

## Breaking the sound barrier—innovations in the Rural Women’s GP Service

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Dr Susan Downes was born and raised in Australia, but studied in England where she achieved first class honours in medical science and then went on to complete a Bachelor of Medicine and Surgery in 1991. She also has FRACGP and Advanced Diploma in Obstetrics and Gynaecology from RANZCOG. Susan returned to Australia in 1993 and began general practice in Fremantle and an obstetrics practice at the former Woodside Hospital as well as taking on rural locum positions. Since joining the Rural Women’s GP Service in 2001, Susan has visited a wide variety of locations including Wheatbelt towns of Kondinin, Quairading and Corrigin, the goldfields at Southern Cross, the Indian Ocean territories (Christmas and Cocos Islands), and the Pilbara, including the town of Newman and the Indigenous communities of Jigalong, Parnngurr (Cotton Creek), Punmu and Kunnewarriji (Well 33). As well as her work for RWGPS, Susan is currently a rural generalist locum specialising in procedural obstetrics and emergency medicine in northern QLD, NT and WA. Susan has been using ultrasound enthusiastically in all aspects of her medical practice for the past 10 years.

Alessandra Sippl has lived in Italy, Switzerland and Germany before moving to Australia. Her qualifications include a Diploma in Welfare Work, a Bachelor of Health Science (Health Promotion and Addiction Studies) and a Diploma in Practice Management. Alessandra has worked in administration and marketing in Europe. In Australia she has worked in the health industry as GP workforce project officer, business support manager, GP After Hours manager and has recently joined the Royal Flying Doctor Service as the manager of the Rural Women’s GP Service.

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### Introduction

In 2000 the Royal Flying Doctor Service (RFDS) expanded its traditional visiting medical clinics with the Rural Women’s GP Service (RWGPS). The RWGPS is an outreach general practitioner (GP) service to rural and remote communities with little or no access to female GPs. In 2008 RFDS Western Operations integrated a Sonosite Micromaxx ultrasound into the Service. This paper will briefly describe the RWGPS and its delivery to rural and remote communities and focus on the improvement to services through the utilisation of ultrasound equipment during consultations. Case studies and examples of use of the ultrasound in clinics conducted in Newman and the Pilbara Western Desert, Shark Bay, the Wheatbelt and the Goldfields will be discussed to illustrate the benefits of sonography in general practice in rural and remote areas with particular emphasis on pregnancy and antenatal care. It will be suggested that adopting the use of portable ultrasound and appropriate training in rural and remote GP clinics can improve outcomes for patients and result in substantial cost savings to health care funding bodies.

### The project

The RWGPS is a project funded by the Australian Government’s Department of Health and Ageing. The Service aims to provide a gender choice of GP and is available to all members of rural and remote communities with limited or no access to female GPs. In 1999, the RFDS was successful in its bid to manage the RWGPS and the Service is delivered across the four RFDS operational sections: Central Operations (Northern Territory and South Australia), Queensland Section (Queensland), South Eastern Section (Tasmania, Victoria and New South Wales) and Western Operations (Western Australia) in partnership with local GPs and health services. In Western Australia the first visits by a female GP took place mid 2000.<sup>1</sup> The Service is available to individual communities or clusters of smaller communities with no female practitioner where the population exceeds 1,000 residents and the closest female GP is over 50 km away.<sup>2</sup> During the 2009-2010 financial year a team of 17 female GPs provided services at 32 locations across Western Australia spanning from Ravensthorpe in the south to Westonia and Mt Magnet, to Shark Bay and Onslow, to Newman and the Western Desert Communities of Jigalong, Punmu, Parnngurr (Cotton Creek), Kunnewarriji (Well 33) on the Canning Stock Route.<sup>3</sup>

During the 10 years since its inception, RWGPS has visited 56 locations across Western Australia providing an increasing number of consultations, currently nearing 5000 attendances per year. The clinics are not limited to female patients or to women’s health. The Service is available to, and is accessed by, all members of the community, however, it is primarily utilised by women. This is reflected in the substantial data that is collected. Figures indicate that women’s health checks, antenatal and postnatal care feature prominently as the reasons

for visiting the female GPs. During the 2009-2010 financial year 88% of consultations were with female patients and approximately 40% were related to women's health issues including, but not limited to, antenatal and postnatal health.<sup>3</sup>

