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Rural Collaborative Guideline Implementation

Evaluation of a hub and spoke multidisciplinary team model of care for orthogeriatric inpatients: a before and after study of adherence to clinical practice guidelines

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Final Report for the Health Education and Training Institute Rural Research Capacity Building Program (2011-2013) Rural and Remote Directorate

Acknowledgements

This research project was made possible by the Western New South Wales Local Health District (WNSWLHD) and the New South Wales (NSW) Health Education and Training Institute- Rural and Remote Directorate (HETI), Rural Research Capacity Building Program (RRCBP). HETI financial assistance provided the author with access to clinical backfill and the opportunity to access academic education and support.

The WNSWLHD managers and executive supported this research project by providing the author with the opportunity to enter the program and access backfill and academic support and other resources. More specifically I would like to acknowledge:

The Sub-Acute Care Team (SCT) (2011-2013) for their dedication to providing older frail members of our community with their health care needs, believing in the importance of this research project and supporting the completion of the project.

Orange Health Service Orthopaedic Team who enabled collaborative care for orthogeriatric inpatients to become a reality and supported the vision of patients receiving better health care in the district.

WNSWLHD Rural Health Facility Teams for their willingness to embrace collaborative care with the SCT and their commitment to improving the delivery of health care.

David Schmidt for his mentoring, encouragement and timely advice throughout all stages of the project.

Cathie Sherrington for her mentoring, support and helpful advice.

Emma Webster for her support whenever needed.

Ministry of Health Biostatistics Trainees Tina Navin, Taylor Harchack, Keira Robertson and Danushka Fox for their dedication and patience in helping the author make the data true and meaningful.

RRCBP Participants for their inspiration to keep working at making public health care delivery better for those we serve.

The WNSWLHD Health Service Information Team who enabled the author to have timely access to the information needed to complete this project.

The Orange Health Service library staff that so efficiently helped the author to access literature.

Abbreviations

ACI	Agency for Clinical Innovation
AUID	Area Unique Identifier
CNC	Clinical Nurse Consultant
HETI	Health Education and Training Institute- Rural and Remote Directorate
IDC	Indwelling Catheter
KPCH	Key Principles for Clinical Handover
NSW	New South Wales
OC	Outreach Coordinator
OMC	Orthogeriatric Model of Care
OT	Occupational Therapist
PSPS	Pressure Sore Prediction Score
PVR	Post Void Residual
RRCBP	Rural Research Capacity Building Program
SCT	Sub-Acute Care Team
WNSWLHD	Western New South Wales Local Health District

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Abstract

Background: An innovative hub and spoke multidisciplinary team using interprofessional collaborative practice was implemented in June 2010 in a rural setting by establishing the Sub-Acute Care Team (SCT). **Aim:** To evaluate whether adherence to orthogeriatric inpatient clinical practice guidelines increased after SCT implementation. **Methods:** This before and after study describes a medical record audit of inpatients aged 65 years and older who sustained a lower limb fracture from a fall, were admitted to a regional facility and subsequent rural facility. The audit included 42 inpatients admitted before the SCT (April 2009-April 2010) and 35 inpatients admitted after the SCT (April 2011-April 2012). The SCT used orthogeriatric clinical practice guidelines to inform inpatient care. Adherence to the guidelines was measured by answering ten questions representative of the guidelines. Chi-square or Fisher's exact tests were used for each question to identify if the proportion of inpatients receiving guideline based care changed significantly after SCT implementation. **Results:** After SCT implementation an increase in the adherence to guidelines was statistically significant ($p < .05$) for; handover, nutrition support, falls prevention, bladder management and more than 5 guideline based care questions. Additionally, more than 60% of the inpatients received care related to weight bearing status, patient/carers discussion, bladder management, osteoporosis management, handover and nutrition support. **Conclusions:** Adherence to orthogeriatric inpatient clinical practice guidelines increased after the implementation of the SCT. The mechanisms likely to have contributed include the multidisciplinary hub and spoke model, interprofessional collaborative care and the comprehensive multidisciplinary handover. **Implications for Practice:** This model is likely to be effective in improving care for other frail inpatient populations.

Key words: collaborative, interprofessional, clinical practice guidelines, implementation, orthogeriatric, multidisciplinary

Executive Summary

Why and how this study was conducted

The increasing demand on rural facilities to provide care for older frail inpatients with a decreasing skilled rural workforce is requiring rural health care services to consider new models of care. There is limited evidence on effective rural models of care for such inpatients.

An innovative hub and spoke multidisciplinary team model of care was implemented in the Western New South Wales Local Health District (WNSWLHD) by establishing the Sub-Acute Care Team (SCT). This team had a particular focus on orthogeriatric inpatients. The SCT were made aware of orthogeriatric clinical practice guidelines at a New South Wales Health forum attended in August 2010. These guidelines as well as handover guidelines were used by the SCT to inform orthogeriatric inpatient care through interprofessional and collaborative practice.

A medical record audit was conducted to answer the research question "Can adherence to clinical practice guidelines in the management of orthogeriatric inpatients in a rural setting be enhanced by the implementation of a Sub-Acute Care Team (SCT)?"

The inpatient medical records were audited for all inpatients who were at least 65 years of age, experienced a fall, sustained a lower limb fracture, received orthopaedic surgical specialist consultation, were admitted to the acute ward of a WNSWLHD regional facility, the hub, and were transitioned to one of six possible neighbouring rural facilities, the spokes, for the sub-acute phase of their inpatient care.

There were 42 inpatients admitted between April 2009-April 2010 and 35 inpatients admitted April 2011-April 2012, before and after the SCT was established.

The results of this study

Before the SCT the areas in which guideline based care were most commonly being provided included weight bearing status (81%), patient/carers discussion (95%) and bladder management (79%). Before the SCT the areas in which guideline based care were not commonly provided included falls prevention (26%), pressure injury prevention (5%), analgesia (41%), osteoporosis management (43%), handover (0%), nutrition support (36%) and bowel management (12%).

After the SCT these percentages increased for weight bearing status (94%), patient/carers discussion (97%), bladder management (97%), falls prevention (57%), pressure injury prevention (14%), osteoporosis management (63%), handover (83%) and nutrition support (66%) with more than 60% of the inpatients receiving care according to the clinical practice guidelines for weight bearing status, patient/carers discussion, osteoporosis management, bladder management, handover and nutrition support.

The increase in the proportion of 'yes' after SCT introduction was statistically significant for the areas of handover (Fisher's exact test, $p < .001$), nutrition support ($\chi^2 = 6.87$, $df = 1$, $p = .01$), falls prevention ($\chi^2 = 7.61$, $df = 1$, $p = .01$) and bladder management (Fisher's exact test, $p = .02$) as well as for more than 5 guideline based care questions ($\chi^2 = 26.11$, $df = 1$, $p < .001$).

This study found that the introduction of the SCT was associated with an increase in adherence to clinical practice guidelines in the management of orthogeriatric inpatients in a rural setting. Given that the SCT was working to encourage the adoption of guidelines through interprofessional collaborative care within nine facilities, which was likely to affect the intensity of intervention within each facility and this occurred within only six to 18 months of the SCT being established, these results are very promising.

This study indicates that the SCT model of care was effective in changing inpatient care in a rural setting. The aspects of guideline based care that were not enhanced following SCT introduction provide the rural facility teams and the SCT with evidence of process gaps that potentially compromise inpatient care. This evidence can now provide the opportunity for the SCT and rural facilities to address these gaps.

The implications and recommendations of this study

The key mechanisms that are likely to have contributed to this successful outcome include the: hub site holistic coordinated specialist multidisciplinary inpatient assessment and discharge planning; the provision of a comprehensive multidisciplinary handover to the rural facility staff; and the spoke site follow up of the inpatient by the SCT to effect the inpatients' plans and goals.

With the expected increase in rural facilities providing inpatient care for more frail aged inpatient populations and the expected decrease in available specialised rural health care staff it is likely that these mechanisms would also be effective for other rural inpatient populations like frail medical inpatients or rehabilitation inpatients. Additionally, this hub and spoke multidisciplinary model of care could be instrumental in enabling sustainable and effective multidisciplinary inpatient care for such frail aged inpatients being cared for in a rural setting.

