

Introduction

The RFDS (Royal Flying Doctor Service) has been an iconic Australian organisation for more than eighty years. It was founded on the novel approach of using aircraft and radio communications to bring medical care to people living in the most remote parts of our nation.

I have been privileged to work as a flying doctor for over thirty years, a period during which considerable changes in technology have enabled us to implement a variety of innovations to improve patient care. The changes evolve relatively slowly over time when you are immersed in them; but when you reflect on how things were done in the past and how they are done today, the stark magnitude of the transformation becomes apparent.

In terms of communication, for the hundreds of remote out-back locations we dealt with, there were no fixed-line phones, no personal computers, internet or email. Children's schooling was done over a radio and supplies were ordered by radio, connected to the telephone system by the local RFDS base. Routine and emergency medical care also depended on the radio, which was powered by a car battery if the station had no 240-volt generator running.

As doctors, we had no pager coverage in country areas and no mobile phones. If you were out and needed to call the RFDS base, you went to a public phone and put money in. It all seems so archaic. Nowadays even the most isolated place can have a

satellite phone with broadband data and internet over the satellite connection.

People sent formal messages by telex or telegram, as there was no fax or email. They could make a radio call to the RFDS and our radio operator would type the message into the telex machine and transmit it. When telegrams arrived, they were read out over the radio. A paper copy would be received in a few months when the recipient came into town and picked up the mail.

In aviation, we flew piston-engine aircraft at around 300 kilometres per hour. These have been superseded by faster turboprops at close to 500 km/h and pure jets at nearly 1,000 km/h when at altitude. Unpressurised aircraft have been replaced with fully pressurised aircraft, while navigation using paper maps, a compass, dead reckoning and some basic radio aids has been enhanced with accurate and universal GPS (global positioning system) receivers. In the dark of night, weather radar tells us where the storm cells are located ahead. Instrument approaches and night landings are now augmented with GPS-based RNAV approaches. If that all sounds a bit technical, then in essence we go faster, higher, more safely – and don't get lost.

In our medical care, what was predominantly 'hands-on' clinical monitoring of patients has been improved with comprehensive portable vital signs and physiological monitoring. We use compact intensive-care-style monitors, which run on batteries and tolerate rough handling, extremes of temperature and changes in altitude. Once, an intravenous line ran by gravity feed. Now infusions are administered with syringe drivers and small pumps.

'Best guess' oxygenation and acid base status have been exchanged for pulse oximetry and point-of-care testing. That is, we can take blood samples and do lab tests in flight using a portable handheld device. Simple respiratory support and hand ventilation have been traded for sophisticated ventilators. Physical examination by our doctors has been enhanced with portable ultrasound scans.

INTRODUCTION

A modern flying doctor carries a smartphone or tablet offering diverse communication options, including messaging, voice and video, plus access to unlimited online medical reference material. What a change from the days of the pedal radio...provided you are in an area of mobile coverage. The contemporary doctor has location information (a GPS in their phone and Google Maps™) and numerous clinical calculators, books and applications in their pocket. Yet, they still need the essential clinical skills, experience and judgement to do the job well, often in isolation, with limited resources.

In this book, I have chronicled the recent history of the RFDS in Western Australia, with a focus on the many innovations of which I have been a part, especially in medical care. I like gadgets and hope you will find the explanation of the technologies interesting. I have endeavoured to provide anecdotes of how they have benefited patients and enabled us to stay at the forefront of what we do. Whether it was the adoption of the low-tech Spil-Pruf® urine bottle (an important advance for medical flights), or high-tech portable diagnostic ultrasound, I think you will find these observations and brief stories fascinating.

In addition to our medical initiatives, I describe improvements in communications and aviation, along with a few insights into life as a flying doctor over this time.

Section 1

Retrospective

Starting out

An exciting but rewarding adventure

It is interesting looking back at decisions we make in life and how they influence the path we follow. I sometimes wonder how I would have fared as a procedural general practitioner on the Mornington Peninsula, which is where I was heading...if it had not been for just one phone call.

After completing a range of hospital positions including general medicine, surgery, anaesthetics, obstetrics and paediatrics, I was embarking on another year of emergency medicine. I had been keen to volunteer as a doctor during the Ash Wednesday bushfires in February 1983 but was locked into roster commitments at my hospital. However, it got me thinking about other things. I was a bit restless, so I wrote to the Royal Flying Doctor Service, as a private pilot, asking what opportunities there were to work as a doctor and do some flying as well. I also applied to the Australian Antarctic Division, with a view to a position at one of the Australian Antarctic bases the following year. Not surprisingly, I received a polite reply from Mr Ken Knight, at the Federal Council offices in Sydney, indicating that it was no longer normal practice for RFDS doctors to fly; but he had forwarded my letter to each of the sections across the country.

