



SPINAL FRACTURES,
CONSERVATIVE
MANAGEMENT AND
OVERCOMING
TYRANNY OF
DISTANCE FOR
MANAGING RURAL
PATIENTS

DR RYAN GALLAGHER PhD

DISCLAIMER



I am presenting from my personal perspective



The content I am presenting is publicly available/published



The information presented today is my own personal opinion based on my own experience as a health clinician and researcher



If unsure or seeking further information on what has been presented today I encourage you to review the references provided or investigate further.

ABOUT ME



- Physiotherapist working in NSW Public Hospital System for last 11 years.
- Working full time in Neurosurgery and Neuromedicine for 9 years.
- Currently advanced practice Physiotherapist in John Hunter Neurosurgery clinic
- Multiple secondments to rural hospitals in early career
- PhD in Physiotherapy and Neurosurgery
- Presented at international and national allied health and medical conferences
- Published in *Neurosurgery*, *Archives Physical Medicine*, and *Australian Journal of Rural Health*.
- Led model of care redesign project in 2013-2016 for rural patients with spinal fractures determined by Neurosurgeons suitable for conservative management.
- ORCID ID: <https://orcid.org/0000-0003-4366-124X>

OVERVIEW



Today's talk will cover:



1. Rural health issues for patients and clinicians



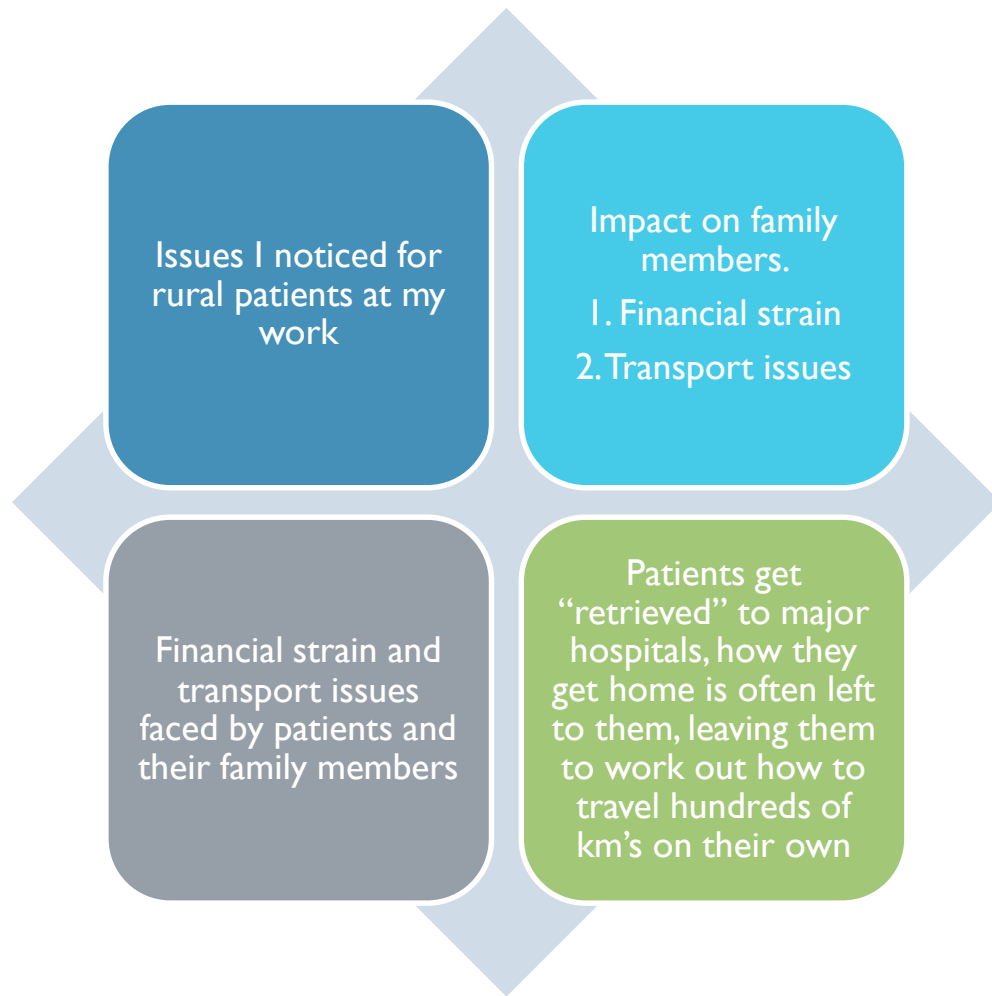
2. Telehealth and its role in overcoming rural health barriers



3. Background to a Telehealth model of care deployment to manage spinal fractures



4. Outcomes from a Telehealth model of care to manage spinal fractures in rural hospitals

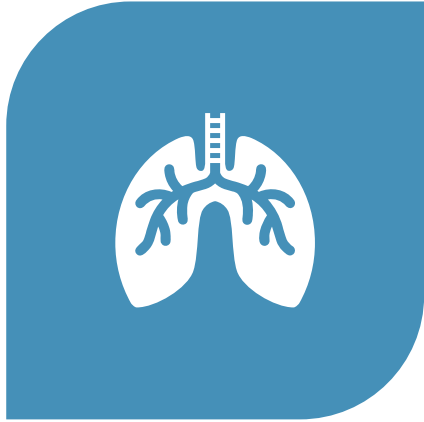


WHY AM I
TALKING ABOUT
THIS?

RURAL HEALTH ISSUES



- *“Australians living in rural and remote areas tend to have shorter lives, higher levels of disease and injury and poorer access to and use of health services compared to people living in metropolitan areas. Poorer health outcomes in rural and remote areas may be due to a range of factors, including a level of disadvantage related to education and employment opportunities, income and access to health services.”*
 - Source - Rural and remote health report Australian Institute of Health and Welfare <https://www.aihw.gov.au/reports/ruralhealth/rural-remote-health/contents/rural-health>



In 2014, the full-time equivalent (based on total weekly hours worked) rate of employed GP's per 100,000 population was higher in *remote and very remote areas* (137) than in *major cities* (109); however:



The overall rate of employed medical practitioners (including specialists) was lower (253 per 100,000 population compared with 409)