From this study it is recommended that regional facility teams transitioning frail older inpatients to rural facilities prioritise providing:

1. the inpatient with a specialist multidisciplinary holistic assessment and treatment while in the hub
2. the rural facility teams with a comprehensive multidisciplinary handover including patient centred goals and plans
3. follow up clinical support for rural facility teams caring for the more complex inpatients in the spoke sites.

Introduction

This report informs health care providers about the findings of a study to answer the research question: “Can adherence to clinical practice guidelines in the management of orthogeriatric inpatients in a rural setting be enhanced by the implementation of a Sub-Acute Care Team (SCT)?” This report also examines the role of the SCT, the guidelines implemented and the methods used to implement these guidelines.

The increasing demand on rural facilities to provide care for older more frail inpatients with a decreasing skilled rural workforce is requiring rural health care services to consider new models of care. There is limited evidence on effective rural models of care for such inpatients.

Background

Australians are getting older which in turn places pressure on health services to provide effective and sustainable health care¹. An estimated one third of people over 65 years of age living in the community fall each year². Falls account for more than half the injury related hospitalisations for older people³ with hip and thigh injuries being the most likely⁴.

The older person living in rural Australia tends to have higher levels of disease risk factors and illness than those in major cities⁵. Therefore, the older person living in rural settings who falls and sustains an injury requiring hospitalisation is more likely than their metropolitan counterparts to require specialist medical care. With a decreasing skilled rural workforce⁶ this places an added pressure upon rural health facilities to provide the older inpatient with their health care needs. In a rural setting for patients to receive adequate care they often travel long distances from their home base to a regional facility for specialist care services before returning to a rural facility for their sub-acute needs. If specialist rehabilitation care is required they may be transported back to the regional facility resulting in further travel. The care of this inpatient across long distances and within a number of facilities by a number of different teams is likely to jeopardise their continuity of care.

There is no definitive evidence available of the most effective rural health care service delivery model for orthogeriatric inpatients. In metropolitan health services there is some evidence that collaborative orthogeriatric care reduces inpatient complications and mortality^{7,8,9}. The mechanisms enabling this improvement remain unclear. However, some components that appear to be effective for older inpatients admitted for acute care include a multidisciplinary aged care team, targeted assessment to prevent complications, and discharge planning with communication between care providers across the care continuum¹⁰.

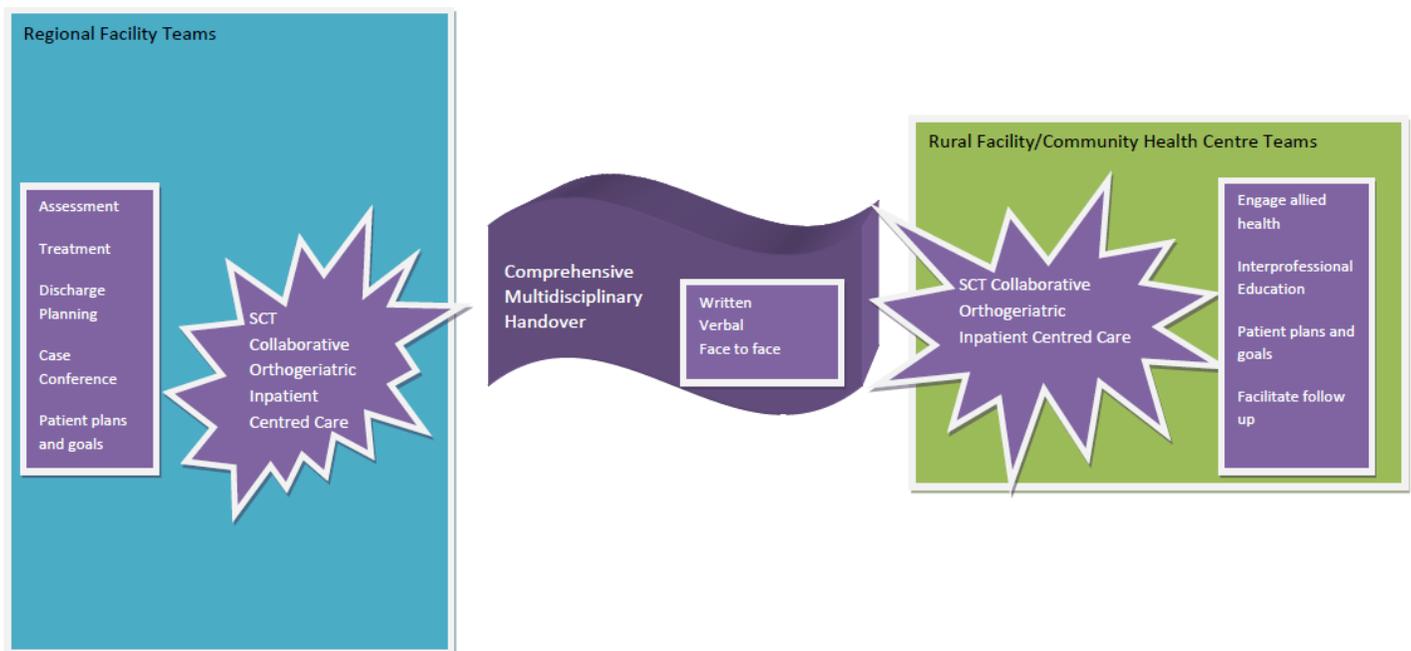
For WNSWLHD¹¹ rural health facilities, the capacity to provide multidisciplinary care varies with the most likely health professionals available to provide inpatient care including nursing and medical staff. Without multidisciplinary targeted assessment to prevent complications and discharge planning including communication across the care continuum sustainable and effective inpatient care is likely to be compromised. With this reduced rural health workforce and the increasing demand to provide health care for the older inpatient there is an urgent need for rural health settings to establish models of care that are relevant to the rural context¹². A framework proposed by the World Health Organisation to address this problem recommends health services implement strategies to promote interprofessional collaboration within the context of their health care setting. Interprofessional collaboration occurs when two or more health workers with complementary skills interact to create a shared understanding to positively address current health challenges, strengthen the health system and improve health outcomes¹³.

With federal funding¹⁴ the WNSWLHD established a senior hub and spoke multidisciplinary team called the Sub-Acute Care Team to work interprofessionally and collaboratively with rural facility teams in the management of orthogeriatric inpatients. The aim of this study was to evaluate whether the introduction of this team was associated with a greater adherence to clinical practice guidelines in the care of orthogeriatric inpatients.

The Sub-Acute Care Team

The SCT was established in September 2010 and included a Rehabilitation Physician, Clinical Nurse Consultant (CNC), Outreach Coordinator (OC), Occupational Therapist (OT), Physiotherapist, Social Worker, Dietitian and Speech Pathologist. This senior clinical team operated within a hub and spoke model of care to implement orthogeriatric inpatient management across both the hub site, the regional facility, and the spoke sites, the rural facilities. This approach enabled the SCT to provide multidisciplinary in-reach for the inpatients at the regional facility and multidisciplinary outreach for the same inpatients at the rural facilities. Collaborative care with the facility teams provided continuity of care through the SCT being involved in the inpatient's care in all the relevant facilities. The SCT domain of practice included one hub site, a regional facility with approximately 250 beds and eight spoke sites, the neighbouring rural facilities with between 20 and 50 beds within WNSWLHD (Figure 1).