About mid-year I had reached a shortlist for Antarctica, then out of the blue I received a phone call from Dr David McDowell,

the senior RFDS doctor at Jandakot Airport. He had received a copy of my letter and wondered if I would be interested in a position at our Port Hedland Base in the Pilbara, as the locum doctor was leaving. We had a useful discussion about the role as he had worked there for a year or two and knew it well. Eventually we agreed that I would come over and have a look. I would pay half the airfares, to be reimbursed by the RFDS if I took the job.

An opportunity arose to take a couple of days off in early July to visit. I remember it very well. It was 0 degrees when I woke early that morning in Melbourne, rising to 5 degrees as I drove to Tullamarine Airport. Arriving in Perth that afternoon, it was 25 degrees. David put me up in his home with his wife and young son, then the next morning we flew up to Port Hedland, where the temperature was over 30 degrees.

Almost as soon as we arrived at the base a call came in from Anna Plains Station, about 350 kilometres northeast of Port Hedland and halfway to Broome. It was a classic story but one that we don't actually see very often. A stockman had fallen from his horse in the morning and broken his leg. He had only been found mid-afternoon, after lying in the scrub in the heat for hours as others searched for him.

David suggested we hop on the aircraft, a Piper Navajo, which was just about to leave. So both of us set off with a flight nurse to evacuate the patient. I sat up the front with the pilot, as doctors and nurses often did in those days, seeing a bird's-eye view of the terrain and talking aviation stuff en route: 'What sort of engines does the Navajo have? What's its cruise speed? What's this instrument?'

Soon we found the airstrip – a short, roughly graded piece of cleared dirt adjacent to the homestead – and came in to land. We were met by a ute and a couple of blokes in jeans, dirty shirts and Akubra bush hats, who would take us to the mustering camp where the patient was. This was about a twenty-minute drive away.

STARTING OUT

As was the custom, we piled into the back tray of the ute with a stretcher and some medical equipment, then headed off.

It is neither legal nor wise to ride in the tray of a utility, but the two compliant doctors and a couple of stockmen did so, while the nurse was offered the courtesy of sitting in the front passenger seat. It was private property and this was how things were done. Roaring along the rough dirt track across vast rusty red dirt plains, spotted with spinifex grass, was a real hoot. Dust trailed behind us. As we hung on grimly to the frame behind the cabin, I chatted with one of my fellow passengers.

‘How big is the station?’

‘Ah, about a million acres’, he said.

Even for me, a city boy, I could work out that this was very big! Not wanting to appear overly surprised, I just nodded. Then I thought I’d continue the dialogue and try to be cool by asking some more farm-like questions.

‘How heavily do you graze it?’ I asked.

‘Ah, about fifty to one’, was the response.

‘Oh’, I piped up, ‘fifty head to the acre?’

‘Nah, fifty acres per head.’ I had blown it! He looked at me like a typical drongo from the city who had no idea whatsoever. This sort of land couldn’t sustain intense grazing. There was no rain for most of the year, if at all, and just the occasional cyclone or rain-bearing depression during the summer period every couple of years. I recall he said they had almost 20,000 head of cattle but weren’t exactly sure. Livestock roamed freely over the million acres, breeding naturally, and the graziers gained some idea of the numbers only when they did a muster. At up to \$1,000 a head for large beef cattle, they had a significant investment here.

We reached the place where the stockman was resting and set to work, giving him pain relief, splinting his leg and inserting an intravenous line because he was hot and dehydrated. He seemed to be more concerned that we did not cut his jeans or lose his boots

than with his broken leg. With the help of all the strong volunteers, we transferred him on a stretcher into the back of the ute then drove back to the airstrip, this time at a much more leisurely pace. After loading him into the aircraft, we farewelled everyone and took off before we lost daylight.

Again, it was an exciting experience, watching the sun set in front of us as we headed predominantly westward. We made a smooth night landing on the large airstrip at Port Hedland, taxied back to the base then handed our patient over to an ambulance crew to be taken to the hospital. I hung around with David and the pilot as the aircraft was put away, thinking 'I can definitely do this for a job!' David couldn't have planned it better if he had tried. It was a real *Boy's Own* adventure and although I realised it was not always going to be like this, it certainly seemed to beat the idea of spending a year in the Antarctic with an essentially healthy expedition team.

