Implementing results of a change process at the Andrew Love Cancer Centre – The axillary technique

Abstract Purpose: Change is ever present in radiation therapy departments and it can impact on the quality of work, staffing and job satisfaction. Understanding stages of change for individuals can assist management in successfully developing the service of their department. At the Andrew Love Cancer Centre (ALCC) there have been many developments in recent years. This paper aims to describe a successful change in practice at the ALCC, focusing on the quality assurance improvements made with the introduction of a new radiotherapy treatment technique used for melanoma, squamous cell carcinoma and Merkel cell carcinoma with axillary node involvement.

Methods: A four-stage model of change was used to guide the introduction of the new axillary technique. The accuracy of the new technique was evaluated in comparison with the historical technique, using pre-treatment images. Results: A total of 219 pre-treatment images were analysed in this study, 141 with the historical technique and 78 with the new. Seven out of eight reference points indicated reductions in translational correction in field placement with the new technique compared to the historical. Conclusion: Improvements in set-up accuracy were found when utilising the new set-up technique compared with the historical technique. The four-stage model of change assisted in the smooth implementation of this new treatment technique. At the ALCC innovation and development are encouraged, along with management having a sound understanding of organisational change enabling the radiation therapy department to develop successfully and cope with rapid change.

Keywords: axillary, radiation therapy, stages of change.

Introduction
Radiation therapy departments are constantly changing in technology and practice. The degree of change within a department can impact on practitioners and job satisfaction. Understanding the stages of change and managing the process carefully is important. This paper aims to describe a successful change in practice at the Andrew Love Cancer Centre (ALCC), focusing on the quality assurance (QA) improvements made with the introduction of a new radiotherapy treatment technique used for melanoma, squamous cell carcinoma (SCC) and Merkel cell carcinoma with axillary node involvement. A description of axillary radiotherapy, along with the historical axillary technique will be presented; followed by a rationale for changing the technique and innovative ideas for improving the technique. The introduction will finish with a brief overview of change management theory and change readiness.

Axillary radiotherapy
Radiation therapy has been shown to improve regional control of high-risk skin cancers. At the ALCC, patients presenting with melanoma, SCC or Merkel cell carcinoma are prescribed radiotherapy when there is axillary node involvement. Both melanomas and SCC are treated with radiotherapy post-surgery if there is multiple node involvement, extranodal spread and nodes more than three centimetres in diameter. Primary Merkel cell carcinomas are given adjuvant radiotherapy to the clinically negative regional nodal basins that are greater than one centimetre in diameter.

Patients with a melanoma are prescribed 48 Gray (Gy) in 20 fractions with five fractions per week, in accordance with the TROG 02.01 multicentre randomised clinical trial. For SCC and Merkel cell carcinoma, a prescription of 50 Gy in 25 fractions with five fractions per week is used. All axillary radiotherapy uses anterior and posterior fields of six megavoltage (6 MV) photons.

Background to changing the axillary technique
Radiation therapy relies on precise patient positioning to ensure accurate treatment delivery. The axilla region is an extremely mobile region of the body. The head, arm, shoulder, elbow, wrist and hand position can all effect the position of the patient and cause set-up reproducibility issues. One radiation therapist at the ALCC was particularly interested in investigating changes to the stabilising equipment and set-up to improve treatment accuracy. There have been a number of changes made to the stabilisation and positioning of axillary cases, which have resulted in improved accuracy, ease of set-up and patient comfort. A description of the historical axillary technique and discussion about the related problems will be presented. The new axillary technique will be outlined, working through the stages of change and preliminary results will be presented.
Historical axillary technique

Historically, axillary patients were positioned supine with the ipsilateral arm in the akimbo position. A standard neck shape was used to support the patient’s head and a contouring support was placed under their knees, neither of which were indexed, refer to Figure 1. The patient’s hand was recorded as ‘on hip’ or ‘thumb hooked in belt loop’, which was a potentially inaccurate method of positioning. This technique also required a large number of ruler measurements resulting in the treatment sheet appearing complicated and often taking the radiation therapists’ time to orientate themselves with all of the measurements. The measurements included: mental protuberance to sternal notch (chin to chest), olecranon (tip of elbow) to chest wall and tip of acromion (shoulder) to sternal notch. To assist in set-up accuracy five tattoos were used, as illustrated in Figure 2. Anterior and posterior treatment fields were used with multi-leaf collimator (MLC) shielding for the lung, spinal cord and part of the humeral head.