Figure 1
Sub-Acute Care Team domain of practice between one regional and eight rural facilities



Implementation strategies

Guideline based orthogeriatric care

The guidelines used by the SCT to provide coordinated multidisciplinary care for the orthogeriatric inpatients included the New South Wales Agency of Clinical Innovation's Orthogeriatric Model of Care (OMC)^{15,16} and the New South Wales Health Implementation Toolkit Standard, Key Principles for Clinical Handover (KPCH)¹⁷. The KPCH indicates that in the context of an inpatient being transitioned to another inpatient facility a written multidisciplinary handover, a verbal telephone handover and if possible face to face handover must be completed. The OMC covers many aspects of an inpatients care including preoperative, perioperative and postoperative management. The postoperative aspects of the OMC were the most relevant aspects of care to be addressed in the rural facilities. The OMC provided the SCT with some recommended aspects of inpatient care that could improve the post-operative care of the inpatients within the rural facilities (Table 1). The SCT were made aware of the OMC guidelines through a NSW Health forum launching their publication in August 2010. The KPCH was a publication accessed by the SCT to guide the processes necessary for effective handover of inpatients between facilities. The OMC and KPCH informed the SCT of recommended clinical

Table 1: Recommended aspects of “The Orthogeriatric Model of Care”^{15,16} that informed the Sub-Acute Care Team in the postoperative management of rural facility orthogeriatric inpatients.

Pain relief	A combination of at least two regular analgesic medications with differing analgesic mechanisms preferably not non steroidal anti-inflammatory medications
Weight bearing	Weight bearing status adhered to as per orthopaedic surgeon. Clear documentation of weight bearing status and how patient is to transfer or mobilise to comply with this weight bearing status
Constipation	Monitor and provide early intervention to prevent constipation by using laxatives with/without bowel softeners as required
Urinary catheterisation	The indwelling catheter should be removed as early as possible, preferably 24hours after surgery, ensuring there is no faecal impaction, and ideally after patients have begun to mobilise. Intermittent catheterisation is recommended over indwelling catheterisation
Pressure area care	Alternating air mattress considered as a first line preventive strategy for elderly patients admitted with fractures
Nutrition	High energy protein diets to commence after surgery and dietitian consult to review patients nutritional needs
Falls prevention	Consideration of falls prevention strategies throughout the patient’s episode of care and including follow up
Osteoporosis management	Assessment and commencement of osteoporosis treatment
Assessment	Assessment to include pre-morbid function and mobility needs, social support, relevant clinical conditions, cognitive and mental state, goals and needs of patient
Multidisciplinary rehabilitation	Ideally includes nursing and medical staff, physiotherapist, occupational therapist, social worker, speech pathologist, and dietitian. Case conference to include discharge plan and patients plans and goals and staff actions
Discharge planning	Documented early discharge planning, preferably within 48 hours postoperatively, including which rural facility if required.
Comprehensive multidisciplinary handover [^]	Written and verbal and if possible face to face handover to include medical, nursing, physiotherapy, occupational therapy, dietetics and if required speech pathology and social work
Involvement of Patient/Carers	Patient and Carers be informed of progress throughout hospital stay to ensure they are prepared to assist in meeting the patient’s needs

[^] implied from Orthogeriatric Model of Care and further informed by the New South Wales Health Implementation Toolkit Standard, Key Principles for Clinical Handover¹⁷

practice and each team member considered how within the framework of collaborative interprofessional practice they could implement the guidelines most relevant to their discipline. Any processes put in place for care to occur were supported by each team member, for example the physiotherapist assessed the inpatient to determine the safest way to mobilise to maintain the orthopaedic surgeon's recommended weight bearing status. This intervention was written in the progress notes, handover and was also communicated verbally with physiotherapy and nursing staff involved in their care. Further assessment of the inpatient's ability to transfer occurred at the rural facility and was documented to maintain weight bearing status adherence. In the event of this not occurring other SCT members would facilitate the involvement of the SCT physiotherapist or other available physiotherapy staff within the facility to assess and communicate how best to maintain the inpatient's weight bearing status.

Hub site collaborative care

Once the SCT was established collaborative orthogeriatric care with the Orthopaedic Team on the surgical ward of the regional hospital commenced. This meant that all inpatients over the age of 65 years who were admitted with a fracture would have an automatic referral and consultation by the SCT. The SCT provided multidisciplinary patient centred early assessment, treatment and discharge planning. The SCT case conferences occurred twice weekly for up to an hour and included discussion regarding the inpatients' plans and goals and allocation of which team member would be involved in facilitating the realisation of the patient's goals. The collective ownership of such goals was a SCT value and included the participation of the team members and the inpatient in the process of goal attainment¹⁸.

Comprehensive multidisciplinary handover

The SCT set the expectation that clinical handover to rural facilities was valued and was an essential part of their daily work. This included a written multidisciplinary handover and interprofessional verbal telephone handover with the available rural facility staff. If the SCT members visited the rural facility on the same day as the patient was being transitioned to that facility a face to face handover would also occur.

Spoke site collaborative care

The SCT worked collaboratively with the existing rural facility and community health centre teams in each of the rural facilities. Collaborative practice included SCT inpatient review with available rural clinicians to consider any changes to the inpatient's care needs and provide education for staff as required. Interprofessional education was also provided as required and was directly related to a specific inpatient's care. The SCT visits at the rural facilities included inpatient assessment, treatment and documentation of patient centred care plans and goals in the medical record targeting the prevention of complications. These plans and goals were consistent with the guidelines being implemented. For example, "Before discharge home the facility physiotherapist will need to contact Transitional Aged Care Physiotherapist (contact number included) to handover the need to provide high level balance training at home to prevent further falls". Any SCT member could follow up the rural facility inpatient with a holistic view of the patient's care needs. In the event of an inpatient requiring a specific discipline review, the appropriate referral was arranged with the SCT member or clinician within the facility.

When the SCT were off site there was the expectation that the existing teams would provide the inpatient care. Specific strategies to maintain collaborative practice included telephone contact with inpatients and staff and e-mail communication with staff. The SCT case conference mentioned earlier included discussion regarding rural facility inpatients that required follow up. To further inform the SCT case conference a 15 minute teleconference occurred once a week with two of the rural facilities and the SCT OC to discuss any inpatient care issues to be followed up by either the rural facility team or the SCT. Rural facility staff were also encouraged to seek advice from the SCT when required.

Methods

This study used a before and after design. Ethics approval including a Site Specific Application was sought and granted by the WNSWLHD Ethics Committee¹⁹. A literature review was performed to inform the principal researcher on related topics (Appendix 2). The principal researcher was permitted to access the medical records of the inpatients during two separate 12 month periods before (April 2009-2010) and 6 months after (April 2011-2012) the SCT was established in September 2010. The inpatient medical records were audited for all inpatients who were at least 65 years of age, experienced a fall, sustained a lower limb fracture, received orthopaedic surgical specialist consultation, were admitted to the acute ward of a WNSWLHD regional facility and were transitioned to one of six possible neighbouring rural facilities for the sub-acute phase of their inpatient care.

Guideline based care audited

To measure the implementation of the OMC and KPH both patient and process outcomes were considered and key aspects of care were chosen to reflect the SCT aims²⁰. The aspects of care that were selected from the OMC and KPH and audited included;

- pressure injury prevention
- nutrition supplementation
- bladder management related to the removal of an indwelling catheter
- monitoring of bowel status
- adequate pain relief
- osteoporosis management
- maintenance of the orthopaedic specialist recommended weight bearing status
- comprehensive multidisciplinary handover,
- falls prevention follow up
- discussion with the inpatient or family or carers in regard to any aspect of the patients' care.

Ten definitive audit questions were developed by the principal investigator. Each question could only be answered with 'yes' or 'no'. For inpatients with multiple facility transitions within the one episode of care the records were combined and the question was only considered to have been answered 'yes' if this occurred in each record in each facility. All of the questions were consistent with the postoperative recommendations within the chosen guidelines. A project team reviewed the questions and provided advice on the likely validity and reliability of the questions. The final questions are shown in Table 2. The project team included the SCT members, Clinical Nurse Educator of a regional facility, CNC in Pain Management, CNC in Delirium, Nurse Unit Manager of a rural facility and a Senior Researcher from the George Institute.

For the purpose of this study if the care questions being audited were not documented it was deemed to have not occurred. This decision was based on the understanding that documented patient care provides evidence of the care provided by clinical staff within a facility. According to NSW Health policy regarding documentation it is the responsibility of the clinician to "provide accurate statements of clinical interactions between the patient and their significant others and the health service relating to assessment, diagnosis; care planning management / care / treatment/ services provided and response / outcomes; professional advice sought and provided; observation/s taken and results."²¹ Documentation can therefore indicate care provided and care not provided.