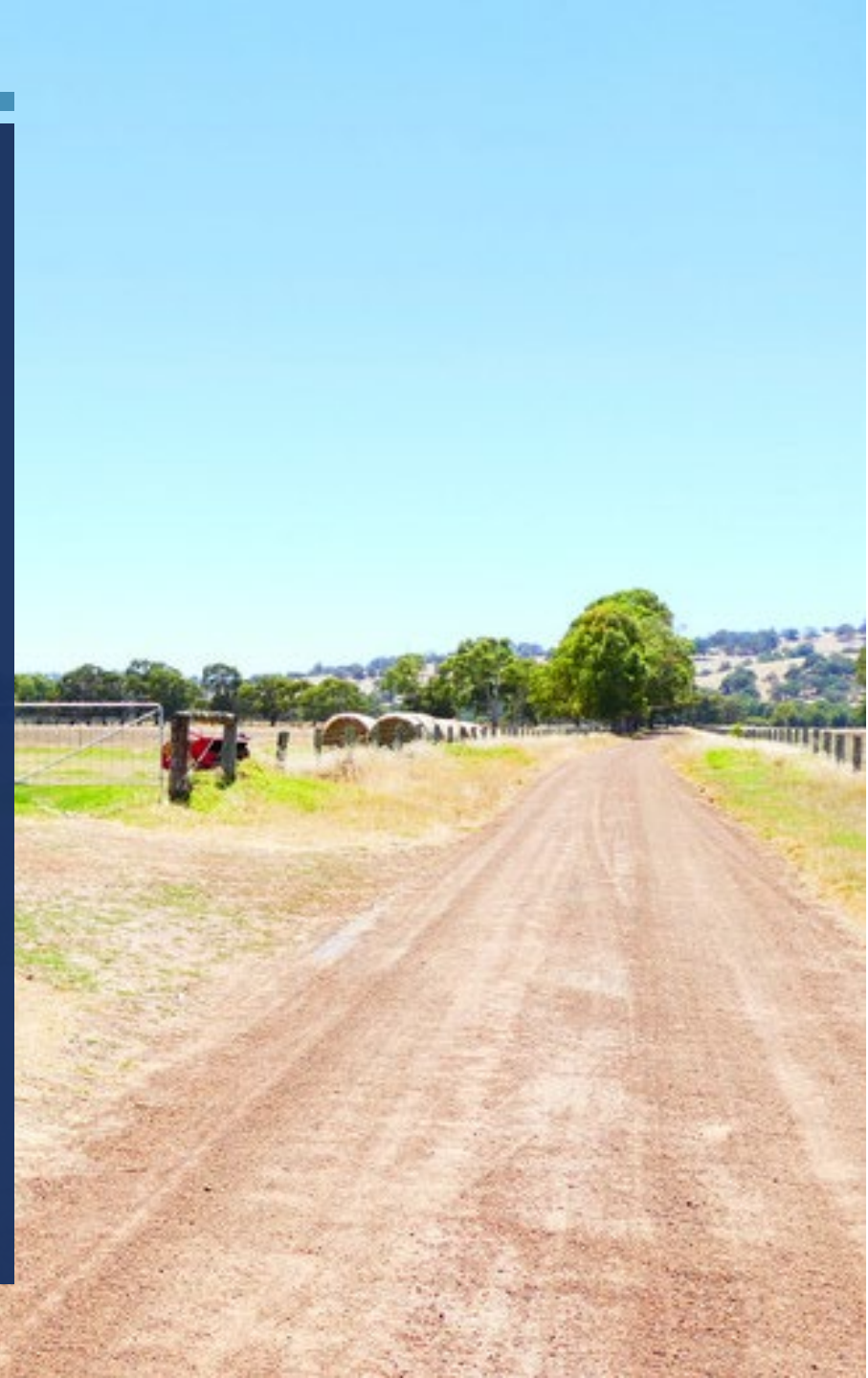


The number of GP services provided per person in *very remote areas* during 2010–11 was about half that of *major cities*.

RURAL HEALTH ISSUES

RURAL HEALTH DIVIDE

- People living in remote areas of Australia may need to travel long distances or relocate to attend health services or receive specialised treatment. For example, based on combined data for 2005–2010, 57% of people with end-stage kidney disease who lived in *Very remote* areas at the start of their treatment moved to less remote areas within 1 year.
- In 2013–14, the rate for emergency hospital admissions involving surgery was highest for people living in very remote areas (22 per 1,000 population) and fell with decreasing remoteness to be lowest among people living in Major cities (12 per 1,000).
- 5.4x the rate of deaths due to a land transport accidents in remote and very remote areas compared to Major cities



RURAL HEALTH DIVIDE

- The death rates for a range of diseases is higher in remote Australia. Death rates from the major causes of death in Australia are significantly higher in remote communities when compared with major cities:»
- Land transport accidents – almost five times more deaths in remote Australia
- Diabetes - three times the number of deaths in remote Australia
- Suicide - twice the number of deaths due to suicide in remote Australia
- Chronic obstructive pulmonary disease – 60% higher death rate in remote Australia
- Coronary heart disease – 40% more deaths in remote Australia
- Lung cancer – the rate is 40% more deaths in remote Australia.
- People in remote Australia die around three years earlier than people in the city. This is despite there being fewer older people living in remote communities

Source: Australian Institute of Health and Welfare. Rural and remote health.

<https://www.aihw.gov.au/reports/rural-health/rural-remote-health/contents/deaths-remoteness>



CAUSES OF DEATH OUTSIDE MAJOR CITIES - 2008

Cause of death and ICD-10 Code	Death rate(c) Per 100,000	Ratio to Major Cities (d)
Ischaemic heart diseases (I20-I25)	143.6	1.44
Strokes (I60-I69)	68.2	1.31
Trachea and lung cancer (C33-C34)	48.7	1.36
Dementia and Alzheimer disease (F01-F03)	43.6	1.20
Chronic lower respiratory diseases (J40-J47)	40.8	1.59
Diabetes mellitus (E10-E14)	27.5	1.61
Heart failure (I50-I51)	22.2	1.70
Suicide (X60-X84,Y87.0)	13.6	1.66
Hypertensive diseases(e) (I10-I15)	12.8	1.90
Transport accidents (V01-V99,Y85)	11.7	3.08

Source: Australian Bureau of Statistics Australian social trends.

Health outside major cities

[https://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/LookupAttach/4102.0Publication25.03.114/\\$File/41020_HealthOMC_Mar2011.pdf](https://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/LookupAttach/4102.0Publication25.03.114/$File/41020_HealthOMC_Mar2011.pdf)

RURAL HEALTH - CLINICIAN BARRIERS

- Access to professional development(or lack of)
- High turnover of rural staff, especially true for nursing and allied health(ref)
- Rural Generalist requirements:
 - Not enough of volume of presentations to become expert
 - Need to know a little about a lot
 - Limitations of staffing and services in rural facilities
 - Lack of professional support
- How to overcome these barriers?