Rationale for change

After treating many axilla patients at the ALCC and assessing their pre-treatment verification images, a number of issues became apparent. The major issue was that, if electronic portal imaging (EPI) was not used to verify the set-up position pre-treatment, then field placement may have been inaccurate. Corrections at this stage involved a translational shift of the isocentre and/or resetting the patient’s shoulder position then re-imaging prior to treatment. Therefore, stabilising equipment and measurements that reduced the translational and shoulder positioning inaccuracies were required. Other issues included: the necessity to improve the set-up stability and reproducibility; and a reduction in the number of ruler measurements to improve the ease of the set-up. It was hypothesised that if the set-up stability improved, along with a reduction in the number of ruler measurements, then the pre-treatment verification images would indicate an improvement in field placement accuracy.

Ideas for improving the set-up

Vacuum form support systems are used for improving the reproducibility and stability of patient positioning in some radiotherapy departments. The effect on surface dose of placing a vacuum support under the axilla to improve the stability of this region was investigated. It was found with the vacuum support positioned under the axilla, the skin dose from the posterior field would be increased by up to 50 per cent. This increase has been shown to result in increased acute skin toxicity, viewed as clinically unacceptable, so a method of axilla immobilisation that did not increase the acute toxicity was sought.

From this study, the position of the hand and wrist in relation to the body are known to affect the positioning of the axilla region. Thus, a vacuum support containing an impression of the patients hand, wrist and lower body was trialled to avoid the increased skin dose, refer to Figure 3. The vacuum support was placed over the knee support, and thus was indexed to the treatment couch, but also fixed the lower body, hand and wrist in the same position for each fraction. The vacuum support was shown to be effective at localising the axilla region without increasing the acute toxicity, as it is at no point in the treatment field.

The following section will briefly discuss change management theory relevant to this study and details of the change model used for introducing the new axillary technique will be presented in the method.

Change management

The development of professional practice depends on the extent to which the profession or individuals within the profession embrace change or change themselves.1 Change can cause fear, a sense of loss of familiarity, and it can take time for people to understand the meaning of the change and to commit to it in a meaningful way.4-5 It is important to have an understanding of the way people move through stages of change.3-7 Understanding a normal progression or how people adapt to and embrace change can help managers, change drivers and all employees in avoiding
under-managing change or over-reacting to resistance.8

Changing professional practice successfully can be a lengthy process; it requires careful consideration of the implications, as well as identifying enablers and barriers to development. This in turn enables management and radiation therapists to be suitably prepared for change and in a position where barriers can be negotiated or avoided, rather than bringing developments to a standstill.

People experience change in different ways and various models can assist in understanding this phenomena.3,9–10 Planned and unplanned changes in a workplace have an element of associated loss for the people involved.5,11–12 Over time change management has brought together the ideas from a business approach, based on tangible results with that of a psychology perspective, focusing on the human aspects of change.7 The well known transition grief cycle, first published in 1969 by Kübler-Ross9 was adopted in organisational change management when recognising and understanding the loss and emotional impact of change on people.12–13 There have been many emotional change response models developed from the Kübler-Ross model.14–17 While the Kubler-Ross model18 has five stages of dealing with catastrophic news (denial, anger, bargaining, depression, acceptance) – a model more applicable for organisational management resulted in the four stage model and has been used by Scott and Jaffe5, Reynolds19, Rashford and Coghlan12 (denial, exploration, commitment).12

While this study was focused on the QA improvements of the change (a new treatment technique), there was emphasis placed on how the radiation therapists coped with the change. There is a vast amount of literature on how people cope with change.1,7,20–24 It is beyond the scope of this paper to discuss all change management theories; however, a description of the four stage model5,12,19 that guided this study will be outlined in the methods section of this paper. The four-stage model was viewed as providing support to staff moving through a change process, as it accounts for how people cope with change and was therefore, viewed as an appropriate model for this study.