Medical record audit

The Local Health District Information Services accessed the State Health Information Exchange Patient Administration System (Inpatient Management System) and provided the principal researcher with the Area Unique Patient Identifier (AUID) of the medical records of the inpatients. Each medical record was accessed within the facilities and audited once inclusion and exclusion criteria were confirmed. The extracted information was de-identified, recorded on an audit form and entered onto an excel spreadsheet to analyse the results. Six of the eight rural facilities the SCT visited that were within 1.5 hours drive from the regional hospital were included to enable the timely auditing of files.

Table 2: Medical record audit questions for rural facilities

Orthogeriatric guideline based care questions	Associated documented information to determine definitive yes/no
1. Was the patient resting in bed on an alternating air mattress within 6 hours from admission?	Date and time of patient resting on air mattress compared with admission date and time
2. Did the patient receive nutrition support?	Evidence of the patient receiving any one of the following: A. high energy high protein or high protein diet B. nourishing mid meals or 6 small meals diet C. resource 2 or resource fibre in medication chart D. enteral or TPN feeding
3. Was the indwelling catheter (IDC) managed prior to admission and followed up appropriately?	Evidence of : A. IDC removed or B. reason for IDC in situ and C. time frame for IDC management adhered to
4. Did the patient receive at least 2 types of regular analgesia with differing analgesic mechanisms?	Evidence on the medication chart of regular analgesia. For example: Paracetamol 1 gram 3-4times a day Oxycodone 3.5mg 3times a day Panadeine= 2 types analgesic mechanisms Non steroidal anti-inflammatory medications not included
5. Did the patient have a completed bowel chart?	Bowel chart recorded as completed (first and last day, gate leave or medical appointment outside of hospital during admission were not included) A bowel chart was considered as a dedicated bowel chart or bowel section on the observation chart
6. Was a comprehensive multidisciplinary written handover received from the regional hospital?	Evidence of a multidisciplinary handover and a discharge summary completed by a medical officer
7. Was the patient treated for osteoporosis?	Evidence on the medication chart of at least one of the following: A. calcium B. vitamin D C. biphosphonate, D. prolia injection E. aclasta injection
8. Was the patients' prescribed weight bearing status (as per orthopaedic surgeon) documented and adhered to within the facility?	Date of orthopaedic intervention e.g. operation report or orthopaedic consultation Weight bearing status recorded on the handover from the regional facility Evidence of adherence to the weight bearing status recorded in the rural facility progress notes before and after any further orthopaedic consultation. In the event of the patient being unable to adhere to the prescribed weight bearing status an appropriate option for transfers was recommended and adhered to e.g. touch weight bearing changed to non-weight bearing
9. Was the patient referred for follow up to prevent further falls?	Evidence of the patient being : A. transferred to an inpatient rehabilitation unit B. receiving a transitional aged care package including physiotherapy. C. transitioned to home or a residential aged care facility with a management plan to reduce their risk of ongoing falls and falls injury. This could include a recommended lifting device or supervision or hip protectors or an exercise program (e.g.Tai Chi)
10. Was there documented evidence of discussion regarding any aspect of the patient's care with the patient and/or carers?	Evidence of discussion regarding the patients care with the : A. patient B. carers C. family D. guardianship board

Regional facility documentation

Inpatients admitted to the regional facility had a hybrid medical record. Scanning of all inpatient paper files commenced in November 2009. This was exclusive of documentation recorded in other electronic systems such as Electronic Medical Records and Intelliview Clinical Information Portal for critical care documentation. The principal researcher had on-line access to most of the inpatient's records. For the patients who were admitted to the regional facility prior to these times the paper medical records were accessed and viewed.

Rural facility documentation

All the medical records within the rural facilities were in paper form and stored within the facility. The principal researcher accessed and viewed these medical records within the facility. Discharge documentation sent to the rural facility was likely to include a medical discharge summary, nursing handover, patient transport information and handover from allied health disciplines. The progress notes were expected to include an initial medical and nursing assessment with varying detail and ongoing daily entries by clinical staff. Other expected forms and charts included the nursing care plans, observation charts (temperature, pulse, respiratory rate, blood pressure and bowel movement) and medication charts.

Inpatient characteristics audited

The inpatient information audited included each patient's AUID, date of birth, a lower limb fracture from a fall. The admission date to the regional facility and admission date, discharge date and time at the rural facility was also included to indicate the inpatient's length of stay and likely arrival and discharge time at the rural facility. The inpatient's co-morbidities were recorded from the regional facility emergency department medical officer's documentation or the surgical ward medical officer's discharge summary. Eight defined co-morbidities were recorded and included:

- mental health issues including depression, bipolar affective disorder or drug and alcohol abuse
- dementia
- cardiovascular disease including ischaemic heart disease, hypertension, atrial fibrillation or cardiac failure
- respiratory disease including asthma and chronic lung disease
- neurological disease including Parkinson's disease, stroke, spinal cord injury or disease
- sensory impairment including visual and hearing impairment
- diabetes
- renal failure including renal insufficiency

Statistical analysis

For each guideline based care question chi-square analysis was used to test whether the proportion of inpatients receiving treatment differed before and after implementation of the SCT. In the case where the assumptions of the chi square analysis were not met (i.e. where expected values were less than 5) the Fisher's exact test was used. For continuous variables the one sample Kolmogorov-Smirnov test was used to check for normality. Where the data were normally distributed the independent samples t-test was used to determine any differences in the distributions of continuous variables between the audited periods. Where the data were not normally distributed the non-parametric Mann-Whitney test was used.

An odds ratio (with 95% confidence intervals, CI) for each individual guideline based care question was calculated using the standard formula for 2x2 contingency tables. In addition, for each patient an indicator of whether they had received more than 5 of the guideline based care items was calculated and analysed similarly. A p-value of <0.05 was considered statistically significant for all statistical tests. Data were analysed using Microsoft Excel and SAS v 9.3.

Results

Inpatient medical records

The District Health Information Services identified 100 inpatients that may have met the inclusion criteria. On closer inspection of the records, 20 did not meet the inclusion criteria. In both study periods a total of three inpatients were transferred from one rural facility to another rural facility for the same episode of care and were combined and considered as one file. A total of seventy-seven medical records were therefore audited with 42 before and 35 after the SCT (Figure 2).

Inpatient characteristics

Comparison of the characteristics of the 42 inpatients before the SCT and 35 inpatients after the SCT did not indicate a statistically significant difference between the inpatients admitted during the two periods (Table 3).

Length of stay and admission and discharge time did not meet normality assumptions for the t-test so non-parametric methods were used to analyse the differences and as a result inferences are on the median value.

The three inpatients who were admitted to long stay beds within the rural facility were not included in the median length of stay in the rural facility or discharge time data analysis for each period as they were not discharged from the facility. Even though they were admitted to long stay beds they were followed up by the SCT. The ten guideline based care questions were audited from their medical records for the comparable median length of stay for the relevant period.

