

Option 1 – No regulatory changes or deregulation (refer to page 23 of the RIS)

Features:

- The current supervision requirements remain unchanged.
- The person under the professional supervision of the radiologist would require the appropriate qualifications, credentials, or training to provide the service.
- The current substitution rules in the Health Insurance Act 1973 remain.
- Rural and remote exemptions.

Alpenglow's Comment:

Alpenglow Australia Pty Ltd focuses on supporting the communities in Regional, Rural and Remote communities. We do not feel we are in a position to comment on the supervision requirements in Metropolitan areas and also we are unable to comment on the concerns raised in the discussion paper about 'alleged abuses' of the supervision rule in Metropolitan areas by up to 80 metropolitan practices.

We strongly believe that the current regulations has enabled the delivery of quality services as well as ensured access to many rural and remote communities under the Rural and Remote exemption. These are communities that are outside the metropolitan centres and the major regional centres and are more than 30 kilometres from a personally supervised CT service.

Our investigations provide us with data that indicates there are more than 70 Rural and Remote centres across Australia that currently are operating CT services that would not have been possible without the rural and remote exemption.

Alpenglow provides later in this document further detail on this, including some examples of the distances involved if these services are terminated as result of a change in the regulation.

We have also included in our submission, a framework that we believe is easily implemented and auditable. This framework will enable the Department of Health to ensure that the dual goals of Quality of Care and Access are achieved whilst enabling the clinicians and patients in these Rural and Remote communities to not only continue to enjoy access to this critical diagnostic tool, but to also ensure that all communities receive the best possible quality of service.

Option 2 – Minor changes including clarification of current requirements (refer to page 24-26 of the RIS)

Features

- Amendments to the current supervision requirements to clarify the circumstances under which a radiologist and/or specialist or consultant physician must provide supervision and how the supervision must be provided.
 - Professional supervision would require: the medical practitioner be available to observe and guide the conduct and diagnostic quality and safety of the examination and if necessary in accordance with accepted medical practice, attend the patient personally, within a reasonable period of time.
- The personal attendance requirement of musculoskeletal ultrasound would be amended to align with all other ultrasound items.
- The person under the professional supervision of the radiologist would require the appropriate qualifications, credentials, or training to provide the service.
- The current substitution rules in the Health Insurance Act 1973 remain.
- Rural and remote exemptions.
- Specified qualification requirements for ultrasound providers.
- Definition of diagnostic ultrasound.

Alpenglow's Comment:

We provide qualified support for this amendment as long as the rural and remote exemptions remains in-place for comprehensive practices (including CT) that are considered to be in a remote location as defined as *“a place within Australia that is more than 30km by road from:*

- a. A hospital that provides a radiology or computed tomography service under the direction of a specialist in the specialty of diagnostic radiology; or*
- b. A free-standing radiology or computed tomography facility under the direction of a specialist in the specialty of diagnostic radiology.”*

We reiterate that for the Rural and Remote communities a more detailed framework can and should be implemented.

Musculoskeletal Ultrasound (refer to page 25-26 of the RIS)

Questions:

- Are the principles as outlined satisfactory to clarify the requirements?
- What reasons, if any, are there for the personal attendance requirements for musculoskeletal ultrasound to remain?
- Would a minimum set of guidelines for ‘accepted medical practice’ per modality be appropriate?
- What savings are anticipated to be realised from removing the personal attendance requirements for musculoskeletal ultrasound services?
- What additional costs are anticipated to be incurred by requiring a medical practitioner (eg radiologist) to be in close proximity to attend on a patient personally within a reasonable period of time in circumstances where this is not currently the situation?
- What other costs (if any) might be associated with the proposed changes?
- What are the potential consequences of the proposed changes?

Alpenglow’s Comment:

We see no reason why Musculoskeletal Ultrasound is treated differently to all other ultrasound examinations.

It is critical to ensure that appropriately trained sonographers who are complying with their ongoing continuing professional development are engaged in undertaking the ultrasound study.

The images will need to be able to be viewed in real time by a radiologist if required, whether the radiologist is physically onsite or at another location.

With the technological advancements in software, hardware and broadband, this is readily achievable.