### Distance and access to imaging services

In much of rural and remote Western Australia, diagnostic imaging is limited to major regional centres and lack of adequate health care facilities, personnel and diagnostic tools remain a major barrier to health care delivery. Access and availability of facilities for consumers in rural and remote areas were identified as a key issue by the Consumers Health Forum of Australia<sup>4,5</sup> with residents facing challenges related to the accessibility of the services in terms of distance, time and associated financial burden. Research conducted by the National Institute of Industry and Economic Research in 2009 titled "Essential services in urban and regional Australia" and quoted by the National Rural Health Alliance<sup>6</sup> found that the costs to rural residents to access essential services such as health and education are two to ten times higher than for residents in metropolitan areas.

The area covered by RWGPS includes the Pilbara Communities of Jigalong, Punmu, Parnngurr (Cotton Creek) and Kunawarriji (Well 33), Shark Bay, the Wheatbelt and in previous years has included the Goldfields locations of Leonora and Laverton. The isolation of these communities makes access to diagnostic services extremely difficult, costly and time consuming because of the need to leave the communities to attend services provided in the large and distant regional centres. This includes access to ultrasound examination for a broad range of diagnostic applications especially in obstetrics, gynaecology, abdominal pain, and emergency examinations.

### Brief history of the use of ultrasound in Australia

Sonography entered the medical field in the 20<sup>th</sup> century after the expansion and further development of SONAR (sound navigation ranging) devices used during the First and Second World Wars.<sup>7</sup> By the 1950s research in the use of ultrasound and its clinical applications was well under way. In Australia, the Ultrasonics Research section of the Commonwealth Acoustic Laboratories initiated research in the use of ultrasound to be carried out jointly by engineers, physicists and clinicians. On the 11<sup>th</sup> of May 1962 the first Australian obstetrics examination was performed by David Robinson, an engineer, and Dr William Garrett, an obstetrician, at the Royal Hospital for Women in Sydney.<sup>7</sup>

In her article on the emergency of sonography as a profession<sup>7</sup>, Lynette Hassall discusses the two training models for ultrasound technicians being considered during the 1970s. One proposed the inclusion of ultrasound as part of the curriculum for x-ray technicians while the other advocated the addition of a post-graduate year at the completion of the x-ray course. Both models would have resulted in sonography training being restricted to radiographers at the exclusion of other health professionals, and in all radiographers being sonographers.

The fact that neither model was implemented at the time opened the way to vocational training programs by organisations such as the Ultrasonics Institute and the Australasian Society of Ultrasound in Medicine, followed by tertiary academic training through TAFE (Technical And Further Education) institutes and universities as well as private providers of accredited courses. Today short introductory, intensive and refresher courses for medical practitioners and other professionals are readily available and financial support is offered to rural and remote GPs and locums who have registered with the Rural Procedural Grant Program (RPGP) or the Locum Education Assistance Program (LEAP) administered by the RACGP and ACCRM.<sup>8</sup>

### The use of ultrasound in obstetrics

Ultrasound investigation provides valuable information. During early pregnancy it can assist in determining

- location of pregnancy
- gestational age
- number of foetal poles
- presence of foetal cardiac activity

- nuchal translucency and diagnosis of congenital anomalies and chromosomal disorders
- trophoblastic disease
- cervical length

as well as the presence of pelvic masses and uterine malformation that can influence the pregnancy.<sup>9,10,11,12</sup>

The earlier the ultrasound examination is carried out, the more accurate is the estimation of gestational age.<sup>11,12</sup> Measurements of the gestational sac and crown-rump length between 6 and 12 weeks should be accurate to within 3 days. During the second trimester the accuracy is reduced to plus or minus 10-14 days. In the third trimester the accuracy is further reduced to plus or minus 3 weeks.

During the later stages of pregnancy ultrasound scan is not offered routinely, however, it is used to assess foetal growth, to monitor high risk pregnancies and as a decision-making tool for delivery. The Department of Health and Ageing Guidelines for the use of Ultrasound in the Management of Obstetric Conditions<sup>9</sup> refer to evidence that such examination during the third trimester can lead to a reduction in perinatal mortality.