We visited the hospital and other medical services the next day, looking around the town of Port Hedland and meeting people. It was not a pretty place by any means. Most of the buildings had a rusty hue from the fine red dust which drifted from the huge stockpiles of iron ore at the port, waiting to be loaded onto massive iron ore carriers.

The pubs looked pretty rough, too, particularly down near the port. It was the first time I had seen segregated bars with two entrances. I don't recall any signs but it was clear which bar you went into from the occupants. The two rooms were separated by a double-sided bar in the middle. Both groups of customers seemed quite happy to keep to themselves and there was a mixed patronage of men and women in each. Neither bar was particularly flash; indeed, my recollection was they were downright grotty in appearance and decor. I was told that the entertainment on Friday nights were informal boxing matches at the Pier Hotel. A hospital doctor was given cheap drinks to be there for medical care and to

STARTING OUT

decide if those who came off the worst needed to be taken to the hospital. This all added to the peculiar appeal of the town.

I returned to Melbourne, very excited by the opportunity. I would be able to practise a mix of emergency medicine and remote general practice and spend lots of time flying, which I enjoyed. I would be the only doctor for the region, working with five pilots and five nurses providing a round-the-clock on-call service, but I figured I could handle that. It seemed to be a great experience for a year.

After extricating myself from my Antarctic application and my hospital job, I arranged a tenant for my house then explained to my parents that I was heading off to a diametrically opposed part of the continent. I was back in Port Hedland within a month for a modest one-year appointment with the RFDs. So far, it has lasted thirty-two years.

Across the airwaves

How it was, then and now

To set the scene, let me explain what it was like in the early 1980s as a flying doctor in the Pilbara. I was the sole RFDs doctor and was expected to be available twenty-four hours a day, seven days a week in case of emergencies. This seems excessive by contemporary standards, but at the time that was how most rural doctors and many city specialists worked. I was young and fit and had come from working a busy obstetric and paediatric rotation where we regularly clocked up 100 hours a week. In hindsight, I regret having enjoyed only half a dozen weekends off each year while in the Pilbara and missing the opportunities to explore the region more fully.

There were no mobile phones at the time and in Port Hedland there was not even a paging service, such as the ubiquitous Motorola 'bleepers' which most city doctors carried. We had a radio base in town which housed all the radio equipment and was separate to the hangars out at the airport, 18 kilometres away. A full-time radio operator, Alan Dean, worked the radios every day and was the only administration person at the base. Alan also had a Telecom tie line to his residence. He was able to divert the telephone after hours so that when an emergency phone call came in, he could take it at home.

High-frequency radio

Many remote locations still did not have telephones and relied on high-frequency (HF) radio for communication. Stations, nursing posts, mine sites and remote communities had Codan HF radio transceivers with a special emergency button located on the front. If they needed to call for help outside of the standard daily radio schedules, they depressed the button for up to a minute. This transmitted a special tone that was picked up by a standby receiver at the RFDS radio base. It triggered an alarm and started the main radio transceivers.

The HF radio was also the means by which children received their early education. School of the Air (SOTA) is a remarkable service, which commenced in Western Australia in the 1960s from RFDS facilities at Derby, Port Hedland, Carnarvon, Meekatharra and Kalgoorlie. It provided an innovative distance education program using the HF radio network until 2004 when all teaching became satellite based.

If you were at the base, Alan could turn up the volume for you to hear the teacher talking to each of the students over the radio and asking about their work on the topic of the lesson. The SOTA teachers had radio consoles and office facilities separate to ours, but used the same radio frequencies. Regular medical schedules and other non-urgent calls would have to fit in around the class sessions. The students were of course helped by their parents or a governess in between these sessions. They would also come into town a couple of times a year to meet their teacher. It is amazing to reflect on how many children in rural Western Australia, over a couple of generations, received their early education over the radio. The SOTA service still operates in remote regions.

HF radio waves bounce off the different layers of the atmosphere in the ionosphere and can skip across thousands of kilometres. The frequencies used in each region were selected to provide the right amount of 'skip' to reach the nearest RFDS base, but

sometimes different atmospheric conditions caused the signal to skip to another base in the state, or even interstate. We would then receive a telephone call to say that a station in our region was calling. Our radio operator would manually start up the main radios and adjust the tuning until he contacted the caller.