**Change readiness**

The readiness of individuals and groups of employees to change can impact on their initial reaction to the change process.25 Five components were identified by Armenakis, Harris and Feild26 for motivating employees with regards to change; these are discrepancy, efficacy, appropriateness, principal support and personal valence. When introducing change, it is important to address each of these components. Discrepancy refers to why the change is necessary, that is the change will be better than the current.27 Efficacy refers to how successful the process is likely to be.27 Appropriateness refers to the change addressing a particular issue and if it is viewed as the best method for achieving this.27 Principal support is the support and commitment from management for the change.27 Personal valence refers to the benefits for the individuals or employees. All of the five components need to be communicated clearly to individuals for the change process to be initiated. This model was not used when introducing the new axillary radiotherapy technique at the ALCC; however, it will be used to discuss how improvements can be made in future change processes.

**Methods**

**Four-stage model of change**

The four stage model5,12,19 of change was used to guide the introduction of this new axillary technique in this study. Referring to Table 1, the first stage of the four stage model is referred to as Denial, this is where the idea of change or the change itself is first introduced to individuals.5,12,19 This stage often involves individuals not believing in the change and convincing themselves that they won't have to go through the change. Two approaches that can assist individuals through this initial stage of change are communication and time.5,19 Communication during this stage is important as individuals need clear, accurate information about the change, the rationale for the change and they need to know details such as, who the change will impact on and how it will impact on their role.5,19,27 It is also important for people to know where the change developed from, for example if a practitioner developed a new change idea, they need to be involved in the change process as a leader and have support from management. This will indicate to staff that management are not driving the change, but that management are supportive of employees driving change. It is also important to provide timeframes at this stage, this will give employees an idea of how long they have to adjust to the change.5

**Resistance** is the second stage of change and involves individuals experiencing resentment and blaming others in an attempt to stop the change.5,12,19 It is important for management to be aware that this is a period where mistakes may occur and the quality of work may decrease due to individuals withdrawing or experiencing a lack of concentration.5 This lack of concentration or withdrawal can be based around employees
focusing their full attention on the change and dealing with it on an emotional level.5 During this stage, time needs to be scheduled to engage practitioners in contributing their expert knowledge, it is also a time for acknowledging, listening and empathising with individuals on how they are responding to the change.5

The Exploration stage is when individuals have moved through the denial and resistance stages and begin to accept the change and explore it.5,12,19 During this stage individuals often ask many questions, they may express concern as to a lack of time and they may ask for training to support the change.5,12,19 At this stage, management need to provide practice support and encouragement to individuals and invite their contributions to the process. Suitable training for practitioners should be provided during this time, also giving individuals the opportunity to plan and set goals is important. Management and change leaders need to focus on short-term goals and the benefits of the change.5,12,19

The final stage of change is Commitment, this is when individuals are ready to entrust in the change and incorporate it into their practice.5,12,19 At this stage, management needs to recognise and provide positive feedback to individuals who have successfully adapted to the change. For individuals who do not accept the change or are still working their way through the change process; management need to work with them and use techniques discussed during the denial, resistance and exploration phases.5 It is important for those leading the change not to dictate the change, but to discuss the benefits of the change and the rationale for making the change to those resisting it.19

The area of change management is constantly developing with new approaches and theories underpinning change. While there are various change management models, the four stage model5,12,19 was chosen for this study as it was viewed as relatively simple and easy to apply in the workplace. Change is dependent on the extent to which employees embrace change, therefore, their coping mechanisms need to be a central idea in managing a change process.28 Regardless of the model used, employees move through the change stages at different rates and this can often make change management complicated.10 It is advisable to design and plan a change management strategy to recognise and support the transition phase, as this will reduce the impact on productivity due to the stages of change.10 Some management strategies for each stage of change are covered in Table 1.5,12,19 More importantly, managers will gain respect and commitment from employees if the transition phase is managed well.10 Managing change well involves people feeling supported rather than manipulated through the process of change.29 For the purpose of this paper, a four-stage model of behaviour change was chosen based around the work of Scott and Jaffe5; Reynolds19; Rashford and Coghlan12, as it was concerned with how people cope with change and managing the process from that perspective. The models described in Scott and Jaffe5; Reynolds19; Rashford and Coghlan12 work all used a four-stage model, similar to the one presented in Table 1.