### Benefits of using ultrasound in rural and remote clinics, including RWGPS visiting services

As the clinical applications of the ultrasound were refined, so was the equipment. Recent advances in affordability, durability, and portability have brought ultrasound to the forefront as a sustainable and high impact technology for use in rural and remote settings. In 2008 RFDS Western Operations became the first and only RFDS section to incorporate ultrasonography in its service. Six Sonosite Micromaxx ultrasound units were purchased for the use of the RWGPS doctors as well as the RFDS traditional medical clinics.

Fertility rates in the Indigenous population are higher than in the general population, with WA presenting the highest fertility rate.<sup>13</sup> RFDS data for the 2009-2010 period confirm that the Pilbara region had the highest percentage of pregnancy-related RWGPS consultations as a percentage of the total number of female patients (11% for all ages and 16% for the age group 15-44). The figures for the age group 15 to 44 are highest in Jigalong (21%), Newman (16%) and the remote community of Punmu (15%). In comparison, percentages of pregnancy-related consultations in other locations visited by RWGPS ranged between 2% and 4%, with 2% being found in four of five regional areas. Adult pregnant women living in the Pilbara and accessing the RWGPS have, therefore, benefited the most from the presence of ultrasound services as obstetrical scanning is the most frequently used application with emergency medicine also featuring in remote locations.

Evaluation of gestational age and growth parameters, foetal position, and placental location are the most common needs for clarification by ultrasound. Accurate dating of pregnancies allows planning for antenatal care and confinement. The expectant mother needs to be near to the place of delivery at 36 weeks and accurate ultrasound dating should result in less RFDS retrievals in labour. Every time the ultrasound is used it directs management. It can offer reassurance and mean that the patient can safely remain in the community, or indicate that the patient does indeed need to be referred and transported to a larger facility. The information gained by the ultrasound can help the doctor decide on the degree of urgency of the referral and to where that should be made. The decision as to whether or not to involve the RFDS retrieval service can be made with greater confidence.

The integration of the ultrasound in the RWGPS in remote Pilbara communities has highlighted many other benefits, including cost savings to health care providers such as the Western Australian Country Health Service (WACHS) and Puntukurnu Aboriginal Medical Service (PAMS). The availability of ultrasound investigations on site, at the community where the patient lives, reduces the need to travel to regional centres with the related demands on the WACHS Patient Assisted Travel Scheme (PATS) for subsidised travel and overnight accommodation for the patient and a carer. Furthermore, the provision of ultrasound examination through the RWGPS clinics reduces demand for diagnostic services for the purpose of dating and confirming placental position and foetal growth. The patient's antenatal care during a normal pregnancy would require one detailed morphology ultrasound scan by WACHS diagnostic services at approximately 20 weeks and a visit to the antenatal midwives and doctors from 36 weeks, when the patient reaches Port Hedland for confinement. The costs of providing antenatal visits outside Port Hedland, for example in Newman outreach, for a normal pregnancy would, therefore, be greatly reduced.

To fully understand the benefits of ultrasound availability, one needs to be aware of the circumstances of these remote locations. Most are at least six hours via unsealed road from a centre offering ultrasound facilities. Public transport is not available and often patients have no access to personal transport. Should the patient be escorted by the community nurse or Aboriginal health worker, this would leave the community without an emergency vehicle and without a health worker for at least two days and one night. The toll on PAMS in terms of personnel and costs is considerable. Should the appointment be missed due to, for example, breakdown of a vehicle or a personal calamity and be rescheduled, it would cause further disruption to the health service provider. This is all complicated by the fact that in some areas the ultra-sonographer is available only one day a week and in any case routine appointments are difficult to achieve in the short term.

The RWGPS ultrasound has been used in the management of approximately 50 pregnancies in the eastern Pilbara since its purchase. During this time the cost of at least 75 ultrasound and 100 obstetric outreach appointments at WACHS facilities with their inherent PATS and inconvenience to PAMS and the women themselves, would have been avoided. Ultrasound is offered at every antenatal visit in the RWGPS Pilbara visits for reassurance, education and health promotion. Whilst these additional scans are not a cost saving as such, their value is considerable.