Each remote transceiver had a number of different crystals which corresponded to the different HF frequencies. Once contact was established, different channels could be tried to find the frequency offering the best signal. The frequencies were cleverly allocated so that all RFDS bases had one or two common frequencies but the rest were different. This helped ensure that radio transmissions within one region did not interfere with communications in adjacent regions.

In the event of an emergency outside the regular scheduled contact hours (skeds), callers would push their emergency button, an alarm would be activated and the radio operator would commence setting up communications. Some of this could be done from home, but often the radio operator had to drive to the base and work the radios directly. As the doctor on duty, he would call me at home on a landline to advise of the call. I could be patched by telephone into the radio communications or sometimes I had to go to the base where I could use a secondary radio communications panel directly. This was generally clearer and I had the benefit of being with the radio operator tweaking the controls to obtain the best signal.

Just imagine an emergency. You are on a remote outback station and your husband has sawn off part of his foot with a chainsaw. After administering first aid you start your radio, hold down the emergency call button and hope someone will answer the signal. It might be an RFDS base elsewhere in Australia. Then there is a further delay putting the call through to the nearest base and linking in a doctor. Eventually you receive medical advice about managing the wound to stop the haemorrhage and giving

an injection for pain relief, then you wait a couple of hours for the aircraft to arrive. This is certainly not like calling an ambulance in the city and being in hospital in thirty minutes. Everyone did the best they could but you had to be stoic.

Our HF radio system offered simplex rather than duplex communications; that is, only one person could speak at a time or else the signals on the same radio frequency would interfere with each other. Although the distances that could be covered were huge, the quality was often poor and usually accompanied by a high level of background static. With experience, you became more accomplished at discerning what people were saying but it was very difficult at first.

The use of correct radiotelephony phrases and the phonetic alphabet was important in conducting a medical consultation by radio. Each person's communication was concluded with the words 'Over' which then allowed the next person to speak. Part of a routine radio medical consultation would have gone like this:

DOCTOR: Can you give me his name? Over.

CALLER: It's John War...[unintelligible]. Over.

Can you spell that? Over.

It's Juliet-Oscar-Hotel-November [J-O-H-N].

Whiskey-Alpha-Romeo-Delta [W-A-R-D]. Over.

How old is he? Over.

He's my son and he's fifteen...one-fife years. Over.

And what is his temperature? Over.

It's 39.6, three-niner-decimal-six. Over.

Further discussion about signs and symptoms...

DOCTOR: It sounds like tonsillitis. We need to give him some antibiotics. Can you go to your medical chest and find item number 109, that's one-zero-niner? Over. [Pause]

THE LEADING EDGE

*CALLER: Yes, I've got it, item one-zero-niner. Over.
It should contain some capsules and may also have the word
penicillin somewhere on the label. Over.
Yes, that's right. Over.
Fine. I want him to have one capsule three times a day. Repeat.
One capsule, three times a day. Over.
Yes, copy that. One capsule three times per day. Over.
And you can also give him some paracetamol, item one-seven-
three, one tab up to four times a day, as we discussed earlier.
Over.
Yes, copy that. What about asp...[unintelligible]. Over.
Say again. Over.
Ah, I copied that, but what about some aspirin? Over.
No, let's stick to paracetamol and keep up the fluids. Can you
call again on the 7 am morning sked and let me know how
he is going? Over.
Yes, will do. Over.
Okay. Talk to you then. VKL out. All stations, VKL
standing by for other traffic.*

The call sign VKL identified our Port Hedland Base. Meekatharra was VKJ, Carnarvon VJT, Derby VJB and Kalgoorlie VJQ. The Jandakot Base used 6PY as its call sign, similar to broadcasters in Perth, such as the ABC on 6WF.

There were regular schedules every day, usually starting at 7 am, including medical calls and people wanting to be patched through to telephone numbers in Port Hedland or down in Perth. This was the innovative new 'radphone' system, which had just been installed across our bases in 1982–83. The radio operator called the telephone number and explained it was the RFDS and that only one person could speak at a time. He then linked up the call, which involved alternating from transmit to receive as each party spoke. Our radio operator could do this almost

without thinking. Rather than listening to both parties intently, he managed to switch back and forth almost automatically based on the pauses between phrases and on hearing the word 'Over'. Alan could carry on a conversation with me while still managing to switch a call.

The radphone service had an immediate and dramatic effect. While there were thousands of licensed users of the RFDS, in 1983 in Western Australia about 145 fixed locations were in regular contact and there were 118 portable radios. Instead of making radio calls to the RFDS base to have them converted to telegrams (radiograms), users could now speak directly, albeit a little awkwardly, to whomever they wished. The RFDS charged \$1 for the connection and within the first year, telegrams dropped by one-third from 19,232 to 12,395 while the radphone calls hit almost 12,000 in an incomplete first year.