The four-stage model was used to guide and evaluate the introduction of the new axillary technique. The accuracy of the new technique was evaluated in comparison to the historical technique, using pre-treatment images. The process of change and results will now be presented.

Results

The new axillary technique: introduction of the hand vacuum solution

To accurately locate the patient’s position, indexed neck and knee supports were used. The patient was off-set on the couch, five centimetres to the contralateral side to achieve the akimbo position enabling the patient’s elbow to rest on the firm surface of the couch top. The vacuum bag was formed over the knee support, refer to Figure 4. The indexing of

Table 1: Stages of change and management strategies for dealing with change.

<table>
<thead>
<tr>
<th>Stages of change</th>
<th>Management strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENIAL</td>
<td>Communication of information. Time.</td>
</tr>
<tr>
<td>RESISTANCE</td>
<td>Acknowledge and listen to individuals.</td>
</tr>
<tr>
<td>EXPLORATION</td>
<td>Practical encouragement and support. Highlight the benefits of the change. Provide training. Set short term goals.</td>
</tr>
<tr>
<td>COMMITMENT</td>
<td>Recognise those individuals who have acclimatised to change well Set long term goals.</td>
</tr>
</tbody>
</table>

(Scott & Jaffe5; Reynolds19; Rashford & Coghlan12)
The new and historical set-up techniques were compared. The data therapists in set-up accuracy, a formal discussion session was held with all radiation patients. The first patient had completed their course of treatment and there was noted by some negative attitudes towards the new technique. After resistance to the new technique was present. This resistance in an informal manner through discussions with planning and treatment community. Feedback was provided may never eventuate. Following this, the first patients were treated with the new technique and feedback was obtained. Feedback was provided – this highlighted many of the radiation therapists were in the resistance phase of the change process. Some quotes providing insight into the concerns of the radiation therapists in regards to the new axilla technique. The white stars depict the reference points (that represent the intended position) for each anatomical point of interest (POI). The individual coloured dots represent one fraction’s position for that POI. The reduction in spread of the individual POIs around the intended position in Fig. 6B is evidence of the reduction in variability for the POI.

By comparing the historical translational corrections for 25 daily pretreatment images with the new technique (24 images), there was evidence from this trial case of a reduction in translation errors and this was illustrated on the digitally reconstructed radiograph (DRR) images that were presented to the discussion group (refer to Figure 6). It was noted that this discussion session that the data was only based on a single case. The data did not provide conclusive evidence, but it did show a positive result for this one case, using the new technique and provided the evidence to support a larger study.

For this initial case, the improvements were significant and the changes in the technique were clearly an improvement on the historical positioning technique. To enable these changes to be incorporated into the ALCC standard practice successfully, a discussion group was held with all radiation therapists to gauge their opinions of the change of practice process. This was also a forum where ideas for further improvements could be discussed. The discussion session was facilitated by the research/education radiation therapist and the radiation therapists investigating this new technique. The points raised at the discussion session were recorded by the research/education radiation therapist and then distributed after the session similar to meeting minutes. Initially, radiation therapists were given the opportunity to discuss their views on the new technique. Concerns about the technique were raised and there was some negative feedback – this highlighted many of the radiation therapists were in the resistance phase of the change process. Some quotes providing insight into the concerns of the radiation therapists in regards to the new axilla set-up are provided below;

- “It's difficult to set-up, the instructions are not clear.” (RT1)
- “The vacuum bag is hard to orientate, there was no indication if it was on an angle or square with the bed. It was confusing to set-up if you hadn’t seen it before.” (RT2)
- “There are still a lot of ruler measurements and the treatment sheet is still hard to follow.” (RT3)