Option 3 – Practice based approach (refer to page 27-34 of the RIS)

Features

- Amendments to the current supervision requirements to clarify the circumstances under which a radiologist and/or specialist or consultant physician must provide supervision and how the supervision must be provided.
 - Professional supervision would require: the medical practitioner be available to observe and guide the conduct and diagnostic quality and safety of the examination and if necessary in accordance with accepted medical practice, attend the patient personally, within a reasonable period of time.
- The personal attendance requirement of musculoskeletal ultrasound would be amended to align with all other ultrasound items.
- The person under the professional supervision of the radiologist would require the appropriate qualifications, credentials, or training to provide the service.
- Computed Tomography services would only be able to be provided in a comprehensive practice, with the exception of CT of the coronary arteries (items 57360 and 57361).
- Supervision would be tailored to the type of diagnostic imaging practice.
- A comprehensive practice would require a radiologist to be available during agreed operating hours.
- Where a radiologist is on site during ordinary operating hours, the radiologist would be allowed to determine the supervision requirements for the practice and have the flexibility to implement and supervise efficient and effective processes.
- Where a radiologist is on site during ordinary operating hours, the radiologist would be allowed to substitute a requested service for a more appropriate service, without the need for consultation with the requester, if the substituted service has a lower MBS fee than the requested service.
- The current substitution rules in the Health Insurance Act 1973 remain.
- Where a radiologist is NOT on site during ordinary operating hours, a radiologist must be on site for the performance of the following services:
 - Mammography;
 - The administration of contrast; and
 - Image guided intervention procedures/surgical interventions.
- The reporting and supervising radiologist would not have to be the same person, but practices would be required to maintain records which indicate the name of all the radiologists involved in the service.
- Rural and remote exemptions.
- Specified qualification requirements for ultrasound providers.
- Definition of diagnostic ultrasound.

Alpenglow’s Comment:

We believe a radiologist should be available to view the images real time from all modalities to influence the outcome of the study and provide professional guidance and supervision to the technical staff and communication to the referring clinician.

This real time supervision can be achieved with or without the radiologist physically onsite. One recent example we had in South West Queensland demonstrates that with **Real Time Remote Supervision**, we can influence results ensuring the best possible clinical outcomes for the patient (refer to the Case Study attached in the Appendix).

In Metropolitan areas where the recruitment of a specialist radiologist is more likely to occur, the requirement for on-site supervision should not raise too many issues.

In Regional, Rural and Remote communities the long standing workforce shortages of specialist radiologists is most acute and this view is supported by data that shows a major issue with distribution of radiologists relative to population and service delivery. The data also clearly shows that radiologist distribution is skewed to urban major city areas as shown in the paper *Resident Radiologist Distribution in Australia*₁. The study showed that only 13.7% of radiologists are based in Regional areas and none in Remote or Very Remote areas. This is also evident in the ratio of radiologists to population as per the table below. Enforcing any requirements to only provide comprehensive services with a radiologist onsite will certainly cause severe hardship for patients and affect their clinical outcomes.

	Major city RA1	Inner regional RA2	Outer regional RA3	Remote RA4	Very remote RA5	TOTAL
Population	15,121,725	4,114,033	1,855,358	291,978	131,152	21,514,246
% population	70.2	17.3	9.5	2.0	1.0	100.0
Radiologists	1391	191	30	-	-	1612
% radiologists	86.3	11.8	1.9	-	-	100.0
Radiologists/ million	92.1	46.6	15.8	-	-	75.0

Table: Population and radiologist distribution by region₁

The administration of contrast should not occur without a Medical Practitioner on-site if an emergency condition was to occur, however, it does not specifically need to be a radiologist. For example, even in major tertiary referral hospitals, the administration and supervision of intravenous contrast is often performed by the treating emergency physician.

Questions:

- Are there any other types of practices which have not been identified?
- Are there comprehensive practices that do not currently have a radiologist onsite?
- What are the costs of employing a radiologist onsite during ordinary operating hours?
- What are the costs of non-comprehensive practices expanding to become comprehensive practices?
- Are there enough radiologist for this to occur? What are the barriers?
- Is there any role for standalone CT and, if so, how would current safety and quality concerns be addressed? What will be the impact of this change on providers and patients?
- What other costs (if any) might be associated with the proposed changes?
- What are the potential consequences of the proposed changes?

Alpenglow's Comment:

Under the current exemption for Rural and Remote communities we have identified more than 70 CT services across Australia that operate without having a radiologist on site full time under the Rural and Remote exemption.

