram	13 (12.1)
Cardiac outflow tracts identification	10 (9.3)
Trisomy screen order	7 (6.5)
Antenatal screening (sex-linked disorders)	2 (1.9)

*Participants were asked to indicate their 6 most preferred topics for further education.

cental site; assessing uterine scar thickness. One doctor wrote: *"As I will be the only service at [a town without a resident ultrasonographer], I need all the help I can get."*

Participants were asked to indicate their 6 preferred topics for education from a list of general and EM ultrasound. The main areas of educational need are listed in Table 3. One doctor each listed other conditions where they would benefit from education: cardiac trauma; penetrating injuries; shoulders; echocardiography; appendix; duplex; vein scans for varicose veins; valve assessment in rheumatic hearts; renal artery stenosis; doing fine-needle aspiration under ultrasound control; assessing pleural cavity; and knee effusions. Two doctors listed screening for deep vein thrombosis.

Participants were asked to indicate their preferred modes of education from a list of 17 education types. The most preferred modes were practical ultrasound workshops with hands-on experience with patients, followed by CD-ROM, clinical attachment to a hospital or specialist, scan review with a sonographer and scan review with a radiologist and/or obstetrician (Table 4).

They were given sample clinical questions (Davies S, Australian Institute of Ultrasound, Gold Coast, Australia. 2003: unpublished document) that could be answered by using ultrasound: *Is there an intrauterine pregnancy? Is there an abdominal aortic aneurysm present? Are there any gallstones seen? Is there any hydronephrosis present? Is cardiac tamponade present? Is there free fluid in the abdomen? Is there a foreign body present?* and *Is there any flow in the testis?* They were also asked to contribute further questions from their own practice (i.e., *"Can you think of any other clinical questions in your practice where you think ultrasound would be useful?"*). Their responses are listed in Table 5.

Eighty-one percent of the respondents (n = 87) said they would like to be notified about ACRRM's proposed combined pilot intermediate obstetric ultrasound/EM ultrasound workshops, and 61% (n = 65) stated they would be interested in attending one of ACRRM's basic obstetric ultrasound workshops.

Table 3. Most preferred emergency medicine ultrasound topics for education,* as chosen by the 107 respondents

Preferred topics	No. (and %) of doctors
Focused abdominal sonography in trauma	68 (63.5)
Detecting foreign bodies	43 (40.2)
Gynecological ultrasound, including ovarian problems	42 (39.2)
Gall bladder and biliary tract	40 (37.4)
Abdominal aortic aneurysm	35 (32.7)
Trauma (bleeding)	34 (31.7)
Kidneys and ureters (renal masses, calculi)	33 (30.8)
Evaluation of renal and biliary tract disease	29 (27.1)
Appendicitis	28 (26.2)
Abdomen	27 (25.2)
Ultrasound guided needle puncture	22 (20.6)
Scrotum, testis	22 (20.6)
Breast	20 (18.7)
Liver (liver abscess)	14 (13.1)
Urinary bladder	13 (12.1)
Pericardial fluid	12 (11.2)
Soft tissue	12 (11.2)
Muscle and tendon	11 (10.3)
Peritoneal cavity and gastrointestinal tract, including intestinal organs	9 (8.4)
General ultrasound small parts	8 (7.5)
Pancreas	7 (6.5)
Vascular	7 (6.5)
Neonatal scanning	7 (6.5)
Cysts and abscesses	7 (6.5)
Ultrasound in jaundice	6 (5.6)
Spleen	6 (5.6)
Pericardium	4 (3.7)
Neck	4 (3.7)

*Participants were asked to indicate their 6 most preferred topics for further education.