In the next part of the forum, the radiation therapist investigating this new technique provided justification for the change, along with the aims of the change, including improving the accuracy of the set-up making the set-up quicker and easier with less ruler measurements. The results from the first patient treated with the new technique and the historical technique were compared, as shown in Figure 6. It was calculated that the head of humerus point was within plus or minus 0.7 of a centimetre (cm) of the planned or correct position, with a 95 per cent confidence level for...
the new technique, while the historical technique was plus or minus 1.5 cm. Therefore, a significant improvement in the positioning of the head of the humerus for the first patient was demonstrated. When the results were presented to the radiation therapy group, there was a marked change in attitude towards the new technique. The group was able to visually see the difference the new technique had made to the set-up accuracy and they were more convinced that the change was necessary. There was consensus from all staff that the new technique was better and should be implemented. There was; however, room for improvement. The discussion group concluded with the radiation therapists providing further ideas to improve this technique. This indicated that people had entered the exploration phase and there were even some individuals moving into the commitment phase, where they were showing support for this new change and encouraging others. Providing the radiation therapists with a forum for their ideas and concerns increased their involvement in the change process and enabled them to embrace and take ownership of this change.

From this first discussion session, a number of issues regarding the new set-up were highlighted. The issues included:

- Radiation therapists had experienced positioning difficulties with the vacuum form support; and
- There remained a large number of prescribed ruler measurements to achieve the set-up. It was suggested, the set-up could be achieved with less information and in a simplified form.

As a result of this forum, it was decided that the vacuum form support would be positioned square on the couch over the superior section of the knee support. It was thought that positioning the vacuum support square on the couch would make labelling it clearer and positioning it on the treatment couch easier. Consistent labelling of the vacuum support with sup, inf, left and right would be used to reduce set-up confusion.

An audit on the measurements required to accurately set-up an axillary case was undertaken. According to the feedback received from the first forum, the documentation for the axillary set-up needed simplifying and new standard simulation and treatment pages needed to be developed. These changes were undertaken and a second discussion forum was held to provide information on these further changes and to gather feedback regarding the efficacy of these changes from the practitioners who would be undertaking them.

**Axilla discussion session two – commitment**

A second discussion group was conducted with the radiation therapists to summarise all the changes that had been made to the axilla set-up. These changes included the introduction of new simulation and treatment paperwork. At this forum, radiation therapists were given the opportunity to express concerns and to provide ideas and feedback. The overall feedback at this session was positive indicating that most staff had entered the commitment phase of change. Providing the vacuum therapists with a forum for their ideas and concerns increased their involvement in the change process and enabled them to embrace and take ownership of this change.

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**Further analysis of this new technique**

Once the new technique had been trialled on an individual patient, where it was found to be technically beneficial, it was implemented on the next three patients who presented for axillary treatment. The parameters of the first four patients treated with this new positioning technique were compared with the previous six treated with the historical technique to formally evaluate the previously reported improvements in set-up. Two hundred and nineteen pre-treatment images were analysed as these provided data on how accurate the set-up technique was before an online isocentre shift had been made. Four reference points were used for
measurements (scapula (Scap), chest wall (CW), humerus head (Hum) and arm) – as illustrated in Figure 6. These points were analysed in the superior-inferior (Sup-Inf) and left-right (L-R) directions on anterior-posterior (AP) fields. The data was statistically analysed using descriptive statistics (mean, standard deviation (SD), interquartile range (IQR)) and the Levene's test for equality of variances, refer to Table 2 for details. While the mean is reported as part of the descriptive statistics, it provides little insight into the range of translational error, therefore comparing of the mean values (t-tests) was not conducted. A more useful statistical test based on the standard deviation is the Levene's test. Levene's test is an inferential statistic used in assessing the equality of variances in different samples. Some statistical tests, such as t-tests assume the variances for different population samples are equal, this is known as homogeneity of variances. Levene's test examines this assumption and is a useful tool for comparing two groups of data and assessing if their variance is different. Statistical differences were considered significant when the P-value was less than 0.05 in this study.

Preliminary results of the change process
Ten patients treated with axillary radiation therapy at the ALCC were included in this study (six using the historical set-up and four using the new technique). A total of 219 pre-treatment images were analysed, 141 with the historical set-up and 78 with the new. The four reference points (scapula (Scap), chest wall (CW), humerus head (Hum) and arm) on each image were analysed in the superior-inferior (Sup-Inf) and left-right (L-R) directions on anterior-posterior (AP) fields. Figure 7 (a and b) presents the data from the pre-treatment images using box plots to indicate the variation in translational errors in set-up position with the historical and new techniques. In Figure 7 (a and b), the box represents fifty per cent of the data and the whiskers extending out from the box represent the upper and lower twenty-five per cent of data. The line through the box indicates the median. The circles and asterisks represent outlying data points. The circles are outliers that extend more than 1.5 IQR from the edge of the box. The asterisks represent extreme outliers and extend more than three IQR from the edge of the box.