Figure 2: Inpatient medical record selection process for audit

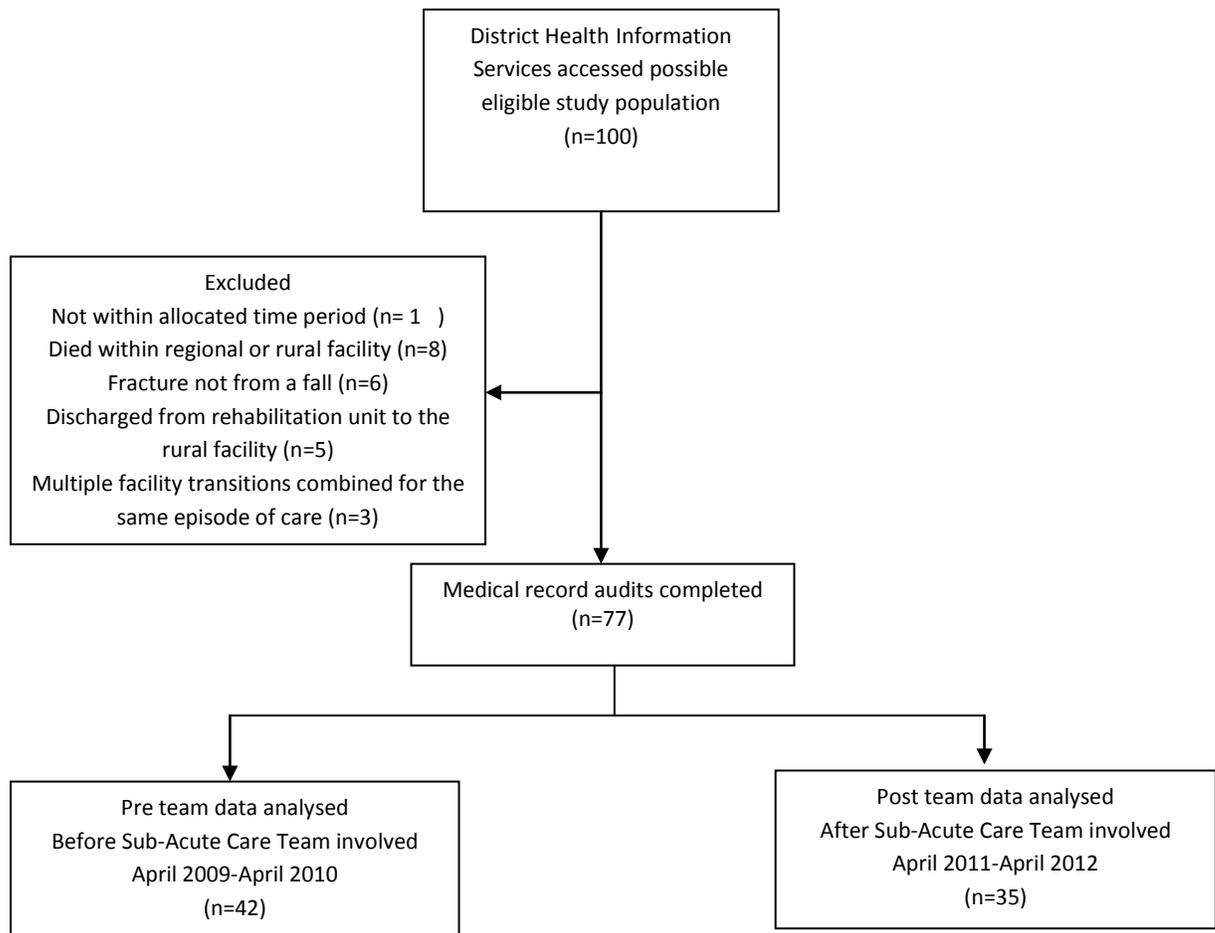


Table 3: Characteristics of inpatients admitted before and after the introduction of the Sub-Acute Care Team (SCT)

Characteristics	Before SCT (n=42) n (%)	After SCT (n=35) n (%)	P value
Age (years)^a	81 ± 8.1	83± 8.2	0.3
Sex			
Male	6 (14)	8 (23)	0.3*
Female	36 (86)	27 (77)	
Length of stay within regional hospital (days)^b	7 (4,11)	8 (4,11)	0.6
Length of stay within rural facility (days)^{b,c}	29 (15,49)	39 (21,52)	0.4
Admission time to rural facility^b	3:52PM (2:29PM,6:00PM)	3:45PM(2:00PM,7:02PM)	0.7
Discharge time from rural facility^b	12PM (11:00AM,2:20PM)	1:10PM (10:30AM,2:20PM)	0.8
Comorbidities:			
Mental health	8 (19)	5 (14)	0.8 [^]
Dementia	7 (17)	4 (11)	0.7 [^]
Cardiovascular	34 (81)	24 (69)	0.2 *
Respiratory	8 (19)	5 (14)	0.8 [^]
Neurological	9 (21)	5 (14)	0.6 [^]
Sensory	6 (14)	8 (23)	0.3*
Diabetes	6 (14)	4 (11)	0.7 [^]
Renal failure	4 (10)	3 (9)	1.0 [^]

[^]Fisher's exact test

*Chi square test

^a Mean ± standard deviation, P-value derived from an independent samples t-test

^b Median (lower quartile, upper Quartile), P-value derived from Mann-Whitney test

^c pre n =41; post n = 33

Guideline based care questions

The number of 'yes' responses for the guideline based care questions answered before and after SCT periods are shown in Table 4. Before the SCT the areas in which guideline based care were most commonly being provided included weight bearing status (81%), patient/carers discussion (95%) and bladder management (79%). Before the SCT the areas in which guideline based care were not commonly provided included falls prevention (26%), pressure injury prevention (5%), analgesia (41%), osteoporosis management (43%), handover (0%), nutrition support (36%) and bowel management (12%).

After the SCT these percentages increased for weight bearing status (94%), patient/carers discussion (97%), bladder management (97%), falls prevention (57%), pressure injury prevention (14%), osteoporosis management (63%), handover (83%) and nutrition support (66%), with more than 60% of the inpatients receiving care according to the clinical practice guidelines for weight bearing status, patient/carers discussion, osteoporosis management, bladder management, handover and nutrition support.

The increase in the proportion of 'yes' after SCT introduction was statistically significant for the areas of handover (Fisher's exact test, $p < .001$), nutrition support ($\chi^2 = 6.87$, $df = 1$, $p = .01$), falls prevention ($\chi^2 = 7.61$, $df = 1$, $p = .01$) and bladder management (Fisher's exact test, $p = .02$) as well as for more than 5 guideline based care questions ($\chi^2 = 26.11$, $df = 1$, $p < .001$). There was a trend of an increase in the proportion of 'yes' answers in the SCT period for a further three of the questions i.e. weight bearing status (Fisher's exact test, $p = .1$), pressure injury prevention (Fisher's exact test, $p = .23$) and osteoporosis management ($\chi^2 = 3.06$, $df = 1$, $p = 0.08$), (Table 4). There was no indication of an increase and relatively low adherence to guidelines at baseline for the areas of analgesia ($\chi^2 = 0$, $df = 1$, $p = .97$) and bowel management (Fisher's exact test, $p = 1.0$). There was no indication of an increase in patient/carer discussion (Fisher's exact test, $p = 1.0$) but there was a relatively high adherence at baseline (95%) for this item.

Figure 3 shows the odds ratios (OR) and 95% confidence intervals (CI) of an increase in the post SCT intervention period compared to the pre-intervention period. The largest impacts were in the area of bladder management (OR 9.27, 95% CI 1.11 to 77.31) and the proportion of people receiving guideline based care in more than 5 areas (OR 10.15, 95% CI 4.98 to 52.30).

Table 4
Number of 'yes' responses for guideline based care questions for inpatients in rural facilities admitted before and after the Sub-Acute Care Team (SCT) introduction