There was little privacy. Not only could the radio operator hear all the details of the call, but also anyone listening on the same frequency would hear everything. This made some of my medical consultations quite challenging. Without going into detail, we might have a discussion where it was a 'problem down there', meaning a condition involving their genitalia. We would have to discreetly discuss whether, for example, it was a rash, a discharge or a lump, and I sometimes had to make an educated guess based on the sorts of cases I saw on clinics and the probabilities as to the most likely diagnosis. All the time we knew that the caller's neighbours and others on the radio were listening with great interest!

Medical chests

To provide treatment to such remote locations, a cache of pharmaceuticals was needed and this was the role of the RFDS medical chest. It was a large green steel box about 400 mm square that contained supplies of pharmaceutical items, including a broad range of medicines and dressings. Each item was identified by a numbered

sticker. To prescribe a particular antibiotic, you only needed to give the caller the number and the dose without having to worry about complicated drug names. In situations where an agent had to be given by injection, we talked through the process of how to prepare the needle and syringe in a sterile manner, how to draw up the correct quantity of the medication, and how and where to inject it. Fortunately, on most stations there was often someone with a nursing background, or someone used to giving injections to livestock, so we could bypass the initial reluctance to do it.

Injections were mostly for giving strong pain relief to someone with an injury such as a fracture or burns. It was always going to take a few hours before our aircraft could arrive, so this was the most humane thing we could do in the interim. On some occasions, other injectable drugs were used. I had one or two cases of anaphylactic reaction, a severe allergic reaction to seafood or something else, where treatment with intramuscular adrenaline, prescribed from hundreds of kilometres away, was life-saving.

We mostly treated with oral medications, or used ointments and creams, or dressings. Without this essential supply of prescription medications, people in remote areas, then and now, would have no means of treating common conditions – tonsillitis, ear infections, conjunctivitis, boils, rashes and the like – their nearest medical help being hundreds of kilometres or days away.

Emergency calls

When an emergency call required us to evacuate the patient, a number of things happened. The base radio operator or I telephoned the pilot and nurse on duty and explained where we needed to go. As the doctor I also had to arrange where we were going to take the patient and talk to the hospital doctors about the case. I then drove out to the airport, with the pilot and nurse doing likewise. The pilot towed the aircraft out of the hangar, checked and prepared it, topped up the fuel and submitted a flight plan in

person to the Flight Services office at the airport. The flight nurse selected the medical equipment we needed, took the drugs out of the fridge and loaded the aircraft for the flight.

On arriving at our airport facility twenty minutes later, I would call the base radio operator on a landline to give an estimate of when we expected to leave for the patient's location and try to obtain an update on their condition. Each RFDS base operated independently, tasking our own aircraft and managing the emergencies in our region. If the patient was seriously ill and needed to go to Perth, however, we needed the assistance of a second aircraft from another location to complete the transfer, which was about five hours in duration each way. We would contact the RFDS base at Jandakot in Perth and plans would be made for an aircraft and doctor to come up from Perth to meet us halfway at Meekatharra Airport.

Most of this could be done on the phone but to confirm our movements, the radio operator compiled a message which was then transmitted by Telex. When I look back, this seems so antiquated. The operator would type the message into the Telex machine, which contained long rolls of thick paper tape about 2.5 cm wide. The machine punched holes into the paper tape as you typed. When the message was complete, the paper tape was inserted into another part of the machine and transmitted. The machine, effectively called the receiving machine, and then the punched tape ran through as the letters and numbers were transmitted. At the receiving end, the Telex machine contained rolls of paper about 25 cm wide running on a sprocket drive and the message would be typed out, line by line, as it was received.

This was effectively the same as a telegram. Indeed, one of the services the RFDS provided to remote outposts was to take messages by radio, type them up and transmit them by Telex to the recipients who would receive them as a telegram. On the return side, we would receive telegrams and then call the remote station

by radio, reading it out to them and then putting the original in the post to be collected in a few weeks.

Communications were not always about medical issues; often people called in to order supplies. I remember listening to a woman on a station ordering hardware supplies to be freighted up. She also wanted some paint for redecorating her lounge room. When asked what colour, she could only say, 'Oh, something in a nice beige shade'.

