Patient experience from a radiographer’s perspective
Clinton Heal
melanomaWA, Perth, WA, Australia

During their education, medical radiation science (MRS) students learn and develop capacity for effective patient care. As postgraduate MRS professionals gain experience, we learn to juggle the demands of providing high quality patient care in a complex technological environment. It is inevitable that, at some time during our careers, our personal experiences will intersect with our professional practice. Such intersections provide us with an opportunity to view our patient care from a changed perspective.

In 2005, Clinton Heal was diagnosed with melanoma at the age of 22 years. Since that time, he has experienced care as a patient in surgery, radiation therapy, radiology, chemotherapy and immunotherapy. His experiences of receiving care have coincided with his work providing care as a radiographer and CT specialist. This intersection of perspectives as both provider and receiver of patient care, coupled with Clinton’s determination and resilience, has seen him emerge as a leading advocate for melanoma awareness, information and support services.

This presentation will challenge us to consider our own practice from the perspective of the people in our care, as well as the opportunity to assess where we as individuals sit on the reactive – proactive health spectrum.

CyberKnife: an Australian experience
Gemma Waters
Sir Charles Gairdner Hospital, Nedlands, Australia

Sir Charles Gairdner Hospital was lucky enough to install Australia’s first CyberKnife Machine in January 2014, with the first patient treated clinically at the start of April 2014. The CyberKnife is a unique Radiosurgical tool unlike any other machine in Australia. It has the ability to deliver ablative doses with sub millimetre accuracy to a range of areas throughout the body. CyberKnife has the ability to track moving tumours in real time, which is a real stand out feature for this amazing machine.

The CyberKnife has been clinical for almost 3 years at SCGH. My presentation will aim to give a background of the CyberKnife and the different treatment capabilities and modalities experienced at SCGH. With the experience of treating over 800 patients, our team has had to be inventive and come up with some unique techniques in treating these patients. Interesting case studies will be presented, with a focus on the range of sites the CyberKnife can treat.
Emerging 3D-printed technologies in radiation therapy
Jodi Mitchell, Ashley Watts
Queensland University of Technology, Brisbane, Australia

Objective: To identify and justify current and potential uses of 3D-printed accessories for radiation therapy (RT), with consideration of costs, dosimetry, workflow and patient outcomes. This paper is an evaluation of current research and consideration of future applications.

Method: A systematic review of literature published after January 1st 2011 has located papers from databases and non-traditional sources. The MeSH term “Printing, Three-Dimensional” was introduced in 2015 and papers before 2014 are scarce. In light of this we anticipate data collection will continue until shortly before final submission.

Results: 3D-printed personalised bolus, brachytherapy templates and immobilisation devices emerged as foci of treatment-related research to date. Findings suggest that the 3D-printed accessories deliver equivalent or improved dosimetric properties, superior efficiency and enhanced patient experiences when compared with other current methods. This emerging technology is a cost-effective alternative to traditional methods, with the benefit of being able to reproduce multiple exact copies in a time-efficient manner.

Conclusion: 3D-printers can efficiently produce high-quality, personalised accessories for a broad range of radiation therapy applications. The required hardware is increasingly affordable and the development of open-source RT-specific software means the technology is becoming more accessible, therefore providing potential opportunities for both established and developing radiation therapy providers. Ongoing research is warranted in this rapidly evolving technology.

Overcoming communication barriers and improving health care access for people with an autism spectrum condition
Cathy Tran
RMIT, Melbourne, Australia

Introduction: Good practitioner-patient communication in healthcare is essential in providing the best possible patient outcomes. However, difficulties arise when practitioners interact with patients who have an autism spectrum condition. This is largely due to inexperience, stigma and a lack of training.

Objective: To conduct a review of the literature available on working with patients with autism spectrum conditions. In particular, focusing on the current definitions and perceptions of autism spectrum condition as well as on strategies to improve patient-practitioner communication.

Methods: Searches were performed on online databases for articles and resources available relating to autism spectrum conditions and communication with healthcare practitioners. These were analysed for relevance to the aim of the study and excluded if not applicable.