RURAL HEALTH CLINICIANS

- Allied health professionals - Access to allied health professionals is limited in remote Australia, particularly with regard to ongoing treatment and management of chronic diseases and for rehabilitation and recovery from significant illness or injury.
- Looking at the number of key health providers accessible in remote Australia per 100,000 population, there are 42% fewer pharmacists, less than half the number of psychologists (65% fewer), podiatrists (68% fewer), physiotherapists (51% fewer), optometrists (68% fewer) and occupational therapists (65% fewer).
- 80% less medical specialists in remote Australia compete to major cities, only one third the number of dentists in remote Australia compared to major cities.
- Nurses – In contrast to the poor distribution of most health professionals in remote Australia, nurses are fairly evenly distributed across major cities, remote and very remote Australia. Indeed, in many small remote communities, nurses are the main provider of health services. Remote nurses can be sole practitioners, seeking input and advice to support the management of patients via mobile and internet based support systems, where those are available. Nurses and midwives living and working in remote settings frequently work long hours and often have to deal with a range of emergencies. This professional independence can at times also mean professional isolation, an extended scope of practise, and working and living in a different social and cultural setting.

TELEHEALTH



- Definition
 - “Telehealth refers to the delivery of services by healthcare organizations using information and communications technology (ICT) solutions when the clinician and patient are not in the same location”
 - Source <https://www.infoway-inforoute.ca/en/component/edocman/334-telehealth-benefits-and-adoption-connecting-people-and-providers-summary/view-document?Itemid=101>
- Benefits and applications to Telehealth
 - Real case examples of Telehealth
- Telehealth can be billed under the Medicare benefits scheme

ENABLING TECHNOLOGY

- Smart phones
- NBN – faster connections, less drop outs, decreased latency
- Video streaming technology
- Growing acceptance of the ability of technology to improve health outcomes
- Medicare billable rebates for telehealth consultations (limitations to this for allied health professionals)