We are not aware of any metropolitan or major regional centre that is operating without a radiologist onsite though we note the comments in the paper about claims that there are up to 80 metropolitan practices operating without supervision in contravention of the regulation

The cost of a FTE radiologist in the Metropolitan area appears to range from \$625k to \$780k per annum including on costs. In Regional centres a premium above this is often required to entice the recruitment of a radiologist, the package in this situation for 1 FTE radiologist can cost \$900k per annum inclusive of on costs but excluding costs such as travel and accommodation.

The cost of non-comprehensive practices expanding to comprehensive practices are significant in both capital cost, operational costs and staffing costs. The total operational running cost would be greater than \$1M per annum per site with an additional capital cost per site conservatively up to \$1.2M.

There has been a workforce shortage for radiologists for many years, this has been highlighted by the college of radiologists, this shortage is even more pronounced outside metropolitan areas, and is nearly impossible to recruit radiologists into Rural and Remote practices.

There are multiple barriers in being able to increase the numbers of radiologists in Regional, Remote and Rural areas. Some include the length of time for training, an ageing workforce, increasing the workload and demand for radiology services. Rural practitioners have reported that those who are compelled to work in rural areas are often not engaged with their work or their community. Incentives by governments and employers for doctors to seek a rural career would also help₂. Quoting an Area of Need (AoN) radiologist from the *2012 RANZCR Radiology Workforce Census Report: Australia₂*, he believes that the answer is for regional health authorities to make it more attractive for radiologists and technical staff to stay, live and

work in the regional [centres]. It is obvious Australia struggle with getting radiologists into Regional areas and what of remote and rural areas?

Another barrier to the recruitment of regional, rural or remote radiologists which we have recently experienced is the placement of a radiologist from Canada into a Regional Centre that has been classified as an area of need. This process was lengthy and costly and takes up to 2 years to be finalised. Until the process has been completed, the regional centre had to cope with this shortage of a specialist radiologist.

We do not support stand-alone CT service. It is our view that General X ray, Ultrasound and CT are complementary imaging modalities required for providing holistic services required by the Medical Practitioners in Rural and Remote communities.

If the changes lead to the closure of CT service in rural and remote communities, the additional costs are significant. For many of these communities, as well as their public hospitals, that rely on the CT services the transport costs for the patients can be one of their largest areas of cost after the cost of staffing.

The patients who require this service would ultimately pay the price of this additional cost. Removing the exemption means removing their access to these CTs and as a result, they would have to undertake long trips for services that patients in metropolitan areas do not have to undergo. Often these patients in rural and remote communities have to travel for several hours on roads that are difficult. Additionally options for public transport are very limited. As a result, they would most likely be away from their home for several days. Due to this difficulty, some patients may forgo the scan especially with follow ups and hence cause an increase in morbidity and mortality rates.

The availability of Pathology and Radiology Services in rural and remote communities is an important aspect for recruitment of young GPs to these rural and remote communities. Generally speaking young general practitioners are extremely reluctant to commit to practise in a location where these services are not available.

In the communities that Alpenglow Practices service, there are additional benefits to the communities and the surrounding towns. These include:

- 1) Sharing of our equipment with visiting cardiologists to allow them to supervise specific specialist services
- 2) The sharing of our radiographer workforce at the local on-call at public hospitals in these communities
- 3) A large amount of the imaging services for the public hospitals
- 4) Continuing education for GPs and rural doctors as part of the rural doctor training program
- 5) Training of clerical and technical staff, with the provision of training programs
- 6) Working with communities at establishing multi-purpose medical practice complexes which seem to be the direction of rural communities. We work and cooperate with local councils to enable a comprehensive service under one roof which provides further support for local GPs. For example, we work very closely with and have a strong relationship with QLD Health.



In the appendix, we have provided maps and data to show the impact on the patients if services were terminated for CT that is currently provided under the rural and remote exemption.

Non-radiologist specialist practice (refer to page 30-31 of the RIS)

Question

- Are there any other services currently performed by non-radiology specialists?

Alpenglow's Comment:

We are aware of sonographer owned and run rural services without any real time radiological input.

ADDITIONAL ISSUES FOR CONSULTATION

1. Rural and remote exemptions (refer to page 31-32 of the RIS)

The intention of having rural exemptions is to ensure patients have access to services without compromising on quality. However, current arrangements for rural exemptions vary for each of the modalities, creating confusion due to an inconsistent approach. The current approach is also difficult to administer.