Results: The medical definition of autism spectrum conditions is constantly evolving and adapting. Broadly, it is characterised by deficits in social communication and interaction and restricted, repetitive patterns of behaviour, interests or activities. Individually, characteristics vary widely. Communication is greatly improved by respecting individual modes of communication (e.g. verbal, text-based, diagrammatic) and awareness of specific needs such as hypersensitivities.

Conclusion: Care for patients with an autism spectrum condition can be optimised by being aware of and respecting the needs of the patient, preemptively providing tools to aid the patient, and better incorporation of supporters. Increasing access to and providing a positive experience of one aspect of healthcare will reduce patient anxiety around general healthcare situations.
Friday 24 March, 1330–1500
Student Conference 1

“Do my hips look good in this?” tips and techniques for DDH pelvis radiographic presentation
Anseley Forergus
Princess Margaret Hospital, Perth, Australia

In 2006 the number of pelvic examinations requested, where the clinical question related to developmental dysplasia of the hip (DDH), was approximately 264. Fast forward to 2016 and that number has increased to 2547. The radiology department at Princess Margaret Hospital has identified the increase in pelvic requests, in light of the recent protocol change for gonadal shielding and the radiographic repeat rate due to positional errors.

The AP Pelvic radiograph has consistently fallen in the top 3 anatomical rejected regions. Historically it is the projection of choice in order to best demonstrate and diagnose DDH. Radiologist and orthopaedic surgeons use this radiograph for assessing pelvic symmetry and defining relationships between the proximal femurs to the developing pelvis.

It is important to realise that from these radiographs we are able to diagnose, assess result of treatment and time line the prognosis – all from the initial radiograph. Therefore the radiographer must produce a pelvic radiograph which will answer clinician based questions utilising the ALARA principle for positioning and technique.

This presentation aims to re-introduce us to positioning and image exposure quality, when viewing the pelvic radiograph in order to assess DDH.

A curious case of marking the right side
Georgia Williams
University of South Australia, Adelaide, Australia

It’s the morning of the first day of your first placement as a second year medical imaging student.

Examination requested: Chest x-ray.
You have learnt this at university and now it’s time to put your knowledge into practice for the very first time.

To begin, you position the patient carefully, place your cassette in the bucky, put your marker on and take the PA image. It’s a CR system so you process the cassette and slowly the image begins to appear on the monitor. But there’s something really odd about the image. The heart appears on the left side of the image, on the patient’s ‘right’ side. You’ve put your right marker on the cassette, it’s sitting on the top left corner of the film - this also suggests that the heart is right-sided.

You’re confused. Really confused.

How could this happen? Have you made a mistake?
Could it be:
Wrong protocol selected? AP instead of a PA?
Cassette around the wrong way?
Image inverted incorrectly?
But what about the marker? Wrong marker? Wrong way around?
Or could it actually be an anatomical variant? . . . .Could it? Is that such a thing? Surely not?!

This case study will explore a curious case of marking the right side.

Supporting documents:
Design and development of a web-based learning resource for radiation therapy students
Hayden Juriansz
Curtin University, Perth, Australia

It is a truisim that learning comes with experience, however it may be difficult for beginning radiation therapy students to gain sufficient early experience in practical tasks that might enable them to feel confident and prepared to advance their professional capabilities. The implementation of web-based learning is becoming more popular, particularly in healthcare fields, with it being shown to have a positive effect on student learning.

As part of a final-year student project, a website has been designed and developed for radiation therapy students to assist in their learning of aspects relating to their clinical practice. The aim of the website is to better prepare students for their clinical placements by providing a supportive tool to link their academic knowledge to their clinical practice. The website utilises images and videos of clinical situations and authentic examples to promote radiation therapy students understanding of how certain practical clinical tasks are performed. The website incorporates topics that, based on real radiation therapy students’ personal experiences, provide the opportunity to benefit learners. While the website is in the early stages of development, peer feedback indicates that this resource has the potential to increase the confidence of students, thereby allowing them to get more out of their clinical experience.