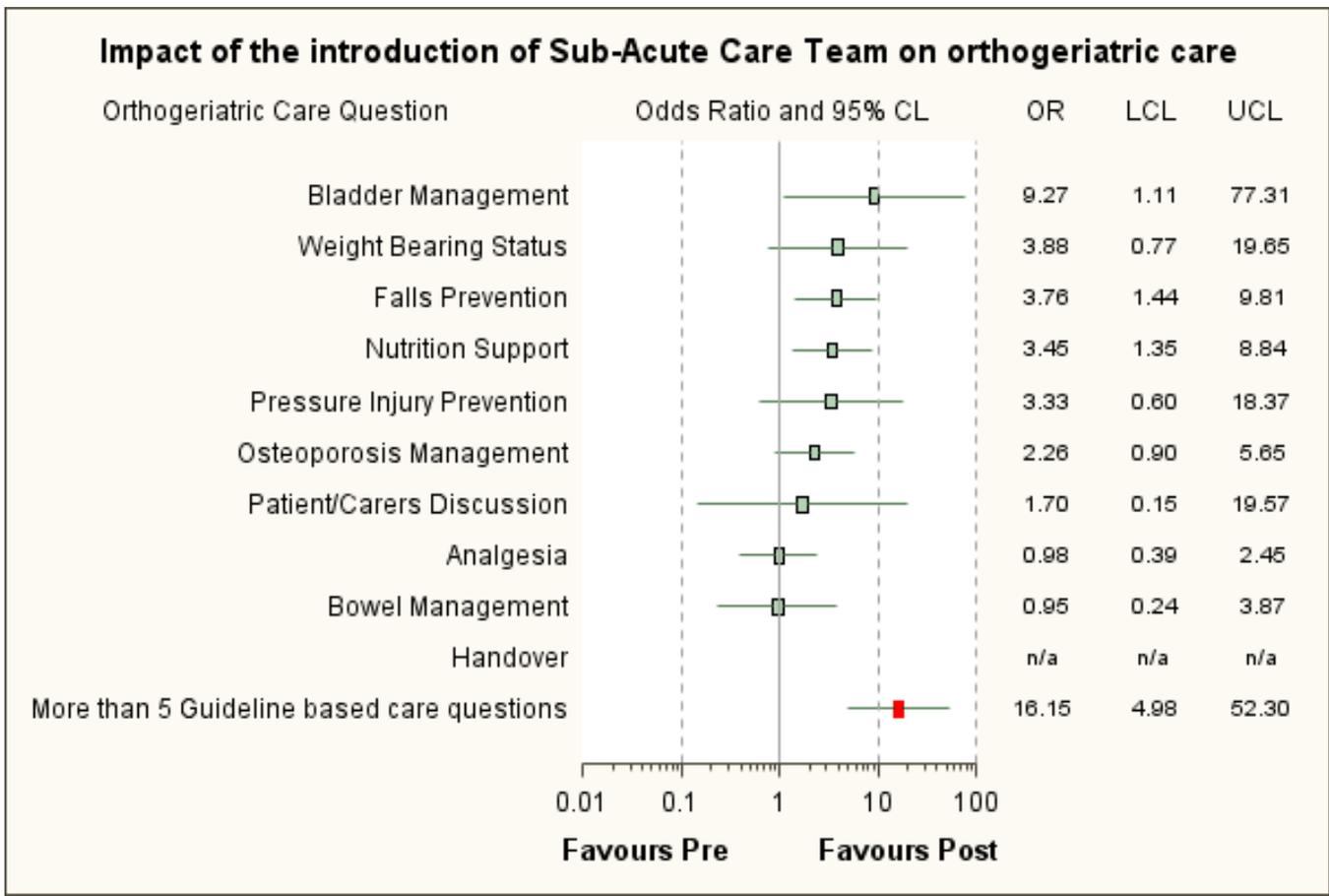
Guideline based care questions	Before SCT (n=42) n (%)	After SCT (n=37) n (%)	P-value	Odds Ratio (95% CI)
Bladder management	33 (79)	34 (97)	0.02*[^]	9.3 (1.1, 77.3)
Weight bearing status	34 (81)	33 (94)	0.1 [^]	3.9 (0.8, 19.7)
Falls prevention	11 (26)	20 (57)	0.01*	3.8 (1.4, 9.8)
Nutrition support	15 (36)	23 (66)	0.01*	3.5 (1.3, 8.8)
Pressure injury prevention	2 (5)	5 (14)	0.23 [^]	3.3 (0.6, 18.4)
Osteoporosis management	18 (43)	22 (63)	0.08*	2.3 (0.9, 5.7)
Patient/carers discussion	40 (95)	34 (97)	1 [^]	1.7 (0.1, 19.6)
Analgesia	17 (41)	14 (40)	0.1*	1.0 (0.4, 2.4)
Bowel management	5 (12)	4 (11)	1 [^]	1.0 (0.2, 3.9)
Handover	0 (0)	29 (83)	<0.001[^]	n/a
Guideline based care in more than 5 areas	5 (12)	24 (69)	<0.001*	16.1 (5, 52.3)

[^] Fisher's Exact test

*Chi square test

CI = Confidence Interval

Figure 3



OR-Odds Ratio
 LCL-Lower confidence level
 UCL-Upper confidence level

Discussion

A greater proportion of orthogeriatric inpatients received guideline based care after the introduction of the SCT than before the SCT was established. This impact was particularly evident in the areas of handover, nutrition support, falls prevention and bladder management. These positive outcomes are all likely to be related to the SCT domain of practice within the hub site, the comprehensive multidisciplinary handover to the rural facilities and the capacity for the SCT to affect follow up when the inpatient was discharged from the rural facility. Within the rural facilities before the SCT patient /carer discussion (95.2%) and weight bearing status (80.9%) were already being addressed relatively well so there was less room for improvement. However, this study has identified that within rural facilities before and after the SCT there were limitations to the implementation to the orthogeriatric clinical practice guide in relation to pressure injury prevention, analgesia, osteoporosis and bowel management. These limitations were particularly evident for analgesia and bowel management where there was no indication of an improvement after the introduction of the SCT.

Comprehensive multidisciplinary handover

A comprehensive multidisciplinary handover was defined as a multidisciplinary handover and a discharge summary completed by a medical officer. Before the SCT there was not one comprehensive multidisciplinary handover in the rural facility medical records. The availability of a medical officer discharge summary, nursing information and allied health discharge summaries was inconsistent. After the SCT 83% of the medical records contained a medical officer discharge summary and a multidisciplinary handover including nursing, physiotherapy, occupational therapy, dietetics and if

required speech pathology and social work information. The presence of a comprehensive multidisciplinary handover in the medical records after the SCT is likely to be related to the value placed on handover by the SCT. It is also likely to have impacted on the positive outcomes for nutrition support, falls prevention and bladder management.

Other available information on the same document after the SCT included a fracture clinic appointment, rehabilitation follow up options and the SCT mobile telephone contact numbers. An increase in the availability of the medical officer discharge summary after the SCT may have been related to the introduction of electronic medical records during the same period. The medical discharge summary would be available on most of the rural facility computers. The audit did however require the discharge summaries to be in paper form on the inpatient's medical record in the rural facility. If the medical discharge summary did not arrive in paper form it would potentially be easier for the staff to access and print out the medical discharge summary. However it is important to consider that staff in the rural facility would need to be aware of how to perform this procedure. The multidisciplinary handover was not available in the electronic medical records. To facilitate the written handover going with an inpatient to a rural facility the SCT completed and copied the handover prior to them leaving the regional facility. In the case of an inpatient leaving the facility before the handover was completed it was the responsibility of an allocated team member to send a copy via facsimile or e-mail as soon as possible.

Nutrition support

To promote fracture healing these inpatients have high energy and protein requirements. These requirements are often not met through their daily food intake. As a result high energy and protein supplements are required²². It is likely that the increase in nutrition support from 36% before the SCT to 66% after the SCT was due to the process of the rural facility dietitian or medical practitioner entering the high energy, high protein supplement on the medication chart. This process highlighted the importance of the supplement and meant the inpatient was offered the supplement regularly. It is possible that unlike analgesia and osteoporosis medication prescription the written handover combined with verbal handover and face to face visits by the SCT Dietitian resulted in the medication chart being completed by the rural facility Dietitian or Medical Officer. This follow up is also likely to have resulted in the inpatient receiving a high energy and high protein diet.

Falls prevention

Best practice recommendations for exercise likely to prevent further falls must include a moderate or high challenge to balance and be of a sufficient dose to have an effect²³. This research project does not investigate the amount and type of falls prevention exercise provided for the inpatient following their discharge from the rural facility however it does identify whether they were referred for follow up to prevent further falls. There is strong evidence that this follow up occurred more after the SCT. This follow up included inpatient rehabilitation, a transitional aged care package including physiotherapy or when transitioned home or to an aged care facility included a management plan to reduce their ongoing risk of falls or falls injury. The increase in documented falls prevention follow up from 26% before the SCT to 57% after the SCT is likely to be due to the comprehensive handover, including the long term plan of the inpatient receiving rehabilitation, and the collaborative care of the inpatient in the rural facilities.