Physitrack



medicare



Telehealth Benefits and Adoption
Connecting People and
Providers Across Canada

A Study Commissioned by Canada Health Infoway

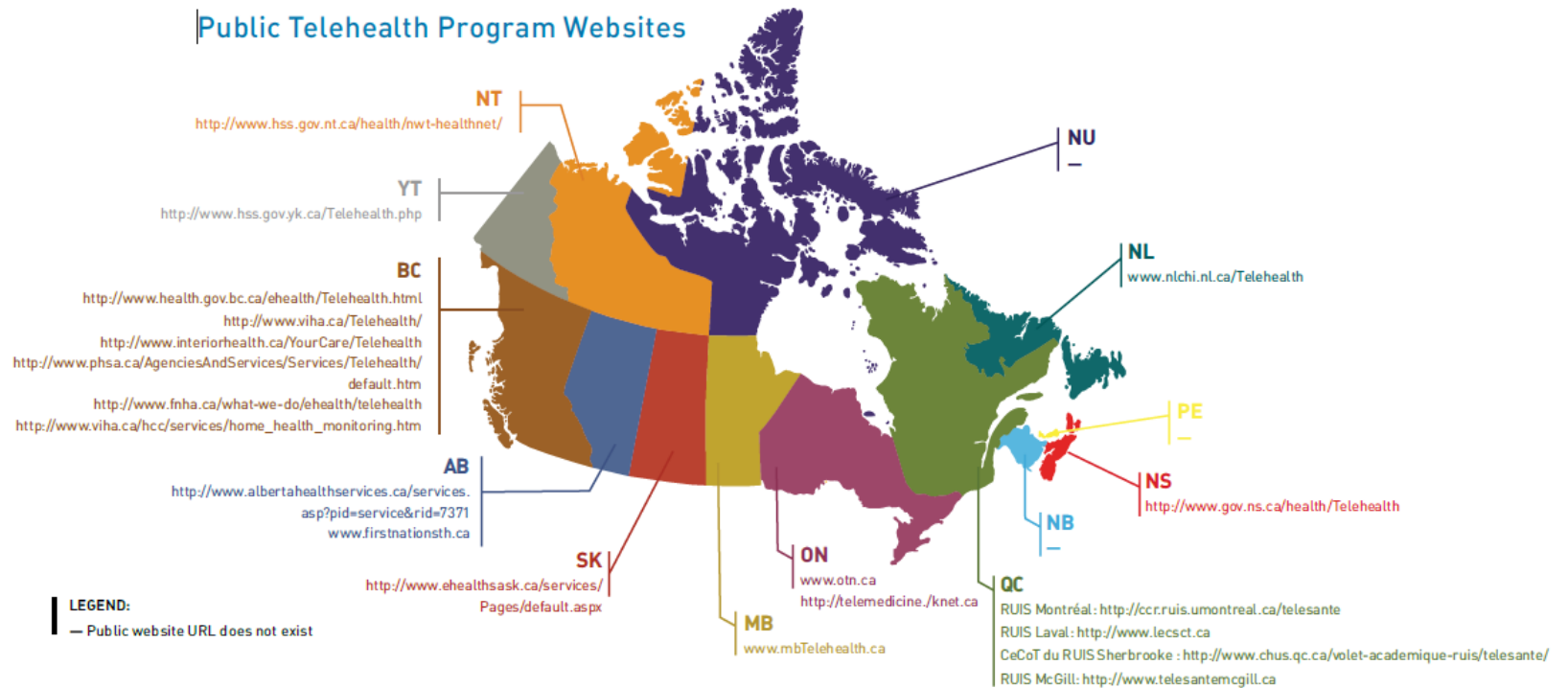
30 May 2011

TELEHEALTH
MODEL OF CARE
– CANADIAN
EXPERIENCE

IDENTIFIED BENEFITS FROM CANADIAN TELEHEALTH

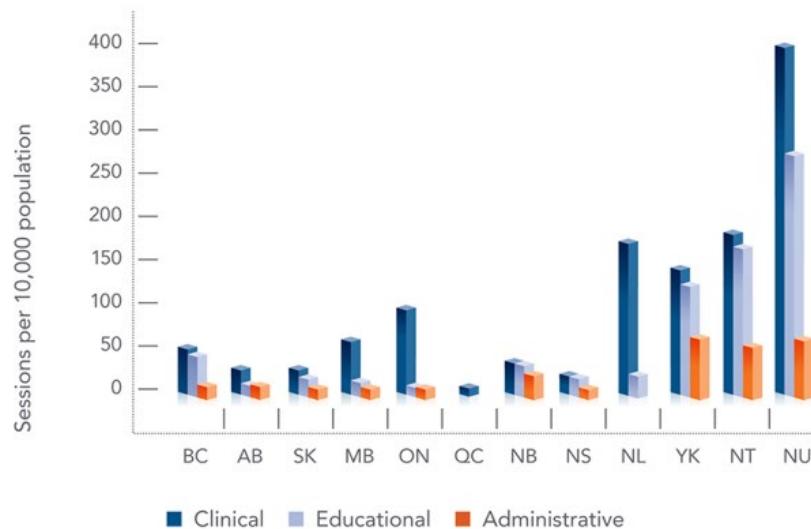
- 47 million km's of travel saved, 5.6 million litres of fuel saved
- Reduction in wait time for crisis services in rural communities from 48 hours to 2 hours
- Reduction in waiting time for wound nurse reviews from 3 weeks to 48-72 hours.
- \$55 million in health system savings through reduced travel subsidies.
- \$20 million saved in reduced inpatient healthcare costs

Public Telehealth Program Websites



CANADIAN HEALTHCARE AS AN EXAMPLE FOR TELEHEALTH

Figure 2: Total Number of Telehealth Sessions in 2010 — per 10,000 Population

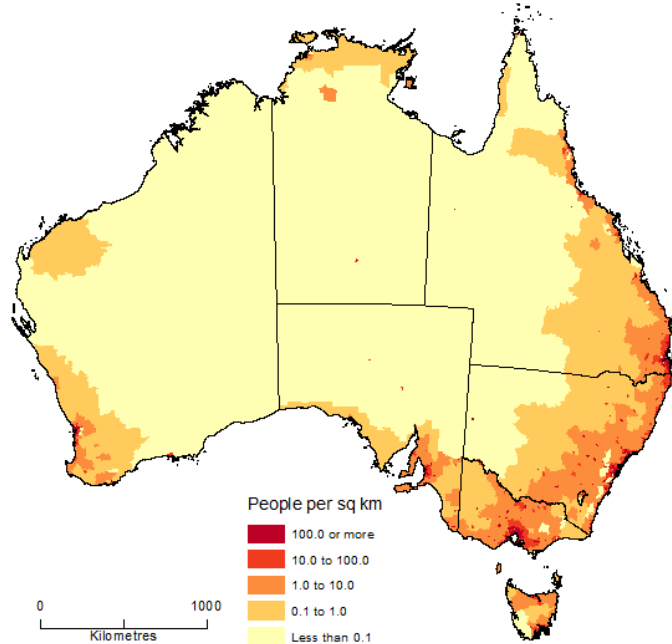


Source(s): 2010 CTF Pan-Canadian Telehealth Survey. Quebec data and Alberta administrative numbers were collected from key informant interviews with the respective Ministries of Health. Data for Prince Edward Island were unavailable.

- Yukon(YK), Nunavut(NU), Northwest Territories(NT), Newfoundland and Labrador(NL) Provinces
 - All represent highly rural provinces with Canada.
 - High utilization to overcome rural healthcare divide
- Population densities (people/Km²):
 - Yukon 0.1
 - Nunavut 0
 - Northwest Territories 0
 - Newfoundland and Labrador 1.4
- 21% of Canadas population live in rural areas

BY COMPARISON - AUSTRALIA

POPULATION DENSITY BY SA2, Australia - June 2016



- Comparative population densities(people/Km²):
 - Greater Sydney- 400
 - NSW- 9.5
 - Regional NSW - 3
 - Greater Melbourne - 9800
 - Victoria - 26
 - Regional Victoria – 7
 - Greater Adelaide - 400
 - South Australia – 1.7
 - Regional South Australia – 0
- 29% of Australia's population live in rural areas