The following case studies and examples illustrate how the use of ultrasound investigation is benefiting remote patients and health care services alike.

### **Example of presentation 1: positive pregnancy test**

The most frequent presentation requiring the use of ultrasound is an isolated positive pregnancy test. In this scenario the doctor and patient need to know the gestation, viability, number of foetuses and site of the pregnancy. Provided the woman has a full bladder the examination is quick, and easily delivers the answers without the need for travel. In these communities, the menstrual cycle history is usually unknown, so the earlier the ultrasound evaluation can be made, the more accurate the estimation of gestation. Once gestation is established, further routine antenatal testing can be organised for the appropriate timing for meaningful results.

Without immediate ultrasound evaluation, the pregnant woman would have to be referred to a regional facility for gestational dating, with the inevitable delay reducing the accuracy and the chance of compliance. Prior to the availability of the ultrasound facility in the communities, women were sent for morphology scans often to find that their pregnancy was too early or too advanced for such a scan. If too early, a scan would have to be rearranged two or three weeks later involving the difficulties of a return trip.

Accurate dating of gestation and estimation of delivery date allows the timing of the woman's relocation to the place of confinement at 36 weeks gestation and thus mostly avoiding emergency RFDS transfers in labour.

Should there be suspicion of an ectopic pregnancy or a blighted ovum, the GP has the power to wait and watch, and repeat scanning at appropriate intervals, or to arrange for appropriate transfer to a gynaecological service.

If the patient has a potentially viable pregnancy but requests a termination the GP will have the information to counsel and refer the patient within the appropriate time frame.

### **Example of presentation 2: vaginal bleeding with a positive pregnancy test**

Another common presentation is vaginal bleeding with a positive urinary pregnancy test. Again the clinician needs to determine gestation and viability and site of the pregnancy. In the majority of cases an intrauterine early viable pregnancy will be demonstrated and a watch and wait approach can be safely offered. Without the portable ultrasound facility the patient would need to travel for assessment with its innate difficulties already discussed.

In the case of blighted ovum a routine referral can be made to the regional centre and the patient travel by road, but if an ectopic pregnancy is suspected, referral to the RFDS retrieval service for air transport is required and justified.

### Example of presentation 3: spontaneous miscarriage

Often a pregnant woman presents with abdominal pain and vaginal bleeding due to a spontaneous miscarriage and the type of miscarriage needs to be determined. With the ultrasound the GP can easily determine if the uterus is empty or has retained products of conception. If the uterus is empty the patient can remain in the community without the risk of endometritis and bleeding. Should the examination establish that the patient has retained products requiring transfer for treatment, the GP and staff can refer the patient to the nearest regional health service for removal of retained products of conception by dilatation and curette under general anaesthetic.

### Example of presentation 4: mid and late pregnancy problems

In mid and late pregnancy, ultrasound is used to scan for the parameters to ensure adequate growth, placental position and, at a later stage, specifically foetal lie. All patients should have a professional morphology scan at 18-22 weeks<sup>14</sup>. Commonly, this examination will identify a potentially low-lying placenta that will require rescanning in the third trimester. What seems an easy request is very difficult to implement for a patient living in a remote location. In this situation, the portable ultrasound equipment enables the GP to perform this examination in the community in two minutes, as opposed to subjecting the patient to a two-day trip.

Often when the women's abdomen is palpated it is either bigger or much smaller than expected. In the city this would necessitate another visit to the radiology department. In the RWGPS Pilbara clinics the ultrasound allows the GP to measure parameters of head, abdomen and femur, as well as amniotic fluid volume during a brief examination, and so gather all the information required to hopefully be reassured that all is well or, alternatively, to refer the patient appropriately.

### Example of presentation 5: health promotion in pregnancy

Aboriginal pregnant mothers often present multiple risk factors that influence the outcome of the pregnancy and their baby's growth. Culturally appropriate forms of diagnostic examination are advocated to ensure child and maternal health is promoted and protected<sup>14</sup>. The GP has a powerful tool in the images produced during the ultrasound examination. The patients are enthralled and the GP can use the strong imaging to empower the women to avoid cigarettes and alcohol, aim for good glucose control in gestational diabetes and to eat good food for the sake of their baby's brain and wellbeing.