Questions

- Does the current rule meet its goal of increasing access for patients without comprising on quality?

Alpenglow's Comment:

The question relates both to increased access and the quality of services.

In our view it is indisputable that the exemption rule has ensured access to quality diagnostic services in rural/remote communities. We have identified more than 70 practices in Australia that currently operate under the exemption rule providing CT Services in these communities.

Examples of these communities and the distance to access a full time supervised CT service as compared to one operating under the rural/remote exemption is displayed below.

Community Location	Round Trip Distance to Nearest On-Site Supervised CT	Round Trip Distance to CT Operating under Rural/Remote Exemption
Western QLD	1730km	362km
North Western NSW	314km	64km

If this exemption were removed, many patients would face a round trip from 180km to more than 1000kms to attend a CT that has on-site supervision by a radiologist. The rural practices that currently operate under the current supervision rules also provide access for inpatients and outpatients which would otherwise not be available. It would be devastating to the community to lose this access. A number of the CT and ultrasound systems that operate under the remote exemption rule are located in the local public hospital. The CT imaging is a critical service whether in public or private sector as it provides a key diagnostic tool to the clinicians within the communities for urgent cases to determine whether or not to transport the patient to a tertiary centre. If this transport is required it is either by air or lengthy road trip.

Attached in the Appendix 3 are maps of the 11 communities the Alpenglow practices are located in. These maps demonstrate the towns and communities which benefit from our services and their distances to the nearest on-site supervised CT.

Currently there are a number of regional hospitals throughout Australia that are installing CT scanners into their hospitals (based on the current supervision rules). In each case the hospital has not had CT which has been a critical access issue for the patient and clinicians and also a serious detriment to patient care and their clinical management. The removal of this exemption would significantly hamper these developments and cause disruption to the development and provision of essential clinical services. Some examples include Katherine (NT), Forbes (NSW), Parkes (NSW), Longreach (QLD), Goondiwindi (QLD) and Warwick (QLD).

It is important to also note that in every case of a CT scanner located remotely in a regional community this scanner also supports other surrounding townships which can be even further distances from the closest full time radiologist attended CT services.

These remote CT scanners have significantly lower volumes than those located in Metropolitan or major regional centres, given the population bases and number of referring clinicians in the regional and remote communities. As such they would make a minimal contribution to the growth rates in CT volumes that have been experienced within the Diagnostic Imaging outlays. It appears that most remote and regional CT centres average 10 CT scans per day or less. Additionally, there is current insufficient radiological workforce across Australia, to be able to provide on-site radiologists supervised services in rural and remote sites.

The presence of these services in rural communities gives immediate access to diagnosis in acute care patients, and affords patients with chronic disease and illness (including cancer) the regular monitoring they require. Without these services, not only would there be the impost of increased time and cost of long distance travel to access CT scanning, but experience has shown many patients would no longer travel these distances routinely and therefore not be monitored appropriately. This would result in increased morbidity and mortality rates in the community. Also avoided by these rural CT services is the transport cost by ambulance (ground and air) of sick patients.

Best practice that is equal to and often surpass metropolitan quality levels is achieved through **Real Time Remote Supervision (RTRS)**. This code of practice could be defined and established in government policy and would allow the continuation of these important and often critical diagnostic services in the many regional communities that they operate in. These services already have a proven track record of excellence in patient care and strong clinician support with access to appropriate imaging.

RTRS is a comprehensive medical imaging service utilising a Picture Archiving and Communication System (PACS) that is integrated with a high speed telecommunications network. This allows the radiologist to monitor and influence CT and Ultrasound studies conducted in regional and remote areas. The radiologist is able to review images in real-time, confirm the appropriate imaging protocol with the technicians, provide secure image transfer from site to radiologist and prioritisation of reporting and communication of critical findings in a timely manner to the patient referring clinician. It also enables radiologists to determine which examinations require intra-venous contrast administration. All contrast studies are performed whilst a trained and qualified medical practitioner

is onsite in case there is a need to respond to any emergency situation such as a contrast reaction. Greater than 90% of routine studies are reported in less than 2 hours and greater than 99% of urgent routine studies are reported in less than 1 hour of the commencement time of the patient exam.