Seven out of the eight reference points with the new technique showed a decrease in the mean, standard deviation and interquartile range compared with the historical, refer to Table 2. Six of the eight comparisons resulted in significant (P < 0.05) improvements in set-up accuracy using the Levene's test. The significant results were for the scapula and humerus measurement points in both the Sup-Inf and L–R directions; for the chest wall and arm in the L–R direction. The scapula point results in the Sup-Inf direction were F (1, 199) = 3.98, P < 0.05 and in the L–R direction were F (1, 199) = 20.26, P < 0.01. The humerus point results in the Sup-Inf direction were F (1, 209) = 17.21, P < 0.01 and in the L-R direction were F (1, 209) = 36.42, P < 0.01. The chest wall results in the L–R direction were F (1, 209) = 11.66, P < 0.01. The arm results in the L–R direction, F(1, 210) = 25.23, P < 0.01. Therefore, improvements in set-up accuracy were found when utilising the new set-up technique compared with the historical technique.

Discussion
Ten axillary patients (both new and historical) had their pre-treatment images assessed, resulting in 219 images being analysed for this study.

Table 2: Descriptive statistic results.

<table>
<thead>
<tr>
<th>Reference points</th>
<th>Left-right (X)</th>
<th>Superior-inferior (Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCAPULA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (cm) (SD)</td>
<td>0.03 (0.66)</td>
<td>0.17 (0.32)</td>
</tr>
<tr>
<td>IQR</td>
<td>0.8</td>
<td>0.45</td>
</tr>
<tr>
<td>F*</td>
<td></td>
<td>3.98</td>
</tr>
<tr>
<td>Sig</td>
<td>0.00**</td>
<td>0.047**</td>
</tr>
<tr>
<td>CHEST WALL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (cm) (SD)</td>
<td>0.72 (0.46)</td>
<td>0.12 (0.27)</td>
</tr>
<tr>
<td>IQR</td>
<td>0.60</td>
<td>0.40</td>
</tr>
<tr>
<td>F*</td>
<td>11.66</td>
<td>1.86</td>
</tr>
<tr>
<td>Sig</td>
<td>0.00**</td>
<td>0.17</td>
</tr>
<tr>
<td>HUMERUS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (cm) (SD)</td>
<td>-0.08 (0.64)</td>
<td>0.35 (0.26)</td>
</tr>
<tr>
<td>IQR</td>
<td>0.80</td>
<td>0.30</td>
</tr>
<tr>
<td>F*</td>
<td>36.42</td>
<td>17.21</td>
</tr>
<tr>
<td>Sig</td>
<td>0.00**</td>
<td>0.00**</td>
</tr>
<tr>
<td>ARM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (cm) (SD)</td>
<td>-0.04 (0.87)</td>
<td>0.62 (0.55)</td>
</tr>
<tr>
<td>IQR</td>
<td></td>
<td>0.60</td>
</tr>
<tr>
<td>F*</td>
<td>25.23</td>
<td>0.16</td>
</tr>
<tr>
<td>Sig</td>
<td>0.00**</td>
<td>0.69</td>
</tr>
</tbody>
</table>

IQR = Interquartile Range
*Levene’s Test for Equality of Variances **Significant result P < 0.05
The majority of comparison points showed an improvement with the new technique (mean, standard deviation and interquartile range). The statistically significant results ($P < 0.05$) for the dataset (Table 2) and the individual cases shown in Figure 6 both indicated the improvements in accuracy from the historical to the new axillary positioning technique. This improvement can be attributed to the introduction of the stabilising vacuum form with particular emphasis placed on making a good impression of the hand and wrist.