Investigation of diagnostic value and radiation dose for CT pulmonary angiography versus ventilation/perfusion scans in the evaluation of pulmonary embolism
Zhonghua Sun, Callum McRobert
Curtin University, Perth, Australia

Study Aim: To investigate the diagnostic value and dose of computed tomography pulmonary angiography (CTPA) for diagnostic evaluation of patients with pulmonary embolism (PE) when compared to ventilation/perfusion (V/Q) scans.

Materials and Methods: This is a retrospective study involving data analysis of patients with suspected PE in a large metropolitan hospital in WA over a period of 8.5 years. A total of 94 CTPA and V/Q cases investigating PE were collected through searching PACS database. Of these studies, 39 CTPA and 55 V/Q examinations were recorded. CTPA dose values in terms of volume CT dose index (CTDvol) and dose length product (DLP), and the exposure factors (ranging from 80 kVp to 120 kVp) for these CTPA examinations was collected. The radioactivity for the isotopes/radiopharmaceuticals used in the Ventilation (Technegas Tc-99 m) and Perfusion scans (Tc-99 m MAA) were recorded. Effective dose for these studies was then calculated using a weighting factor of 0.011 for each of the Ventilation and Perfusion isotopes, 0.017 for the CTPA scans.

Results: Mean effective dose values for CTPA examinations tended to increase proportionally with increases to kVp technique. Effective dose values were as follows: 80 kVp (3.51 mSv), 100 kVp (4.75 mSv) and 120 kVp (10.89 mSv). The mean effective dose value for the Ventilation component of the V/Q was 7.60 mSv. The Perfusion component had a mean effective dose value of 2.11 mSv. The mean dose value for combined Ventilation/Perfusion studies totalled 9.71 mSv.
The effect of pelvic size on radiation therapists’ evaluation of image quality: a phantom study
Sara Chan, Michala Short, Eileen Giles, Lyndal Newmarch
University of South Australia, Adelaide, Australia

Background: The use of planar, kilovoltage x-ray images for treatment verification in radiotherapy has improved treatment accuracy.1,2,3,4 For obese patients, where image quality is compromised, local,5 national2 and international6,7,8,9 treatment verification guidelines do not specify how the images should be acquired to achieve adequate quality for treatment verification.

Aims:
1. Determine the relationship between pelvic size and subjective image quality.
2. Define a pelvic size(s) at which x-ray image quality is considered unacceptable by radiation therapists (RTs) for accurate treatment verification.
3. Recommend post-image-acquisition processing techniques for enhancing image quality.

This would provide evidence for the development of a local image verification protocol for obese pelvic cancer patients.

Methods and Materials: Sixteen RTs evaluated x-ray images of different phantom pelvic sizes. The relationship between size and subjective image quality was assessed using Spearman’s Rho correlation coefficient. The size threshold for acceptable image quality was determined using Cochran’s Q test. Descriptive analysis provided information on post-image-acquisition processing techniques commonly used for enhancing image quality.

Results: Pelvic size was inversely correlated with subjective image quality. The size threshold for acceptable quality was equivalent to a waist circumference between 143 and 169 cm. The post-image-acquisition processing techniques used to enhance the image quality of different phantom sizes varied.

Conclusion: RTs consider image quality to be poorer at larger pelvic sizes. For patients with a waist circumference larger than 169 cm, images should be acquired with individualised acquisition settings. Future research is needed on the usefulness of different post-image-acquisition processing techniques.

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Friday 24 March, 1330–1500
Student Conference 2

The viability of surgical clips for the use in breast radiation therapy
Millie Taylor-Brown, Katrina Smith, Nicola Jones, Kate Bartholomew
Queensland University of Technology, Brisbane, Australia

Objectives: The diagnosis of early stage breast cancer is increasing, accurate target localisation for Partial Breast Irradiation (PBI) and boost Radiation Therapy (RT) is essential to reduce the risk of recurrence. As tumour bed visualisation is hindered by minimal seromas and cosmesis-preserving surgical techniques, this review aims to evaluate the viability of surgical clips for tumour bed localisation in breast radiotherapy.