I thought how much we take for granted in being able to visit a hardware store and pick exactly the colour of paint we want, whereas people living in remote areas then just had to take the best they could get. These days with the internet, people in even the most remote location can generally shop online and have so many more options.

So our emergency evacuation would get underway. We radioed on the aircraft VHF (very high frequency) to the base as soon as we had departed and had an ETA (estimated time of arrival). The base telephoned or used HF (high frequency) radio to call the patient's location and advise of that ETA so that someone could bring the patient to the airstrip or send a vehicle out to pick us up. This would depend on what was wrong with the patient, what sort of transport was available and whether we needed to do any procedures on the patient prior to evacuation.

For very ill or injured patients, it is often better for the carers to stay with the patient and for us to come in to them. In many nursing posts, the nurse was also the driver of the 'troopie' style of ambulance. If she was up the front driving, then she couldn't care for the patient in the back of the vehicle. In certain circumstances it was better to examine the patients and perform procedures in a modestly equipped nursing post than at the airstrip in the aircraft. Our aircraft were well equipped but there was little room inside and no air-conditioning on the ground. If time was not critical,

sorting out the patient at the nursing post 10 kilometres away was more comfortable and convenient.

Once I went out to the Telfer Nursing Post for a young man who had dislocated his shoulder. We had given advice over the phone on some simple manoeuvres to assist with reduction but they had not worked. I flew out to the nursing post, gave some intravenous pain relief and sedation, then easily reduced the dislocation. It was now no longer necessary to evacuate the patient. While we were there, the nurse brought her ginger cat in. It had been mauled by a dingo and had a number of deep lacerations. With some telephone advice from a vet on sedation and local anaesthetic, I spent the rest of the visit stitching the cat, much to the gratitude of the owner, all the while keeping an eye on the young chap whose shoulder we had reduced. We left with no patients but overall it had been a very satisfying evening's work.

Telephones

In the mid-1980s more stations became connected to the telephone service. Telecom installed microwave links along the west coast through to the Kimberley and additional links followed with the North West Gas Pipeline. In a remarkable feat of engineering, the DRCS (Digital Radio Concentrator System) was pioneered by Telecom and NEC. It enabled multiple solar-powered repeaters to be located at 40 to 50-kilometre intervals and provide a link to an exchange up to 600 kilometres away. Pastoral stations and communities in sparsely populated areas could be connected as subscribers and enjoy all the benefits of an automated telephone service.

The station people recounted to me how, ironically, this made them even more isolated than before. In the days of the HF radio, most of them kept the radio turned on during the day and would hear news of what was happening across the region. They would

discover that a distant neighbour was pregnant, know when they went to hospital and hear that they had delivered a healthy baby boy. They also heard when a neighbour became ill or died. As more people started to use telephones, the radio traffic diminished and they lost this vital source of news and gossip.

We found that people didn't need to call at a scheduled time any more for medical advice, but would call whenever it was convenient for them. This was more difficult for me because I was often being chased between home, the hospital, the radio base and the airport to provide medical advice, rather than on regular schedules where I could arrange to be in a single location. We ultimately brought in regular schedules for telephone medical advice, just as we had for radio. Later, in 1992, I established a single 1800 number for the RFDs in Western Australia, to help channel all our calls through a single point.

Being on call in Port Hedland in the early 1980s was difficult. With no mobile phones and no pager, you had to stay at home or tell someone whenever you went out. So just a simple trip to the supermarket required a call from the fixed phone at home to say I was going to the shops for forty minutes. If a medical call came in, the base staff either waited until I got home or would hunt me down in the shopping centre. On more than one occasion, they called the supermarket and the public address system was used to summon me to a telephone. If I couldn't use the phone at the shop for a long-distance call to Perth, I would have to find a public coin-operated phone box and make a reverse charges call.

Likewise, going to the local hospital meant people tracking you down between the emergency department, the general wards or maternity. In retrospect, it was incredibly inefficient, but there were few alternatives. We tried a handheld two-way radio system linked to a telephone line, but it was never particularly reliable over the distances between Port Hedland, South Hedland and the airport.

My wife, before I met her, worked as a flying doctor at the Kalgoorlie Base of the Eastern Goldfields Section, from 1988 onwards. They had a number of handheld radios and could call each of their doctors from the base reliably. She recounted to me that one year, two new British locums arrived and were each given their mobile radios and a small car. They set off following each other across the unfamiliar streets of Kalgoorlie until the following radio call was heard by all staff on the channel.

‘Mobile 6 to Base, I’ve had a car accident.’