Whilst changing practice may be challenging, the axillary stabilisation changes were implemented relatively easily within the ALCC department. The process of change was considered and managed carefully; however, by no means was it perfect. The four-stage model of change$^{5,12,19}$ was used to guide the introduction of the new axillary technique. All radiation therapists were provided with information about the new technique before it was implemented, but the results indicated that they didn't take up the information or provide feedback. One reason for the radiation therapists' lack of feedback at this point was because they were not provided with adequate information to engage them in the change process. The information provided had not followed the advice of Armenakis, Harris and Feild$^{26}$ and only minimal information was given. This was an area where improvements in managing the change process were required. Therefore, the initial communication with all radiation therapists could have been improved to more readily prepare them for the change. In the future, the process described by Armenakis, Harris and Feild$^{26}$ will be followed when introducing change. At this early stage in the change process, many radiation therapists were in the denial phase. It is thought that if the Armenakis, Harris and Feild$^{26}$ process had been used that the radiation therapists may have moved through the denial phase more rapidly. It was also noted in this study that it is important not to rush the introduction of change as this may not provide individuals with the necessary time to adjust.

There was evidence of radiation therapists resisting the new axillary technique when the first patient was trialled. This resistance was still evident when the first discussion session was held with radiation therapists voicing their concerns about this new technique. It was important to provide the radiation therapists with a forum for their views and ideas to be shared and incorporated into the change process. By the end of this first discussion session, all radiation therapists present agreed that the new technique was an improvement on the historical and that it should be implemented. This indicated that the majority of radiation therapists had moved into the exploration or commitment phases of the change process.

Radiation therapists initially began to explore the idea of the new axillary technique during the first discussion group by asking for clarification about certain aspects of the new set-up and providing their ideas to further improve the technique. It was important to regularly highlight the benefits of the new technique to assist the radiation therapists in progressing through the change stages.

Some radiation therapists had progressed into the commitment phase during the first discussion session and the majority of radiation therapists had by the second discussion session. Their commitment was evident from the positive comments during the second discussion session. It was also indicated by radiation therapists encouraging each other to embrace the new axillary technique. It was important for the change leaders to provide encouragement and show appreciation for the efforts made by the radiation therapists throughout the change process to ensure commitment was maintained.

The discussion groups provided an excellent forum for eliciting ideas for further improvement to the technique. Throughout this study there was evidence of the radiation therapists progressing through each phase of the change model, this has been described in the results. The new technique was relatively simple to implement, with statistical significant improvements indicated in the set-up stability and accuracy. As well as providing evidence to support the change and to convince practitioners to accept and comply with the practice change. Additionally, the technique has simplified the set-up with less ruler measurements, increasing the ease of the set-up for radiation therapists and reducing treatment time for the patient, all of which have had positive effects on set-up accuracy. The four stage model$^{5,12,19}$ of change assisted in the smooth implementation of this new treatment technique.

**Conclusion**

The ALCC have a policy of continually researching, refining and developing new techniques while optimising those already in use. At the ALCC, the radiation therapists are constantly looking for new ways to improve patient stability and accuracy in treatment. Radiation therapists are an integral part of the change process within the department, without their support and the ability to contribute, changes to practice would not occur. The implementation of the vacuum form support over an indexed knee support, along with indexing the neck rest has resulted in promising preliminary results in terms of improved accuracy of field placement for axillary cases. The preliminary results have indicated a reduction in translational corrections in field placement. One of the most important features in improving the accuracy of the new technique was attaining a good impression of the patients hand and wrist in the vacuum form. By carefully considering the change process, the contribution of radiation therapists in the change process and the support from management, radiation therapists' feedback has translated into positive outcomes for patient positioning, set-up accuracy and staff morale.

An understanding of organisational change processes and theory is important for management in a radiation therapy department, as change is a constant. Management at the ALCC encourage the radiation therapists to be innovative and develop new and improved techniques for treating patients. This encouragement and involvement of all staff in change coupled with a sound understanding of change management principles enables the radiation therapy department to develop successfully and cope with rapid change.

**Ethics approval**

The Barwon Health Human Research Ethics Committee Human Research Ethics Committee approved the analysis and publication of the data from this quality improvement project. This notification was acknowledged on 3rd December 2010. As this evaluation was considered a quality improvement project, no further ethics approval was required.

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**Conflict of interest**

There were no conflicts of interest.

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