Methods: A literature search of full-text English articles published between 2009-2016 in PubMed and Embase was conducted. The included studies evaluated the accuracy and reproducibility of surgical clips.

Results: Analysis of 10 articles indicated that surgical clips significantly aided in tumour bed localisation, improving the Cavity Visualisation Score (CVS) and intersection volume. Their use in treatment verification is justified, with a maximum residual error of 5 mm towards the centre of gravity. The use of 5-6 clips gave the most accurate delineation; however, a minimum of 4 clips placed at four cardinal points of the cavity were found to be adequate. One study suggested gold fiducial markers were superior to surgical clips; however, further research needs to be conducted in this area.

Conclusion: Surgical clips are viable for accurate visualisation of tumour bed localisation in breast RT as they offer a stable, reproducible surrogate for treatment verification. Further research is required to formulate a standard Australian protocol for the use of surgical clips.

Evaluation of prone and supine patient positioning in external beam radiotherapy for gynaecological cancer
Dianna Nhuy Le
Peter MacCallum Cancer Centre, Melbourne, Australia

Radiation therapy for gynaecological cancer patients have been associated with significant radiation induced gastrointestinal acute and chronic toxicities.1 This is because radiation treatment of gynaecology cancers often involve treating the whole pelvis which incorporates the bowel in the beam path, making small bowel sparing particularly challenging.2,3 However, reducing GI irradiation can potentially allow dose escalation to the pelvis which will therefore improve local tumour control.1,2 With this being said, there has been extensive research demonstrating that patient positioning has an impact on small bowel irradiation, with many studies suggesting that prone positioning can significantly reduce small bowel irradiation whilst providing similar target coverage and conformity in comparison to supine positioning.3,4 Despite this, there have been contradicting studies indicating that there is no significant difference in dose and toxicity to the small bowel between the two positions, with large setup variations caused by pelvic rotations that cannot be ignored in prone treatment.5,6,7 Nevertheless, there is limited research comparing the difference in patient positioning with respect to patient demographics, stability, reproducibility and efficiency. Hence, this article will evaluate the influence of supine versus prone positioning in patients with cervical and endometrial cancer receiving external beam radiotherapy to determine the optimal irradiation position.

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A comparison of E-comp and conventional radiotherapy in patients with lymphoma of the neck region
Jacinta Krstic, Karen McGoldrick, Nigel Anderson, Prabhakar Ramachandran
Peter MacCallum Cancer Centre, Melbourne, Australia

Objective: Long term survivors of Hodgkin’s lymphoma (HL) and Non-Hodgkin’s lymphoma (NHL) have an increased risk to the late effects of radiotherapy. Conventional techniques often result in compromised coverage of the planning target volume (PTV).1 Electronic Tissue Compensation (E-comp) is a forward planning technique that can be applied to a conventional technique to compensate for tissue surface irregularities.2 The aim of this study was to establish whether E-comp can improve PTV coverage and reduce critical organ doses compared to conformal radiotherapy, for patients with HL and NHL of the neck region. Planning time and monitor units delivered was also analysed.

Methods: Ten patients with unilateral HL or NHL disease of the neck were selected from our institution’s clinical database for retrospective planning. A conformal technique and an E-comp plan has been generated for five patients to date, and a comparative analysis of dosimetry was performed.

Results: Preliminary results indicate that three out of the five patients planned have improved coverage and conformity of the PTV with the use of E-comp compared to conformal radiotherapy. Critical organ doses have been comparable in all five cases. Analysis of the remaining cases will indicate if E-comp is a viable treatment option for certain clinical cases.

Conclusion: Preliminary results indicate E-comp may be a feasible technique for patients with HL and NHL of the neck region.