State of the art low-dose CT scanners and diagnostic equipment is used, hence minimising the radiation dosage to patients. Staff training further ensure best practice and the use of state of the art Ultrasound machines ensure high quality images.

The combination of modern PACS systems and current telecommunications networks enable the rapid transmission of the images and hence the real-time viewing of patient images and communication between the radiologist and referring doctors and technicians. The data networks that operate through many regional communities now have improved significantly and with the continued investment of the Federal Government that is committed to continue to improve these networks for a number of years to come will ensure that these new methods of healthcare delivery are provided to remote and regional communities

We share the Department's concern about ensuring best practice utilising the lowest possible radiation dose to achieve the diagnosis required for the patient. We propose that the Department removes the exemption for capital sensitivity for regional and remote practices to ensure the earlier replacement of CT machines that do not offer state of the art technology and low dose radiation to no later than 10 year intervals. This will ensure that new technologies such as dose reduction on CT are available to the rural/remote communities in the same timeframes as those in Metropolitan communities.

We have attached as **attachment A**, a statement by Radiologist Dr John Rouse on our best practice standard for radiology services in rural/remote communities.

- Should exemptions be geographically/distance based rather than looking at population base and local availability of specialist services?

Alpenglow's Comment:

We believe the current exemption rule is effective and achieves the dual aims of quality and access for rural and remote communities.

We recommend that the practices operating under the remote exemption rule are required to register themselves with the Department of Health, as well as provide on an annual basis a Statutory Declaration that they declare that the practice remains a qualified practice under any revised remote exemption rule or in our view that they qualify under the broader framework of Real Time Remote Supervision (RTRS) Practice Framework that we have recommended. These practices should also be regularly audited by the Department personnel, which includes rights of access, to ensure compliance is maintained. This will enable the Department to administer this exemption.

- Are there any other mechanisms that provide incentives for local services provision in rural Australia?

Alpenglow's Comment:

We believe that the exemption rule, has shown its value for encouraging services in rural and remote centres as there have been a number of new services established in communities that had no service previously. These include Esperance in WA and Forbes in Western NSW.

It is imperative that the access to Medicare Services for patients in regional and remote communities is assured and equal to Australians in Major Metropolitan and Regional centres that they currently enjoy. The service providers have committed not only the capital costs of establishing the services but also have employed highly trained and skilled radiographers and sonographers into communities that could not offer them such opportunities in the past. The exemption has allowed these technicians who are professionals and who have trained extensively who wish to live in regional communities rather than major centres. These staff also provide support to the public hospital in functions such as supporting their on call roster.

These practices have made other significant commitments to ensure service quality for the patients and clinicians including high cost service contracts and long term commitments for high speed data lines with the major equipment vendor companies and telecommunication organisations. The equipment in these practices are also open for use and shared with visiting cardiologists to allow them to supervise specific specialist services in the area.

It is also worth noting that PDY and other final year graduates in radiography are also provided training places at these practices that operate under the exemption and again many of these students are keen to remain in close proximity to their family homes. This training and continued education for the GPs and rural doctors are offered as part of the rural doctor training program.

We are also working with rural and remote communities at establishing multi-purpose medical practice complexes which seem to be the direction of rural communities. We work and cooperate with local councils to enable a comprehensive service under one roof which provides further support for local GPs. For example, we work very closely with and have a strong relationship with QLD Health.

- What is the role of tele-radiology? Should it be the only service, or an adjunct the local service provision?

Alpenglow's Comment:

Tele-radiology is not applicable in itself but in fact is the tool that enables the distributed PACS offering in rural and remote communities. The combination of technological advancements of modern PACS systems and modern telecommunication networks allow the following:

1. Zero footprint web viewer systems for clinicians and public hospitals allowing the clinicians to review the images and reports immediately from any location.
2. The cost reductions for data storage allows for storage of previous examinations and access in real time for the radiologists and clinicians to view and compare prior studies that are stored on the PACS. This not only promotes best patient care but can also reduce the number of unnecessary repeat examinations.
3. Combined with the advances in bandwidth across regional Australia, the rapid access to the diagnostic images by the radiologist and clinician, permits immediate management of patient outcomes and access to both images and radiologist reports 24 hours a day, seven days a week.
4. Modern telecommunication has enabled **Real Time Remote Supervision (RTRS)** for the reporting radiologist as outlined above.
5. This real-time service provision is not dependant on the distances between the communicating parties.