TELEHEALTH - BENEFITS



Monitoring



Chat



Diagnose



EKG



Remote
Medicine



Interactivity



App Software

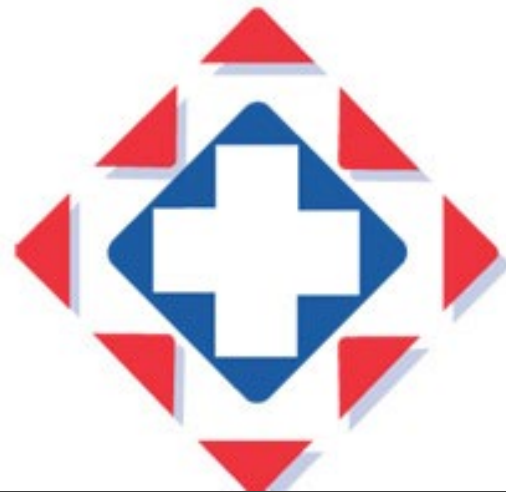


P2P



Patient

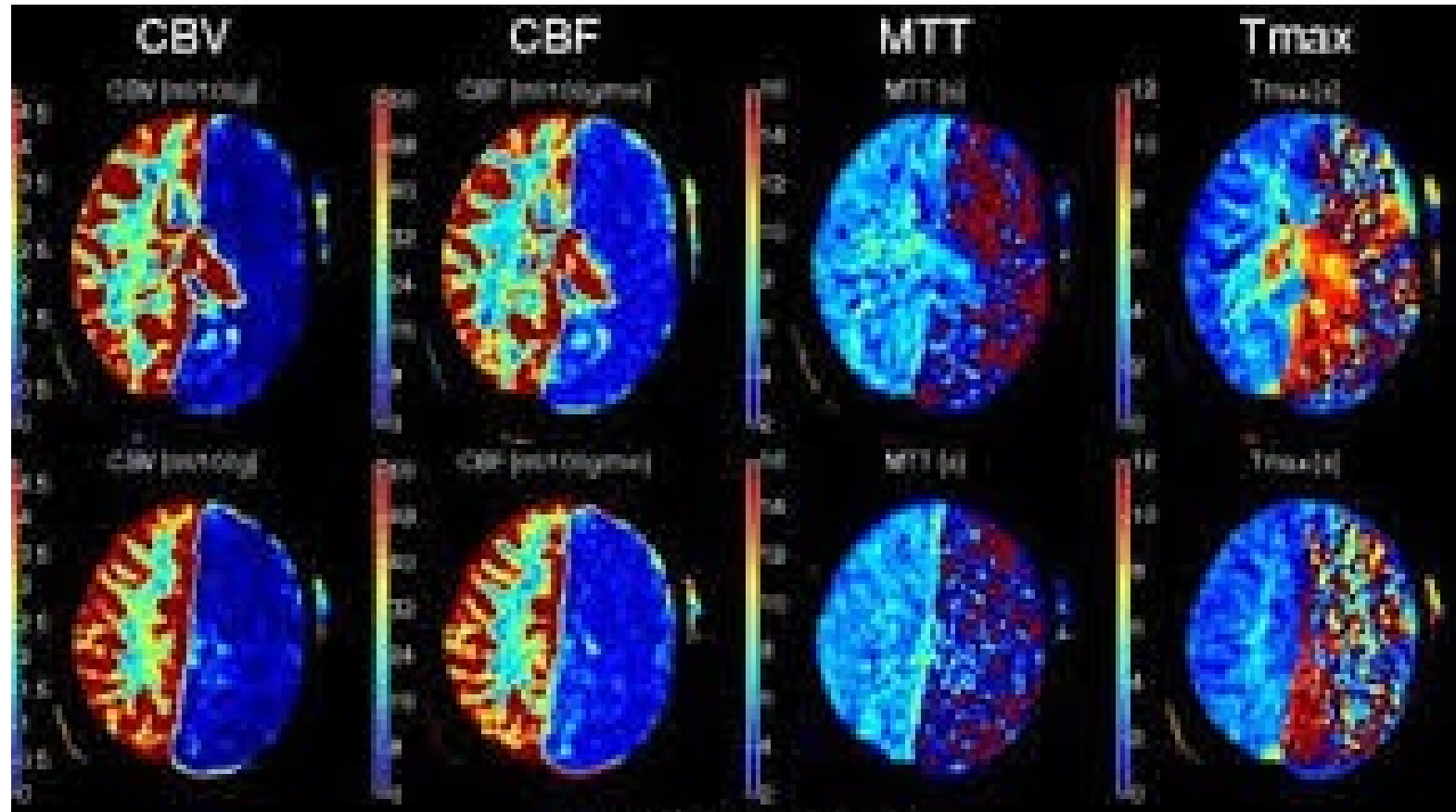
- Eliminates need for clinicians and patients to travel to clinics
- Save hours and thousands in dollars through eliminating travel and healthcare costs
 - IPTAS
 - Travelling health clinics
 - Networking opportunity between rural and metropolitan clinicians (putting faces to names, building familiarity between referring clinicians)



NETS

TELEHEALTH MODEL OF CARE EXAMPLES

- In NSW:
- NETS for critical unwell children
- Hunter New England critical care telehealth service
- Telethrombolysis service for acute stroke management
- Tele fracture clinics



HOW CAN IT WORK FOR ALLIED HEALTH?

- Telehealth can be used to link patients with specialist clinicians
- It can also be used to link rural clinicians to specialist clinicians




**Allied Health
Professions
Australia**



Armidale's Tele-Fracture Clinic team hope their Hunter New England Health 2016 Excellence Award will bring more support to their service.

Matt Bedford



 Award winners, physiotherapist in charge Gemma Model and orthopaedic surgeons Robin Diebold with Inverell based physiotherapist Liz Wellard on-screen.


Armidale's Tele-Fracture Clinic team is among the top performing telehealth service providers in the state.

The clinic has saved Inverell patients more than 100,000 kilometers in unnecessary travel since it opened and was recently recognised with a Hunter New England Health 2016 Excellence Award.

But orthopaedic surgeon Robin Diebold said more support was needed if the clinic was to continue offering a top quality service.

Telehealth, a saviour of sorts for Inverell patients



 Physiotherapist Liz Wellard with patient Wendy George during a Telehealth consultation with Armidale physiotherapist Gemma Model and orthopaedic specialist Dr Robin Diebold.

DISTANCE is no longer an obstacle for many local patients seeking specialist care, with a video-conferencing tool called Telehealth, connecting Inverell residents with Armidale doctors.

Patient Wendy George said her doctor recommended the tool to help cut travel time for her follow up appointments.

Supervised by local physiotherapist Liz Wellard, she was able to consult with Armidale orthopaedic specialist Dr Robin Diebold and physiotherapist Gemma Model from Inverell District Hospital.

Exercises could be supervised via video link and x-rays sent back and forth within a few minutes.




HEALTH CARE COSTS

- NSW Ambulance transfers costs
 - Interhospital transfers by road
 - \$1.87 per km travelled if non emergency plus call out fee
 - \$6.59 per km travelled if emergency plus call out fee
 - Maximum of \$6183 for either emergency/ non emergency for road or plane transport
 - Helicopter transport \$6991 for 1st 30 minutes of transport, \$153 per 6 minutes after.
- Bed day costs
 - NSW schedule for Medicare ineligible patients cost per day for inpatient bed:
 - \$3437 for critical care bed
 - \$1383 for non critical care bed

Original Research

Telehealth-based model of care redesign to facilitate local fitting and management of patients with a spinal fracture requiring a thoracic lumbar sacral orthosis in rural hospitals in New South Wales

Ryan Gallagher B.Phty , Michelle Giles PhD, Jane Morison B.Nurs, Judith Henderson M. App. Sci. (Manip. Phty)

First published: 23 March 2018 | <https://doi.org/10.1111/ajr.12407>

MIAMI TLSO 464



- Indications for Use
 - Conditions requiring gross immobilization of the thoracic and lumbar spine. Such conditions may include:
 - Post-surgical immobilization
 - Spinal Support TLSO attachment is up to T7
 - Spinal stenosis
 - Herniated disc
 - Degenerative spinal fractures
 - Spondylolisthesis
 - Spondylolysis



ALTERNATE CONFIGURATIONS OF THE MIAMI TLSO 464





EVIDENCE BASE : TLSO VS NO TLSO?

- The role of operative versus nonoperative treatment of burst fractures is controversial, with high-quality evidence supporting both options. “Chang et al 2014”
- Thoracolumbar burst fractures account for approximately 45% of all major traumatic injuries. “Aleem et al 2016”

BRACE VS NOT BRACE

- TLSO's won't:
 - Decrease risk of Kyphosis
 - Completely immobilise fracture site
- TLSO's may:
 - Decrease patients subjective symptoms
 - Decrease the fear of movement
 - Decrease risk of progressing to surgery
 - References....