‘Mobile 6, are you alright?’

‘Yes, I’m OK, but I’ve run into Mobile 7!’

In 1988, our general manager agreed to buy me the company’s first mobile phone. It was an NEC 9A, a small brick which weighed 0.7 kg and cost \$6,995. It transformed my life, as I was no longer frustrated in trying to find a public telephone when paged away from home.

Today each of our doctors has a compact smartphone. We can put incoming telephone calls through directly to the doctor’s phone and can send emails with embedded attachments. For example, it is quite easy for many mine-site medics to scan in a 12-lead ECG and then email it to our doctor who can view and interpret it on their phone. We can broadcast SMS messages to all staff when there is a major incident and our doctors can take photos of skin lesions, x-rays and injuries and easily transmit them to someone else for quick advice. While sophisticated technology exists to transmit images, people will still use what is simple and easy. So, instead of high-quality digital x-ray transmission, a simple photo of an x-ray on a viewing box is often good enough.

The convergence of personal digital assistants (PDAs, like the Palm Pilot of the early 2000s) together with digital cameras and telephones has revolutionised how we work. You can photograph an accident site, an injured limb, a broken piece of equipment or an error message and send it to someone for advice, provided you

are in mobile phone range. Yet, even now there are still many outback areas without basic telephone or mobile-phone access. When airborne, mobile phones have limited reach.

With the advent of satellite telephones, the HF radio system has contracted to a point where only a small number of enthusiasts use it today. Satellite phones are easier to use and provide better quality most of the time. They also connect directly to the telephone system without an intermediary.

We adopted a marine version of a satellite telephone and installed it in our aircraft in the 1990s. The team in the back of the aircraft previously used HF or VHF radio and our base radio operators or Coordination Centre in Perth would patch it through to someone on a telephone. Now it was easier to just telephone directly from the aircraft. This has resulted in the demise of aviation radio for most medical purposes.

While HF radio and telephone were the common methods of communication of the 1980s and 1990s, we now have video calls available. We adopted a system called Vidyo® in 2011, which enabled our staff to do desktop video calls from their computer, tablet or smartphone. The system works quite well, allowing multiple participants, but still requires a little bit of setup time at each end. Sometimes firewalls and computer administrator settings can make this difficult. People are impatient and will move on to other things quickly if they work easily. I find they revert to simple but clear telephone calls, or popular applications such as *Skype*™.

When I first started in the Pilbara, there were a few nursing posts at mine sites with cardio-phones. These were essentially an ECG (electrocardiogram) machine with a set of speaker cups that could be connected to the earphone and microphone ends of a standard old-fashioned telephone handpiece. The ECG was recorded and then transmitted through the telephone using this acoustic coupler to a cardiologist somewhere in Perth with a similar system.

The concept was fine but inexpensive facsimile machines soon became readily available. Instead of this cardio-phone arrangement, you simply pasted the ECG strips onto a piece of A4 paper and faxed them to wherever was appropriate. It made it much easier for RFDS doctors, as well as specialists, to look at an ECG without an elaborate setup.

Faxes became a very useful means of clinical communication in the late 1980s and are still useful today. Any document, printed or handwritten, can be sent by just pushing some buttons. In contrast, while transmission of images and documents by email provides better quality than fax, there is more time and effort required to scan and send them. With faxes, you have a contemporaneous paper record, which can be added to other patient notes taken at the time.

A reliable comprehensive electronic medical record, compatible with all other clinical record systems, is yet to be achieved. Until it is as easy as typing a phone number and pushing 'send', faxes and paper documents – which are compatible with all medical record systems – will have a place.

Honeymoon over – remote rollover at Sandfire

It was 1983 and I had only just started working at the Port Hedland Base. A young couple had been married in Perth on Saturday night and were driving to Broome for their honeymoon. It was about twenty-four hours of solid driving from Perth to Broome and they were on the last leg, the 600 kilometre stretch between Port Hedland and Broome. Sometime after sunset they swerved to avoid a kangaroo and rolled their vehicle about 20 kilometres from the Sandfire Roadhouse, which was at that time the only stop midway along that stretch of road. When the dust settled, the smashed vehicle lay upside down just off the soft edge of the road. The young bride, who had been in the passenger seat,

was now there in the dark, humid stillness of a Pilbara night; her husband was unconscious, suspended upside down by his seatbelt and with an obvious serious head injury.