Bladder management

The removal of an IDC is recommended to be as soon as possible and preferably 24 hrs after surgery ensuring there is no faecal impaction and ideally after patients have begun to move around more easily¹⁵. At the time of an inpatient being transitioned to a rural facility, it would be expected that the IDC had been removed at the regional facility. Bladder management compliance before the SCT was 79% and after the SCT it increased to 97%. After the establishment of the SCT the increase in bladder management is likely to have occurred through the SCT CNC collaboratively addressing bladder management with the orthopaedic team in the regional facility. Postoperative bladder management would ideally include the inpatients being encouraged to mobilise and open their bowels and once this had occurred the nursing staff would remove the IDC.

Weight bearing status

Maintaining the orthopaedic specialist prescribed weight bearing status following transition to the rural facility was a priority during both of the audited periods with 81% adherence before the SCT and 94% adherence after the SCT. This is likely to be related to most of the medical discharge summaries for both periods including the prescribed weight bearing status. This was subsequently documented as adhered to by the rural facility staff throughout the inpatient admission. It is also possible that the positive trend of the increased compliance of weight bearing status during the SCT period was unable to show a statistically significant change due to a ceiling effect.

Inpatient/carers discussion

It is encouraging that at least one discussion took place with the inpatients/carers this occurred during periods, 95% before the SCT and 97% after the SCT. However the question did not identify whether the discussion pertained to effectively involving the inpatient or carers in care decisions. In the OMC guidelines the assessment of the inpatient is to include the rehabilitation goals and needs of the inpatient. The interpretation of this by the SCT included engaging the inpatient as an active participant in their care by establishing between the inpatient and the clinician collective ownership of the patient's goals. In hindsight an outcome that may have been more of an indicator of involving the inpatient or carers in their care decisions could have been "Was there documented evidence of the inpatient's functional goals and plans in regard to how these goals would be realised?" This finding of no change is likely to be related to the question being a sub-optimal measure.

Pressure injury prevention

This pressure injury prevention question seemed valid and reliable to the project team. However there was only a small, not statistically-significant, change in the provision of an alternating air mattress, from 5% before the SCT to 14% after the SCT. According to the OMC the inpatients should be assessed and managed with a view to minimising the risk of pressure related injuries^{15,16}. The assessment tool used during the audited periods was the policy recommended²⁴ Pressure Sore Prediction Score (PSPS)²⁵. The pre operative PSPS was likely to indicate a high risk for pressure injury. The recommended intervention would be that the inpatient rest on an alternating air mattress²⁶ within six hours from the time of admission²⁷. However the PSPS of the inpatient at the time of transition to the rural facility (day 7-8) may not indicate a high risk of pressure injury. While the inpatient requiring transition to a rural facility was most likely to continue to have high care needs, hence their need for inpatient care, it is possible they would be more mobile in the bed and able to get out of bed allowing their risk to be reduced. Therefore it is possible that the PSPS allocated by the rural facility staff did not amount to the inpatient requiring an alternating air mattress. Given that the pressure injury risk is meant to be reviewed throughout a patient's episode of care, it would be pertinent to reassess their pressure injury risk just prior to their transition to the rural facility. This is likely to validate the need for pressure relieving equipment and enable its timely acquisition prior to the inpatient arriving in the facility.

Other possible reasons for the lack of pressure relieving equipment could be related to process gaps. There may be a process gap for documenting that an alternating air mattress had been placed on a bed. In this study documentation was the only way a 'yes' could be allocated and could have biased the outcome by the placement of the equipment on the bed not being documented. The principal investigator identified during the medical record audit that the PSPS was recorded on the nursing care plan and at times within the progress notes however the documentation in regard to intervention was limited. The PSPS does not guide the clinician to choose the most appropriate intervention for the high risk patient. One medical record had a local health district "Pressure injury prevention intervention form" that was completed by an OT. This resulted in the provision of an alternating air mattress however this was outside the preferred time period. It would seem there was a lack of awareness of the availability of this tool to guide staff to provide the most appropriate treatment. Another process gap could be in relation to the staff not knowing how to access the pressure relieving equipment within the facility. While the policy advises that the local health districts develop guidelines for the availability and maintenance of specialised equipment to prevent pressure injuries²⁴, it seemed that these were either not available or utilised within each facility. With the validity and reliability of the PSPS needing further investigation²⁸

the principal researcher recommends that the health district use the Waterlow pressure ulcer prevention/treatment policy²⁹. Unlike the PSPS this tool is able to clearly direct the staff to the most appropriate treatment once a score has been allocated.

Analgesia

There was no indication of a change in analgesic prescription after SCT introduction with 41% before the SCT and 40% after the SCT. The decision for adherence to pain management to include regular analgesia with at least two differing mechanisms was based on the understanding that these frail inpatients would be less able to voice their need for pain relief and be at risk of being undertreated for their pain. The analgesia excluded the use of non steroidal anti-inflammatory (NSAIDs) medication due to the high risk of complications in frail, older patients¹⁵. In the rural facility the prescription for analgesia is dependent on the decision of the attending medical officer. The regional facility medical officer can provide recommendations regarding analgesia in the written handover however the decision to prescribe this medication is for the rural facility medical officer. On some occasions completed medication charts were sent with the inpatients from the regional facility however this did not affect a change in procedure within the rural facility in the SCT period.

This finding could be related to the question being a sub-optimal measure as it could be argued that at the time of transition to the rural facility, eight days post fall, regular analgesia with two differing mechanisms is not relevant. It is likely to be more appropriate for the inpatient to receive regular paracetamol and another analgesic if required²⁷. However, it is during this stage of the inpatient's care that mobilisation is encouraged and pain management is critical to allow this to occur. A more appropriate question at this sub-acute phase of care could have been "Did the patient receive at least one type of regular analgesia and have the option of receiving another analgesic with a different mechanism?"

Osteoporosis management

Adherence to osteoporosis management increased from 43% before the SCT to 63% after the SCT. This was not statistically significant however an increased trend is evident. As is the case for pain management, osteoporosis management is dependent on the decision of the attending rural facility medical officer. With the likelihood of these inpatients having osteoporosis, fragility fractures and being at risk of falling again and sustaining another fracture³⁰ the prescription of low risk vitamin D supplements is likely to be appropriate. However the prescription of biphosphonates and calcium could pose some risks for the inpatient. Given that these inpatients have a lengthy inpatient admission of up to 47 days with the recent evidence regarding the correlation between vitamin D supplementation and the reduction in falls incidence for inpatients in residential care facilities it could be argued that the prescription of vitamin D supplements is beneficial for all long stay orthogeriatric inpatients³¹.

Bowel management

The need to monitor and implement processes to prevent constipation for these inpatients is important to reduce their risk of delirium and bladder retention. In this study there was no difference between the audited periods with 12% before the SCT and 11% after the SCT. Nursing members of the guideline based care question project team advised that a completed bowel chart would be expected for all regional and rural facility inpatients. This was not the case in either period. Generous provision of what substantiated a completed bowel chart did not change this outcome. The monitoring of the patients bowel action was generally limited to the observation chart entry. In this study the only inpatients likely to have a separate bowel chart completed were in long stay beds within the rural facility. The study findings clearly indicate the need for the health district to address the processes related to monitoring the inpatient's bowel motion history with a particular focus on all inpatients older than 65years or who have a history of constipation or who are receiving opioids.

More than five guideline based care questions

The increase in the proportion of people receiving guideline based care in more than 5 areas after the SCT (69%) compared with before the SCT (12%) is very strong evidence of increased adherence to clinical practice guidelines. This increase occurred after the short duration of six to 18 months of the SCT being established and within six of the eight rural facilities the SCT worked collaboratively with. The requirement of the SCT to address the management of orthogeriatric inpatients across so many facilities and long distances is likely to have limited the intensity of the team's intervention. This outcome strongly supports the effectiveness of this rural model of care.

This study was dependent on documentation to determine if improvement in care took place. It is important to recognise that documentation provides a basis for comparisons that will continue to be of interest to inpatients and their carers as well as to clinical teams and health services which value cost-effectiveness, especially when it is linked to higher quality care³². Effective documentation needs to remain a priority for clinical teams to inform care practice.