BACKGROUND

- John Hunter is the only Neurosurgical centre between Sydney and QLD border.
- Provide service for Neurosurgical and spinal injuries to all of northern NSW (*Hunter New England LHD, Mid North Coast LHD, Northern NSW LHD*).
- Patient historically bypass regional facilities and are transferred to John Hunter for management of spinal fractures. Historically all spinal patients were transferred to John Hunter for management
- Introduction of digital radiology system(PACS) has significantly reduced the need for patients to be transferred to the John Hunter for assessment by neurosurgeons
- Decisions regarding patients care can be made without need to transport to the John Hunter
- Lack of availability to fit and care for patients requiring spinal collars and braces however required transfer to John Hunter to still occur

PROJECT AIM

- Multidisciplinary team of clinicians across multiple hospital sites identified the need to improve how patients with spinal fractures in rural locations were being managed
- A multi site project was setup aiming to:
 - Facilitate a new model of care utilising telehealth for patients with spinal fractures in rural hospitals
 - Eliminate the need for patients to travel for conservative spinal fracture management
 - Upskill and educate rural clinicians with the skills, knowledge and confidence to manage patients with spinal fractures suitable for conservative management



DISTANCES IN NORTHERN NSW

- 385 km from Newcastle to Coffs Harbour
- 277km from Newcastle to Tamworth
- 384km from Newcastle to Armidale
- 495km from Newcastle to Moree
- 244 km from Newcastle to Port Macquarie



PRE IMPLEMENTATION CASE

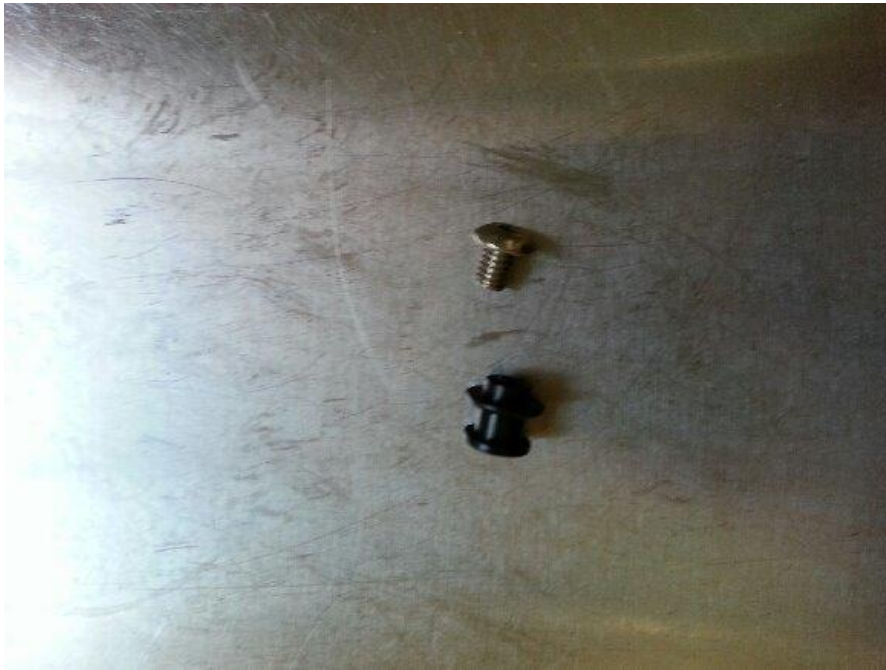
- 28 yr old male admitted to JHH after MBA while racing - # L2
 - Lives in 2 hrs from JHH(72km)
 - Admitted to JHH after trauma call activated
 - Prescribed a TLSO
 - Discharged after 2 days
 - Uneventful admission
- Required to lie flat when TLSO removed
- 2 days after discharge phone call – “Brace was broken”
 - Informed to call ambulance to be transported to JHH.
 - Closest rural referral Hospital not able to assist.
 - No Physiotherapist at local Hospital.
- 6 hours in local Hospital ED
 - 2 phone calls to JHH for advice.
 - Transfer to JHH not available until after hours.
 - Patient and family decided to hold brace together with tape and bandages and drive themselves to JHH.



20 minute review in outpatient setting to fix brace and discharge patient home.



THE SOURCE OF TROUBLE



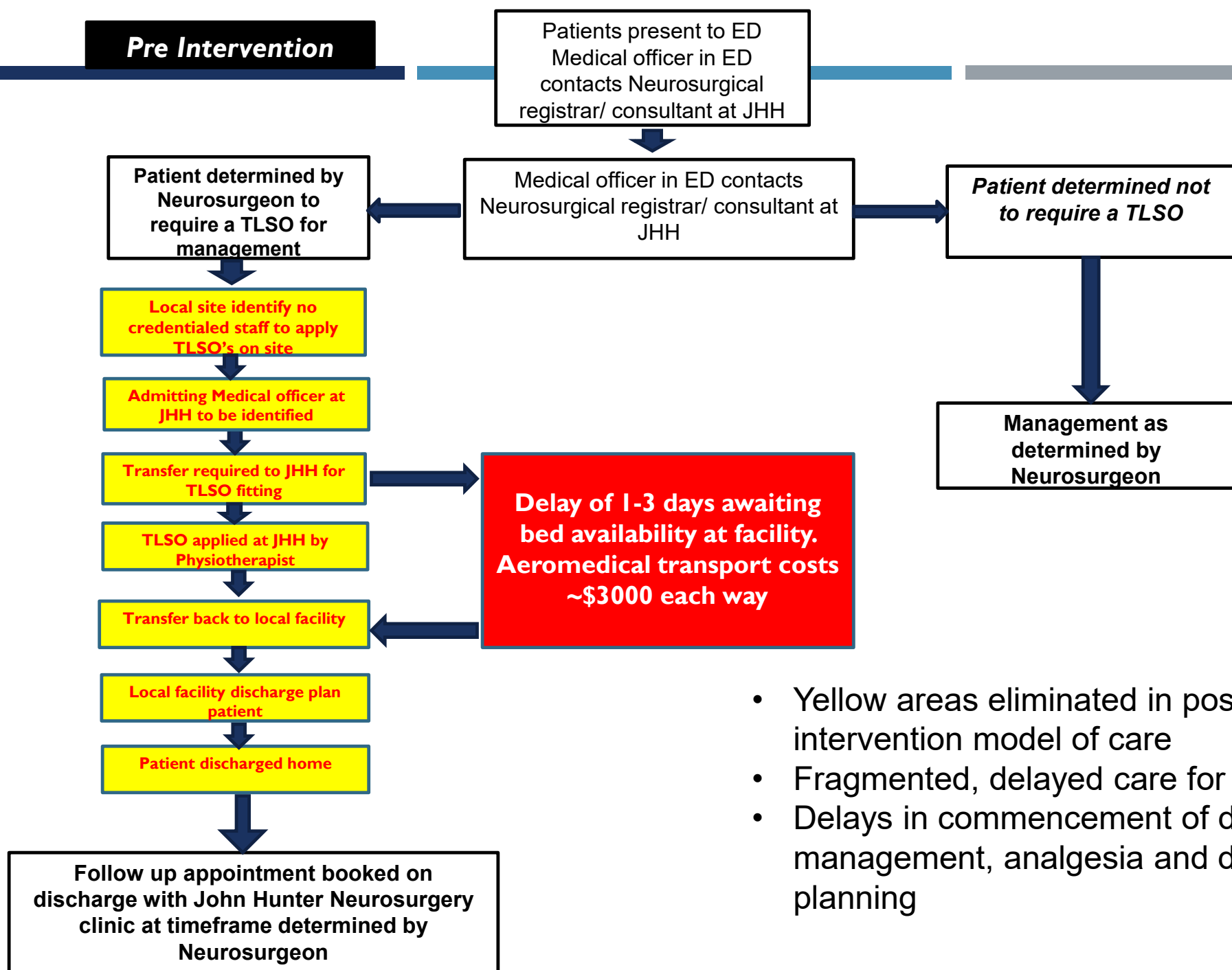
One 20c plug was the culprit!