What do you do? There was little traffic along the road and, in these days, no means of communication unless you had an HF radio. So she waited and waited. Eventually someone came past, stopped to give limited assistance, then carried on to the roadhouse ahead. A bit later, vehicles from the roadhouse arrived and tried to render assistance. At the same time, the flying doctor was called.

The call came in to me at home in Port Hedland. There was limited information except that there had been an accident and at least one person was seriously injured. We are always cautious in launching an aircraft at night to a remote airstrip without a better idea of what the likely injuries are. There are significant safety issues to consider and we often find those who were labelled seriously injured are not as bad as predicted once they arrive from the accident site. Nevertheless, the information that one person had serious head injuries and was still at the accident scene suggested we needed to move quickly.

The pilot was notified, as was the flight nurse, and together we mustered at the Port Hedland Airport and departed for the roadhouse. It was a really dodgy strip, of marginal width, which was adjacent to the highway near the Sandfire Roadhouse. As no one actually owned it, the only maintenance was the occasional grading which occurred at the insistence of the roadhouse manager when a shire road crew passed by doing the roads. A few cartons of beer probably exchanged hands at some point to achieve this.

The pilot was Johnno' Wheeler, who had been a cow cocky and station manager himself prior to becoming a commercial pilot. If there was a pilot in our group who had experience in landing at rough strips, it was him. We landed safely on gravel amid the rows of kerosene flares and by the time we were driven to the roadhouse,

the patient had already been brought back from the accident in a Toyota Land Cruiser four-wheel drive, on a mattress in the back.

He was in a serious condition, stuporose, with a boggy fractured skull and flail chest from multiple rib fractures on both sides. We carried him into the roadhouse diner and set to resuscitating him and then anaesthetising him. After ventilating him by hand for a while, I connected him up to one of our new compact Oxylog ventilators. His wife had a fractured collarbone and lots of bruises and abrasions but was otherwise stable. She sat up the front with the pilot while the flight nurse and I sat in the cabin attending to her husband.

We needed to transfer him to Perth and the only option available at midnight was to fly directly there, a journey of over five hours, plus refuelling stops. So we set off, stopping first at Port Hedland to refuel and collect more drugs and equipment, then again at Meekatharra.

As dawn broke, we arrived at Jandakot Airport. It was much colder in Perth than up north. As we disembarked and arranged to unload the patient I watched the young bride, tired and dishevelled in a dirty torn dress, traipse aimlessly across the tarmac in bare feet. This is all she had with her, the rest of her belongings were still in the wrecked car by the side of the road 1500 kilometres away. While her wedding was to have been one of the happiest days in her life, here she was, three days later, back in Perth – her new husband critically injured and with many challenges to face in the months ahead if he survived.

I still become emotional when I remember this scene. It makes me wonder just what would have happened if the RFDS as we know it wasn't there? Who would have provided emergency medical care to the victims of this accident, hundreds of kilometres from the nearest hospital or ambulance? When and how would the

injured have been taken to the only neurosurgical services in the state?

It reinforces my long-held view that what we do in the RFDS really matters. We make a difference to people's lives every day across the state and it is difficult to envisage outback Australia without the RFDS. I hope that we will continue to always be there for those who live, work and travel in these parts of our nation. They deserve the same level of medical expertise as their fellow Australians in more populated regions.

It is this spirit of the service and its daily importance that has kept me motivated to continue working for much longer than I had initially planned. It drives me to stay passionate, committed and focused on ensuring that our work is not eroded by cost-cutting and budgetary constraints, and that we strive to ensure we are here, doing good work, for decades to come.

Divided then united

Consolidation of our service

'United we stand, divided we fall' is a quotation from Aesop's fables from the sixth century BC but is still applicable in the modern era. When I joined the RFDS in 1983, there were three separate operating sections in Western Australia based on the historic origins of the service. These were the Victorian Section in the Kimberley, the Eastern Goldfields Section out of Kalgoorlie and the Western Australian Section covering the remainder of the state. In the rest of the country, the Queensland Section covered all of Queensland, the NSW Section covered the western half of New South Wales and the Central Section operated in the lower half of the Northern Territory from Alice Springs and out of Port Augusta in South Australia. A small Tasmanian Section provided services in Tasmania and to the Bass Strait Islands.

There appeared nothing particularly wrong with this arrangement at first, with each section providing essentially the same services that were modified locally to meet the needs and existing medical infrastructure in their areas of operation. In Queensland, for example, there was a strong focus on child health and immunisation with RFDS nurses undertaking much of this work in outlying communities. In Western Australia, by comparison, a robust Community Health service had resident nurses across rural areas already providing these services.