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Spinal metastases: a comparison of stereotactic body radiotherapy (SBRT) and conventional radiotherapy
Nina Lin
Queensland University of Technology, Brisbane, Australia

Background: The primary treatment for spinal metastases is conventional palliative radiotherapy. However, due to the risk of myelopathy, the radiation dose is limited by the spinal cord, and re-irradiation can present challenges. Hence, stereotactic body radiotherapy (SBRT) has emerged as an alternative treatment method. In particular, SBRT has the potential to escalate the biologically effective radiation dose without exceeding the spinal cord tolerance.

Objectives: To compare SBRT and conventional radiotherapy treatment for spinal metastases.

Methods: A literature review of studies that discussed radiotherapy for spinal metastases was conducted. It focused on three main criteria to determine technique superiority: clinical outcomes, toxicity and practical issues.

Results: The main goals for treatment of spinal metastases are to increase local control, relieve pain, decrease the likelihood of spinal cord compression and improve quality of life. A randomised controlled trial (RCT) by Braam et al.2 comparing conventionally fractionated radiotherapy and SBRT is ongoing; however, there are no current RCT results available yet. However, single arm studies of SBRT have shown relatively high rates of local control with minimal toxicity.3,4,5

Conclusion: SBRT treatment of the spine has been shown to be effective and safe; however, careful patient selection is very important. Nevertheless, conventional radiotherapy still plays an integral role in the palliative management of patients with spinal metastases. RCTs comparing both modalities with long-term follow-up should be conducted.

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Radiation therapy in Nepal—Australian students’ experience and perspective
Jodi Mitchell, Ashley Watts
Queensland University of Technology, Brisbane, Australia

Introduction: The operation of radiation therapy in the developing country of Nepal provides a stark contrast to the practice students experience in a country like Australia. The age, type of equipment, and lack of immobilisation and imaging used for verification in Australia presented many challenges and questions over patient outcomes for disease control and side-effects.

Case Presentation: In July 2016, students travelled to Nepal for work experience in a radiation therapy department. Time was spent at Bhaktapur Cancer Hospital and Manipal Teaching Hospital. Patient planning utilised 2D simulation with fluoroscopy and treatment delivery via a Cobalt-60 unit. There were disparities observed when compared to recent clinical experiences accumulated in Australia, where 3D planning and linear accelerator are standard methods.

Outcome: In Australia, accuracy is paramount, with technologically advanced treatment modalities, however; circumstances in Nepal create a need to prioritise reduced machine maintenance, running costs and downtime. Major differences witnessed in Nepal were larger treatment fields, 2D fluoroscopy planning, increased skin reactions, poor immobilisation, lack of position verification, patient care and hygiene. Nationwide incidence, prevalence, mortality, and cost-effective radiation therapy remain unverified due to lack of clinical reports and scientific research.

Discussions: Experiencing radiation therapy in Nepal with different economic status, culture, and medical infrastructure to Australia, gave the students valuable perspective on the quality of radiation therapy treatment. Inferior positioning and verification of patients would imply inferior treatment accuracy, likely leading to poorer disease control and greater toxicities. Without evidence and data from research, true statistics cannot be identified.

What education do radiation therapists provide to patients undergoing radiation therapy for breast cancer
Jinglin Yao, Georgia Halkett
Curtin University, Perth, Australia

Background and purpose: Many breast cancer patients undergo radiation therapy (RT) at some stage during their illness. Halkett et al. demonstrated in their pilot study that adequate education and support provided by radiation therapists prior to radiotherapy CT planning and commencing treatment reduced patients’ anxiety level. Halkett et al. have conducted a national intervention project ‘RT Prepare’ which involved comparing usual care to the RT Prepare intervention. The intervention consisted of radiation therapists consulting patients prior to CT planning and day 1 of the treatment. The aim of this CCWA student vacation project was to: (1) determine whether radiation therapists delivering the RT Prepare intervention provided the education and support patients diagnosed with breast cancer require prior to receiving radiotherapy; and (2) Determine whether radiation therapists delivering the intervention performed better than radiation therapists who delivered usual care and had not received training.