BACKGROUND

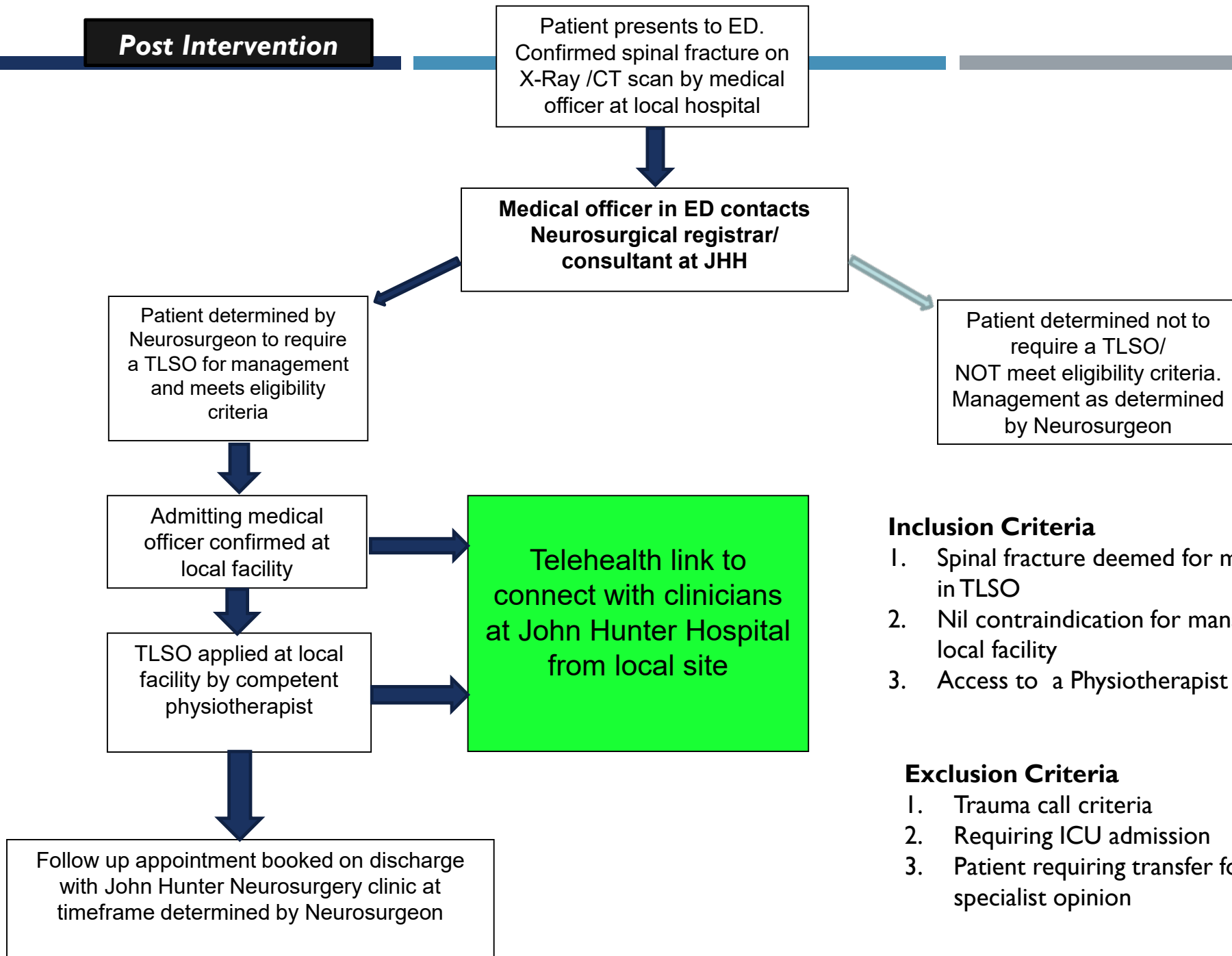
- Phase 1 – Pilot (2013-2014)
 - Collaboration with Tamworth Hospital
 - Establish Telehealth link, develop processes
 - Evaluation
- Phase 2 – Rural Referral Hospitals (2014-2015)
 - Collaboration with Tamworth, Maitland, Taree, Armidale, Calvary Mater Hospitals
 - Individual, targeted site roll out
 - District wide Telehealth links
- Phase 3- Select District Hospitals (2016)
 - Establish Telehealth at Moree and Muswellbrook
 - Site specific education and implementation
 - Refine project inclusion/ exclusion criteria for district hospitals

Pre Intervention



- Yellow areas eliminated in post intervention model of care
- Fragmented, delayed care for patients
- Delays in commencement of definitive management, analgesia and discharge planning

Post Intervention



Inclusion Criteria

1. Spinal fracture deemed for management in TLSO
2. Nil contraindication for management at local facility
3. Access to a Physiotherapist

Exclusion Criteria

1. Trauma call criteria
2. Requiring ICU admission
3. Patient requiring transfer for further specialist opinion

Methods

- Stage 1
 - Baseline Data analysis
 - Retrospective analysis of patient data
 - Definition of patient cohort
 - Establish Prospective tracking
- Stage 2
 - Survey to identify areas to focus training
 - Development of learning package
 - Pilot site staff involvement
- Stage 3
 - Pilot of model of care
 - District wide implementation