In order to further understand the outcomes of this study on changes to care practice a hypothetical scenario of a rural inpatients' care experience following a fall has been proposed by the author for each audited period (Appendix 1). This scenario has been extrapolated from the results.

Study strengths

Unlike the evidence from metropolitan health services that collaborative orthogeriatric care reduces inpatient complications and mortality^{7,8,9}, this study provides evidence of improvement in care provision by measuring the adherence to clinical practice guidelines.

This study supports the evidence that a specialist multidisciplinary aged care team and comprehensive discharge planning¹⁰ are effective in optimising care for older inpatients admitted for acute care.

This study provides Australian rural health districts with some evidence of effective health care delivery in a rural setting.

Study limitations

Three of the questions measuring adherence to the clinical practice guidelines (pressure injury prevention, analgesia, inpatient/carers discussion) may have been sub-optimal. For example; the need for an alternating air mattress and two types of analgesia with different analgesic mechanisms, at the time of the inpatients transition (day 7-8) to the rural facility, may have been unnecessary.

This study was conducted in a sparsely populated health district and limited the number of included patients in the allocated time period.

In order to complete the project in a timely manner, two of the rural facilities, spoke sites, furthest away from the hub site, that were part of the SCT domain of practice were not included in the study. While it is unlikely that there would be many patients who would have met the inclusion criteria from these sites it is important to recognise that these sites were not included in the study.

Conclusions

This study found that the introduction of the SCT was associated with an increase in adherence to clinical practice guidelines in the management of orthogeriatric inpatients in a rural setting. Given that the SCT was working to encourage the adoption of guidelines through interprofessional collaborative care within nine facilities, which was likely to affect the intensity of intervention within each facility and this occurred within only six to 18 months of the SCT being established, these results are very promising.

This study indicates that the SCT model of care was effective in changing inpatient care in a rural setting. The aspects of guideline based care that were not enhanced following SCT introduction provide the rural facility teams and the SCT

with evidence of process gaps that potentially compromise inpatient care. This evidence can now provide the opportunity for the SCT and rural facilities to address these gaps.

The key mechanisms that are likely to have contributed to this successful outcome include the: hub site holistic coordinated specialist multidisciplinary inpatient assessment and discharge planning; the provision of a comprehensive multidisciplinary handover to the rural facility staff; and the spoke site follow up of the inpatient by the SCT to effect the inpatients' plans and goals.

With the expected increase in rural facilities providing inpatient care for more frail aged inpatient populations and the expected decrease in available specialised health care staff it is likely that these mechanisms would also be effective for other rural inpatient populations like frail medical inpatients or rehabilitation inpatients.

This hub and spoke multidisciplinary model of care could be instrumental in enabling sustainable and effective multidisciplinary inpatient care for such frail aged inpatients being cared for in a rural setting.

What is already known about topics related to this study

In metropolitan health services there is some evidence that collaborative orthogeriatric care reduces inpatient complications and mortality. Components that appear to be effective for older inpatients admitted for acute care include a multidisciplinary aged care team, targeted assessment to prevent complications, and discharge planning with communication between care providers across the care continuum.

What this study adds

This hub and spoke multidisciplinary team including interprofessional and collaborative practice in the model of care increased adherence to clinical practice guidelines for orthogeriatric inpatients in rural facilities.

Recommendations from the study

Regional facility teams transitioning frail older inpatients to rural facilities prioritise providing:

1. the inpatient with a specialist multidisciplinary holistic assessment and treatment while in the hub
2. the rural facility teams with a comprehensive multidisciplinary handover including patient centred goals and plans
3. follow up clinical support for rural facility teams caring for the more complex inpatients in the spoke sites.

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Appendices

Appendix 1

Hypothetical scenario of a rural inpatient's care experience following a fall.

Rose is 81 years old and fell at home. The ambulance transported her to the nearest rural facility for assessment by the medical officer in the emergency department. Her initial assessment indicated the fall had caused a neck of femur fracture. She also had a past medical history of cardiovascular disease. The medical officer sought orthopaedic specialist consultation at the nearest regional facility and she was transferred via patient transport to the regional facility for further assessment. She was admitted to the acute surgical ward and had an operation to reduce the fracture. The Orthopaedic consultant recommended Rose remain non-weight bearing through the operated leg for a period of at least 6 weeks. She remained at the regional hospital for at least 7 days when she was transitioned in the afternoon via patient transport to the rural facility closer to home for further inpatient care and was admitted at 4:00pm.

While Rose was at the rural facility she rested on a hospital bed without an alternating air mattress. When transferring out of bed she was encouraged to maintain the orthopaedic specialist requested weight bearing status of non weight bearing. Rose discussed her desire to return home with a rural facility team member and this was documented in her medical record. Her medication chart allowed her to receive analgesia when it was requested and included vitamin D or calcium supplements. Rose was not able to remember when she last opened her bowels and this was not recorded consistently on a bowel chart. She remained an inpatient of the rural facility for 4-5 weeks. Rose was discharged from the rural facility between 12:00 and 1:15 PM.

Before the SCT rural facility care

On Rose's arrival the rural facility staff caring for her received handover information from the regional facility which included a brief medical discharge summary and a nursing care plan. The rural facility staff now caring for Rose were uncertain of how long she would need to stay in the rural facility and what her short term and long term functional goals would be. Rose also had an IDC in situ and neither she nor the rural facility team were informed of when it should be removed. There was no definitive advice regarding her nutritional support or falls prevention follow up throughout her inpatient admission to the rural facility. The rural facility team who provided Rose with her care needs included nursing staff, a medical officer and a physiotherapist. It was unlikely Rose would be seen by an OT, dietitian, speech pathologist or a social worker. Any contact with the regional facility orthopaedic team and rehabilitation team was dependent on the rural facility team contacting them as it was deemed necessary. When Rose was discharged from the rural facility she did not receive falls prevention follow up.

After the SCT rural facility care

On Rose's arrival the rural facility staff caring for her received handover information from the regional facility which included a comprehensive medical and multidisciplinary discharge summary including the her short term and long term functional goals including advice about the appropriateness for her to return to the rehabilitation unit once the orthopaedic specialist advised she could weight bear on her affected leg. Rose had the indwelling catheter removed at the regional hospital and was now able to void effectively. Handover advice from the SCT Dietitian recommended she receive nutritional support in the form of a high protein, high energy supplement being placed on the medication chart to enable her to receive it regularly. Rose was given this supplement as charted. The rural facility team who provided Rose with her care needs included nursing staff and a medical officer. The available rural facility allied health staff who also work in the rural community health centre were contacted by their relevant discipline from the SCT and may have included a physiotherapist, OT, social worker, dietitian or speech pathologist. Following this contact Rose was assessed and treated by each of these allied health professionals as required. When required for example : following a problem

based discussion with the relevant allied health professional regarding Rose's care needs the SCT member would visit her with the rural facility team members to provide problem based education regarding her care needs and address the identified issues for the rural facility staff to follow up. In the event of a vacancy for any of these disciplines the SCT would be likely to visit Rose in the rural facility and provide achievable and reasonable care plans to be followed up by nursing staff or allied health assistants or available allied health staff within the scope of their roles.

While in the rural facility Rose was reviewed by the SCT OC and a rehabilitation physician from the regional facility. Rose would have the opportunity to consider her rehabilitation options following her NWB period. After 4-5 weeks Rose was advised by the orthopaedic specialist to weight bear as tolerated on her affected leg and received rehabilitation and falls prevention follow up.

Appendix 2

Literature reviewed

A search was performed to identify published literature on related topics using the Clinical Information Access Portal .The electronic databases accessed and searched included PEDro, OTseeker, CINAHL Plus, Pub Med, EMBASE, Proquest, Cochrane, MEDLINE and Nursing@Ovid to identify relevant literature published in English between 2007 and 2012 . This was supplemented with internet searches such as google scholar. The search terms included "Fractured Neck of Femur", "Ortho-geriatric care", "Collaborative Care", "Guideline Based Care", "Multidisciplinary Care", "Model of Care", "Hub and Spoke", "Implementation", "Continuity of care" and "Team effectiveness". The reference lists of relevant literature were examined to enable further relevant studies to be identified.