Materials and methods: Overall 408 patients (218 usual care and 190 intervention) from Melbourne, Adelaide and Perth consented to the national project and received either usual care or the intervention. Radiation therapists were trained in delivering the intervention during two communication skills workshops. Digital tape recordings of education were made for 10% of usual care and all patients receiving the intervention. Ten percent intervention recordings from each site were randomly selected and analysed by a clinical psychologist and a radiation therapy student 2 with a comprehensive checklist developed from Halkett et al. previous studies for quality assurance (QA).

Results: This research provides a detailed understanding of the role that radiation therapists can play in providing education and support to patients prior to commencing radiotherapy. The QA analysis demonstrated that radiation therapists delivering the intervention followed the required intervention structure and fulfilled the requirements to deliver quality interventions to breast cancer patients. Furthermore, those delivering the intervention performed significantly higher on the checklist to those providing usual care. The findings have also contributed to the larger study that is being conducted.

Conclusion: Radiation therapists delivering the intervention provide informative and effective education and support compared to radiation therapists who provide usual care. It is critical for breast cancer patients who undergo an unfamiliar medical treatment – radiation therapy to feel supported and accordingly reduce their anxiety towards radiotherapy. This study demonstrates the need for the ‘RT Prepare’ intervention and the improvement in RT delivery of education and support to patients having received communication skills training.

Supporting documents:

| Intervention - CT planning | Responds empathetically to patient emotions | Patient understanding | Blocking behaviour |
|---------------------------|------------------------------------------|----------------------|-------------------|
| 62.62%                    | 28.51%                                   | 61.22%               | 8.48%             |
| 73.22%                    | 41.28%                                   | 68.83%               | 5.00%             |
| 31.9%                     | 9.52%                                    | 43.20%               | 9.11%             |
| 30.52%                    | 2.35%                                    | 37.66%               | 15.00%            |

Table 1. Comparison of intervention and usual care of QA scores in percentages
Friday 24 March, 1530–1700
Student Conference Combined Close

Reach your potential – top tips for career development

Julian Harris
Curtin University, Perth, Australia

Julian applies his background in psychology in his role as Career Development Consultant at Curtin University to support students to develop the employment-seeking capacities they need to take their first steps in a new career.

In this interactive session, student medical radiation science professionals will discover practical strategies to assist in applying for a position and successfully mastering a professional interview. Julian is a very popular and engaging presenter, so participants should come prepared to have fun while they learn.

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**Table 2. Count of the elicited patient emotions in each group consultations (defined emotions/total number of patients)**

| Elicited emotions | Anxiety | Depression | Distress | Anger |
|-------------------|---------|------------|----------|-------|
| Intervention - CT planning | 8/23    | 1/23       | 4/23     | 0/23  |
| Intervention - Pre-Treatment | 9/23    | 0/23       | 2/23     | 0/23  |
| Usual care - CT planning | 0/14    | 0/14       | 0/14     | 0/14  |
| Usual care - Pre-Treatment | 2/12    | 0/12       | 0/12     | 0/12  |
Work the World Australia – International Volunteering Opportunities
James Brown
Work the World Australia, Melbourne, Australia

James Brown is the Development Manager for Work the World Australia. He will be outlining the placement opportunities they provide specific to the Medical Imaging field, and will introduce Cameron Read from Curtin University who will also share some insights on his experience in Kathmandu last year.

Work the World are the leading provider of tailored Radiography and Radiotherapy elective placements in Ghana, Tanzania, Sri Lanka, Nepal, Peru and the Philippines. They work with students to design a placement that matches their interests, take away all the hassle of organising it and make sure them feel 100% prepared and supported throughout.

Digital equipment is limited and in some cases non-existent in the developing world. Manual interpretation is often the only way to analyse data, so participants gain invaluable insight into the fundamentals of their discipline. Work the World placements include diagnostic and therapeutic radiography, working with plain film, X-ray, CT, ultrasound, MRI and fluoroscopy. They partner with large regional hospitals, private clinics, teaching hospitals and specific radiography schools. They are also able to offer radiotherapy placements in Peru and Tanzania, working with treatments that include brachytherapy, cobalt therapy, and radiation therapy.