We believe the on-site supervision in a Regional or remote community does not require a full time physical presence by the radiologist, but via **RTRS**, remote full time supervision is performed. Further enhancement to **RTRS** could be the requirement for any Comprehensive Practice that is operating under **RTRS** to require a radiologist attend the rural and remote centre to provide:

- Onsite procedural services under ultrasound and CT such as pain relieving joint and spine injections and imaging guided biopsies.
- Liaise in person with the practice technical staff on procedures and protocols
- Conduct CME education to Clinicians, registrars and the Rural Doctors training program
- Personal attendance by the supervising radiologist on a minimum of 12 days per annum (monthly visits), to ensure that the widest possible range of services are delivered to the clinicians and their patients in the community as many residents in these remote communities are elderly or minorities who often find it difficult to travel long distances for services and have limited transport options.

These also act as safeguards to ensure appropriate request of scans.

- Should the exemption not be available for certain types of services?

Alpenglow's Comment:

We believe that all modalities currently included in the exemption rule are important. Taking away the exemption rule for certain types of modalities, would lead to loss of access in the rural/remote areas that currently has access to such modalities and it would remove the incentive for new practices. The removal of any one modality type from the exemption rule would lead to the total loss of diagnostic imaging in that community, both because the practices would no longer be financially viable without this mix of modalities and the practice could no longer recommend the diagnostic modality most appropriate to the patient's medical condition.

2. **Implementing any changes and the relative role of regulation and the Diagnostic Imaging Accreditation Scheme (DIAS) (refer to page 33-34 of the RIS)**

The relative role of regulation and accreditation in enhancing the quality framework for MBS funded diagnostic imaging services will be determined following feedback received from stakeholders under this consultation process.

Questions

- Would changes to supervision be better placed in the DIAS or remain in the regulations?
- How would a practice based supervision approach be incorporated into regulation?
- Is it necessary to have a modality based approach in the regulations (as a minimum) and a practice based approach in accreditation?

Alpenglow's Comment:

We are of the opinion that these changes should remain in the regulations. However, these regulations should be tightened with mechanisms implemented to adequately supervise this. We recommend that the practices operating under the remote exemption rule are required to register themselves with the Department of Health, as well as provide on an annual basis a Statutory Declaration that they declare that the practice remains a qualified practice under any revised remote exemption rule or in our view that they qualify under the broader framework of **Real Time Remote Supervision (RTRS)** Practice Framework that we have recommended. These practices should also be regularly audited by the Department personnel, which includes rights of access, to ensure compliance is maintained. This will enable the Department to administer this exemption.

We believe that putting these in place, it would not be necessary to have a modality based approached in the regulations.

3. Any additional proposals, suggestions or comments?

Alpenglow's Comment:

We believe that there is **NO** reduction in service quality utilising the **RTRS** mode of practice as outlined above and that it meets best practice. Alpenglow believes that in the regional and remote communities it currently operates in, continuing access is critical to quality CT and Ultrasound services. We also think that there is an opportunity to improve the criteria to ensure this access continues without diminishing the quality of care whilst assuring access.

With reference to Dr Rouse's statement of Best Practice, Alpenglow are confident that **RTRS**, if implemented, can provide the dual aim of quality of care and patient access to these critical diagnostic services.

Implementation of the **RTRS** requirements as we have outlined above would address all the concerns listed on p 17 of the Consultation paper for unsupervised delivery of CT scanning where the radiologist is not on-site with regards to remote supervision whilst meeting the responsibilities for CT radiologists listed on p 24 to ensure that the patient has received the appropriate procedure in a safe manner with high quality diagnosis.

The addition of having a radiologist on-site a minimum of 12 days per annum to perform on-site interventional procedures, education/protocols with clinical staff and continuing medical education (GPs, specialists and rural GP training programme), will enhance both access and quality of care for the clinicians and their patients.

We agree with the Department of Health's statement on p 24, that supervision is a key component to provision of high quality, safe and effective diagnostic imaging services but believe that this is achieved through RTRS criteria for rural and remote communities.



REFERENCES

1. Bradshaw N. Radiologist distribution in Australia. Sydney: Royal Australian and New Zealand College of Radiologists. 2012
2. Munro PL, Bradshaw N, Stephenson N. 2012 RANZCR Radiology Workforce Census Report: Australia. Sydney: The Royal Australian and New Zealand College of Radiologists. 2013