Analysis

- **Retrospective** analysis of available patient data for admissions to JHH for 2011-12 financial year:
 - suggests *potentially* 21 patients meeting inclusion criteria
- **Prospective** analysis:
 - 6 month tracking prior to stage 3 implementation completed at JHH
 - *10 patients admitted for purpose of fitting of TLSO to JHH meeting inclusion criteria*
- This accounted for:
 - 25 bed days at JHH for these patients
 - TLSO cost \$720 each
 - Typical transport costs (one way):
 - By road: \$1100
 - By Air: \$3344 -\$4065.60

RESULTS

- **81** patients managed under model of care over evaluation timeframe
- Reduced LoS from a mean of **9** to **4** days
 - **405** bed days eliminated
 - **162** Eliminated inter-hospital transfers
 - **24 324km's** in travel eliminated
 - Decreased fragmentation of patient journey
 - Patients stay in same facility for care



Efficiency savings:

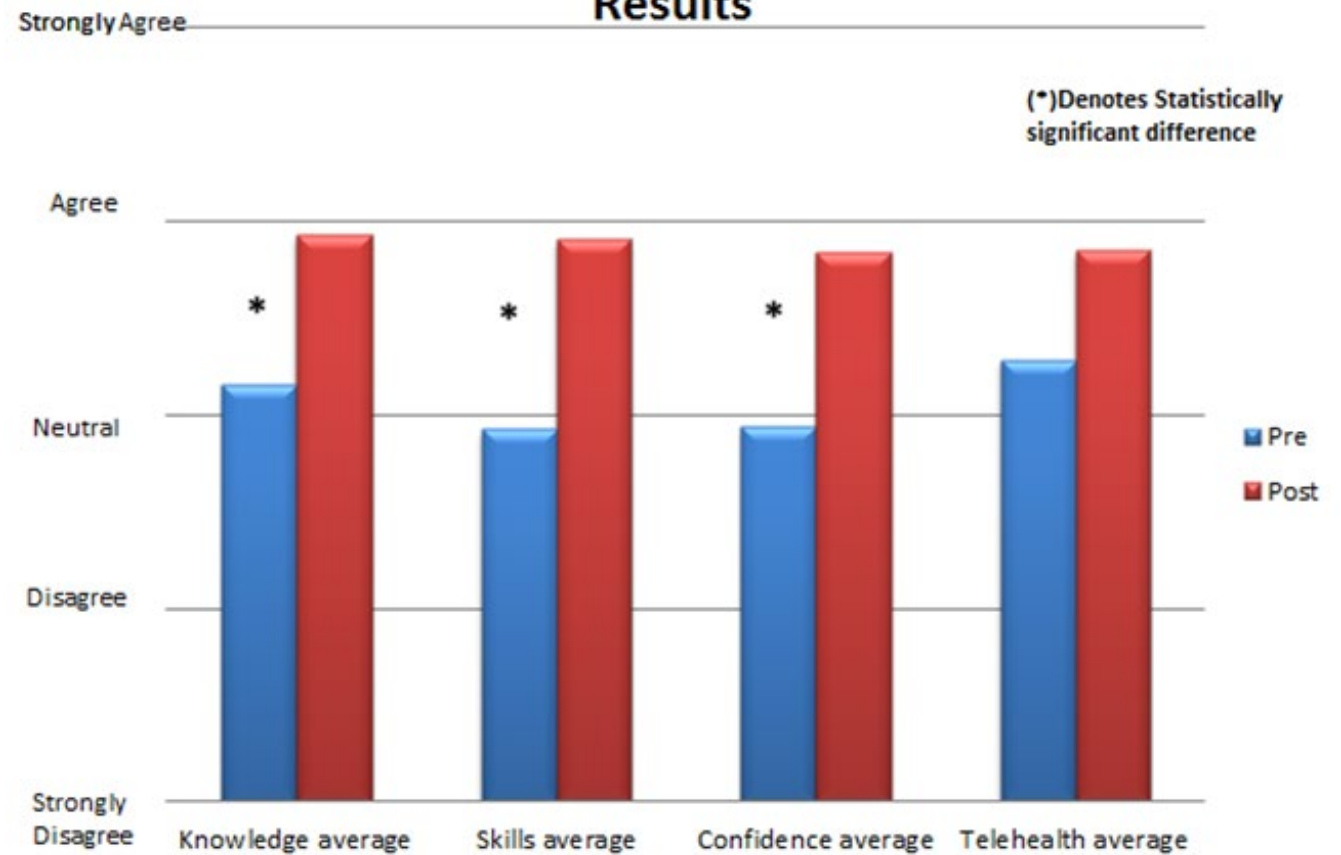
- ***\$1.2 million in efficiency savings***
 - Eliminated transfers savings⁽⁵⁾:
 - **\$348 533.97**
 - Eliminated bed days savings⁽⁴⁾:
 - **\$823 365**
- Scalability
 - Potential for increased capacity for telehealth utilization across additional presentations
 - Targeted clinician learning packages available district wide
 - Increasing number of patients managed each year increasing from 27 in 2014 to 38 in 2015.

HOSPITAL	DISTANCE TO JOHN HUNTER HOSPITAL	RETURN TRANSFER COST (2015 COSTINGS)	NUMBER PATIENTS	SAVINGS
Tamworth	227km	\$8411.96	35	Total patients: 81 Total distance saved: 24 324km Total saved transport costs: \$348 533.97
Taree	171km	\$2357.55	14	
Maitland	33km	\$1246.65	9	
Calvary Mater	5.1km	\$1022.05	12	
Moree	988km	\$9167.12	2	
Muswellbrook	120km	\$1947	2	
Belmont	17km	\$1010.20	6	

HOSPITAL BREAKDOWN

STAFF SURVEY RESULTS

Pre and Post Implementation Staff Survey Results



POST IMPLEMENTATION CASE STUDY

- 53 yr old female fall down stairs - # T7
 - Presented to small rural hospital 221 km from JHH
 - AMO consulted Neurosurgery at JHH
 - TLSO prescribed
- Local Physiotherapist contacted JHH re TLSO options
- Successfully linked into nearby rural referral hospital
 - 66kms away
 - Admitted for 1 day for TLSO fitting
 - Education re TLSO fitting.
 - Discharged from referral hospital.
- Follow up at JHH clinic 6 weeks post injury
 - Successful utilisation of model of care



LEARNING POINTS



I THINK MY WORK HERE IS DONE.

- Benefits of Telehealth
- Benefits of professional networking
- Strategies to support patients to remain in local communities for management of their injuries

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