Table 4. Preferred modes of delivery for an intermediate obstetric ultrasound and emergency medicine ultrasound education program aimed at doctors working in rural and remote Australia, as chosen by the 107 respondents

Preferred mode of education	No. (and %) of doctors
Practical workshop with hands-on experience with patients	85 (79.4)
CD-ROM	53 (49.5)
Clinical attachment to hospital or specialist radiologist/sonographer	46 (43.0)
Scan review with a sonographer	35 (32.7)
Scan review with a radiologist and/or obstetrician	32 (29.9)
Case-based presentations and discussion	31 (29.0)
One-on-one teaching in your own surgery, on your own scanner	29 (27.1)
Video	28 (26.2)
Satellite broadcast	23 (21.5)
Scan review with a general practitioner colleague sonographer	19 (17.7)
Use of guidelines	14 (13.1)
Web-based program	13 (12.1)
Written distance educational material on theory aspects of ultrasound	12 (11.2)
Didactic lectures	8 (7.5)
Clinical audit	8 (7.5)
Videoconference	7 (6.5)
Self-directed learning	7 (6.5)

Discussion

This research investigated the educational needs of a targeted group of Australian rural and remote medical practitioners for intermediate obstetric ultrasound and EM ultrasound. The doctors targeted for the survey were those who had identified themselves as being interested in ultrasound. The fact that 72.8% of the respondents were already practising ultrasound shows that the survey largely targeted its preferred audience.

The most preferred topics in intermediate obstetric ultrasound, mentioned by over 65% of the respondents, included ectopic pregnancy, miscarriage and IUGR. Forty-seven percent mentioned TV scanning and detecting fetal abnormalities. In EM, the most preferred topics were FAST (63.5%), detecting foreign bodies (40.2%) and gynecological ultrasound (39.2%). The most preferred mode of education for ultrasound was a practical workshop with hands-on experience with patients.

Limitations

The response rate was low, and therefore the results cannot be generalized to all rural and remote doctors. However, the information obtained did provide enough data for ACRRM to develop a successful Intermediate Obstetric Ultrasound and Emergency Medicine Ultrasound Program for Australian rural and remote non-specialist doctors. The program has a significant hands-on component using real patients and includes many of the top topic choices made by doctors in this survey.

Conclusion

There is a growing group of rural and remote Australian doctors who are using ultrasound because it is non-invasive, painless technology that gives instant results.

This paper describes research that has identified the educational needs of a group of Australian rural and remote doctors who want to learn how to use ultrasound technology to improve the clinical investigation and diagnosis of a large variety of clinical conditions in their practice.

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Table 5. Clinical questions* contributed by the 107 respondents that they believed could be answered by using ultrasound

Is the fetus viable, or could the dates be wrong?	Can I follow the needle to get an appropriate biopsy/aspiration?	Are any foreign bodies near large vessels that may bleed during evacuation?
Is the fetus the correct size for dates?	Is there a pericardial effusion?	Where is the foreign body?
Is there an ectopic?	Is there fluid in the pleural cavity?	Is there deep vein thrombosis in thigh/calf?
Where is the placenta? (I do cesareans)	Is there free abdominal fluid?	Is it a cystic or solid mass?
Is the miscarriage complete?	Are there metastases in the liver?	Are the bile ducts normal?
Is there intrauterine growth restriction? Patient is a smoker - 3rd trimester	Is there a need for insertion of a catheter in the bladder?	Is this abdominal pain a bladder obstruction?
Is the fetus normal?	Is the tendon ruptured or not?	Is there any rupture of the liver/spleen?
What is baby's position in the uterus?	Is there any flow to the periphery?	Is there a hernia?
Are there retained products?	Is there blood supply to testis/ovary?	Is there cardiac valve disease?
Are the ovaries normal? Any cysts?	What is the degree of stenosis in the artery?	How big is that abscess?
Where is that implanon?	Is the appendix swollen?	Is there a muscle/tendon tear?
Is there a thickened endometrium? (post menopausal)	What is the left ventricular function like?	Are there stones in the ureter?
Is there intussusception?	Is the pancreas normal?	Is the prostate enlarged?

*These questions were taken from the respondents' own experiences and were in addition to the sample questions provided by the authors in the survey.

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