### Example of presentation 6: general gynaecology

The ultrasound is invaluable in locating Implanon for removal and confirming the presence of IUDs in cases where the thread is not visible. When the non-pregnant woman has abnormal vaginal bleeding, the ultrasound can determine the endometrial thickness, the presence of uterine fibroids and ovarian cysts. This in conjunction with endometrial pipelle sampling in the remote clinic can remove the need for referral.

### Example of presentation 7: emergency evaluation

In cases of trauma, the ultrasound can be used to locate blood vessels that may be difficult for intravenous access. The Focused Assessment with Sonography for Trauma (FAST) is a well established tool for determining intra-abdominal bleeding. Establishment of such a diagnosis will aid the RFDS to determine the urgency for retrieval and the doctors to decide the most appropriate hospital to receive the patient.

### Case study 1: facilitate RFDS retrievals

Whilst generally the ultrasound is used to avoid patients having to travel to access other services as well as to reduce the need for RFDS retrievals, an ultrasound examination can provide information that supports the RFDS in its decision-making regarding the priority of the patient. The following is such a case.

A pregnant woman was visiting Newman from Perth for a funeral. She told the hospital staff of her previous two normal deliveries elsewhere and that she had uncertain gestation. No information regarding her antenatal care was available. Dr Downes, co-author of this paper, was called to the emergency department by the local GP. With the ultrasound Dr Downes was quickly able to determine that the foetus was in a breech position, while the growth parameters indicated a gestation of 32 weeks. Furthermore, the placenta was anterior and very low, reaching the cervix. The cervix was short and four centimetres dilated with bulging membranes. All

gathered data indicated that the patient was high risk and required urgent transfer to Perth and not to the nearer facilities of Port Hedland to ensure the baby's survival. With the available ultrasound information, the RFDS made the decision to divert a plane and retrieve the woman as a priority one patient. The contractions were controlled with intravenous and oral medication and the patient was prepared for the RFDS flight that allowed her to deliver the baby at King Edward Memorial Hospital for Women in Perth surrounded by expert neonatal care for her baby.

## Case study 2: abdominal pain

Abdominal pain is a common reason for ultrasound evaluation. Calculi in the gall bladder and kidneys are easily demonstrated. This finding provides reassurance and can direct treatment and referral.

An interesting case presented in one of the Western Desert communities. A 45 year old woman complained of recurrent right upper quadrant pain. She firmly believed that this was the result of "pay back witch-craft". Whilst Dr Downes acknowledged that this could be so, she was able to visualise a perfectly spherical gall bladder totally filled with small faceted stones. Once the GP was able to explain the anatomy and convince the patient that everyone had a gallbladder and that it was not put there by the witch-doctor, the patient was satisfied with the diagnosis of cholelithiasis, avoided fatty foods and was referred for routine cholecystectomy.

## Conclusion and recommendations

This paper suggested that the inclusion of a portable ultrasound to rural and remote GP clinics can offer many benefits for the rural and remote community, in particular in relation to pre-natal health in Indigenous populations, as well as financial benefits for health services, through a more effective use of available resources and a reduction in the need for patients to travel to a regional centre and associated requests for subsidised travel. Examples were given of cases where the patients were examined in their remote communities of the Pilbara, Shark Bay, the Wheatbelt and the Goldfields towns of Leonora and Laverton by the RWGPS visiting practitioners and so avoided long journeys to regional towns, in certain instances accompanied by the community's health care staff. Pregnant patients with accurate estimated dates of delivery were able to leave their communities for confinement at the correct time avoiding fly outs in labour. Not only has the RWGPS been granted a portable ultrasound unit, but all the RFDS bases in Western Australia purchased the equipment with the strong belief that having an ultrasound would benefit the patient, the practitioner and the RFDS. Early indication from GPs and health care staff at regional bases points to the benefits of including ultrasound examinations in rural and remote settings. It is, therefore, recommended that ultrasound training be offered to health professionals practicing at rural and remote health care services and easy-to-use, portable and durable equipment be purchased by health services.

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