



## MANAGEMENT OF PAEDIATRIC DIAPHYSEAL FEMORAL FRACTURES

Natasha Picardo, John Stammers,  
Matthew Barry

# Introduction

- 4 yo girl admitted to Whipps X hospital after slipped and fell in kitchen
- Sustained closed femoral shaft fracture
- Treated in skin traction for 7 days



# Introduction

- Whilst on skin traction, developed two pressure sores:
  - grade 1 pressure sore dorsum of foot
  - grade 2 pressure sore heel/ achilles area
- After 7 days of traction, hip spica applied under GA



# INTRODUCTION

- Due to pressure sores complication, decision made to review paediatric diaphyseal femoral fractures treated across Barts Health NHS Trust in one year
- Aim: to compare treatment with the AAOS guidelines and make recommendations to improve care

**AAOS**  
AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS

TREATMENT OF PEDIATRIC DIAPHYSEAL FEMUR FRACTURES  
EVIDENCE-BASED CLINICAL PRACTICE GUIDELINE

Adopted by the American Academy of Orthopaedic Surgeons  
Board of Directors

June 12, 2015

ORTHOGUIDELINES

## AAOS guidelines – Paediatric diaphyseal femoral fractures

- Pavlik harness or hip spica cast in children  $\leq 6$  months
- Early spica casting OR traction with delayed spica casting in children 6 months to 5 years with  $<2\text{cm}$  shortening
- Unable to recommend for or against early spica casting in children 6 months to 5 years with  $>2\text{cm}$  shortening
- Flexible intramedullary nailing is an option in 5 -11 year olds
- Rigid trochanteric entry nailing, submuscular plating and flexible intramedullary nailing are options in 11 year olds to skeletal maturity.

# METHOD

- All paediatric diaphyseal displaced fractures presenting to RLH, Whipps X and Newham between 31st May 2014 and 31<sup>st</sup> May 2015 identified
- Children  $\leq 16$  included
- Notes, CRS and xrays reviewed
- Length of stay, treatment details and complications noted
- Treatment strategies compared to AAOS guidelines
- Review length of stay and calculate costs of early vs late hip spica

## RESULTS

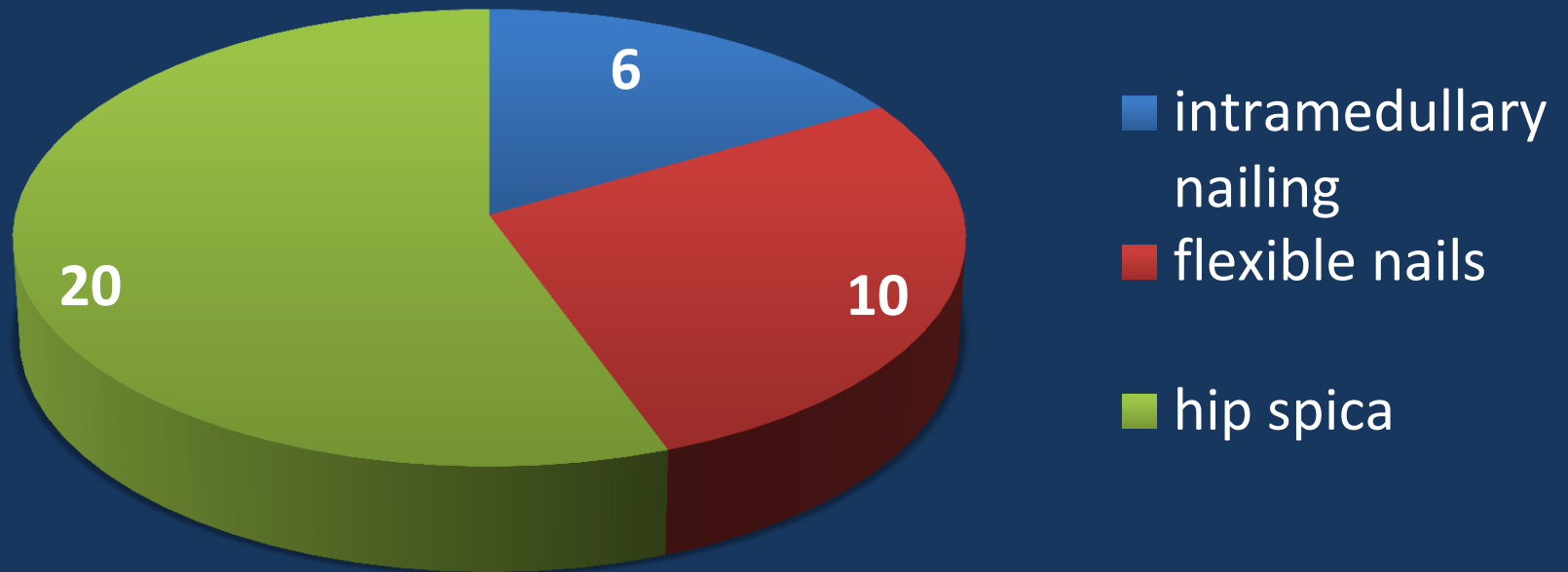
- 36 children admitted to Barts Health NHS Trust over one year for displaced diaphyseal femoral fracture
- Age range 10 months – 16 years
- RLH (28 cases) , WXH ( 8 cases).
- 34 cases complied with the AAOs guidelines, 2 cases did not

## NON-COMPLIANT CASES

1. 13yo M with cerebral palsy, non-ambulatory, learning difficulties. Sustained midshaft spiral femur fracture after epileptic seizure. Treated with hip spica.
1. 6yo M autistic and epileptic. Fell at home. Sustained midshaft femur fracture. Treated with hip spica as parents refused elastic nails.



# Treatments



All intramedullary nailing and flexible nailing undertaken at Royal London Hospital. Hip spica application undertaken at both sites.

# Complications

- 7 complications in total ( 19.4%)
  - 2 children returned to theatre following flexible nailing for nail trimming, wound debridement and closure ( 37 days postop and 9 days postop).
  - 2 hip spicas revised due to soiling
  - 2 hip spica postoperative loss of position – revision to submuscular plating (18 days postop and 11 days postop)
  - 1 child developed pressure sores due to traction (7 days traction in total) before hip spica application.

# Length of stay and time to surgery – both sites

Median length of stay = 5 days ( 1-34)

Median time to surgery from admission = 1 day  
(0-11 days)

Delays between admission and surgery  
accounted for by use of traction prior to hip  
spica application

# Length of stay at each site - RLH

- Median length of stay = 4 days (1-34 days)
- 4 out of 28 children admitted to RLH had inpatient stays of more than 7 days

## Reasons for RLH stays > 7 days:

- 13yo boy with quadriplegic CP – remained inpatient whilst pedinail ordered. LOS = 10 days
- 10yo boy – ped v moped. Femoral fracture and PR bleeding – joint care with paed surgeons. LOS = 10 days
- 12yo boy – ped v car. Head injury (subdural haematoma) and femoral fracture – joint care with neurosurgeons. LOS = 12 days
- 3 yo boy – NAI issues and spica revision necessary due to soiling. LOS = 34 days

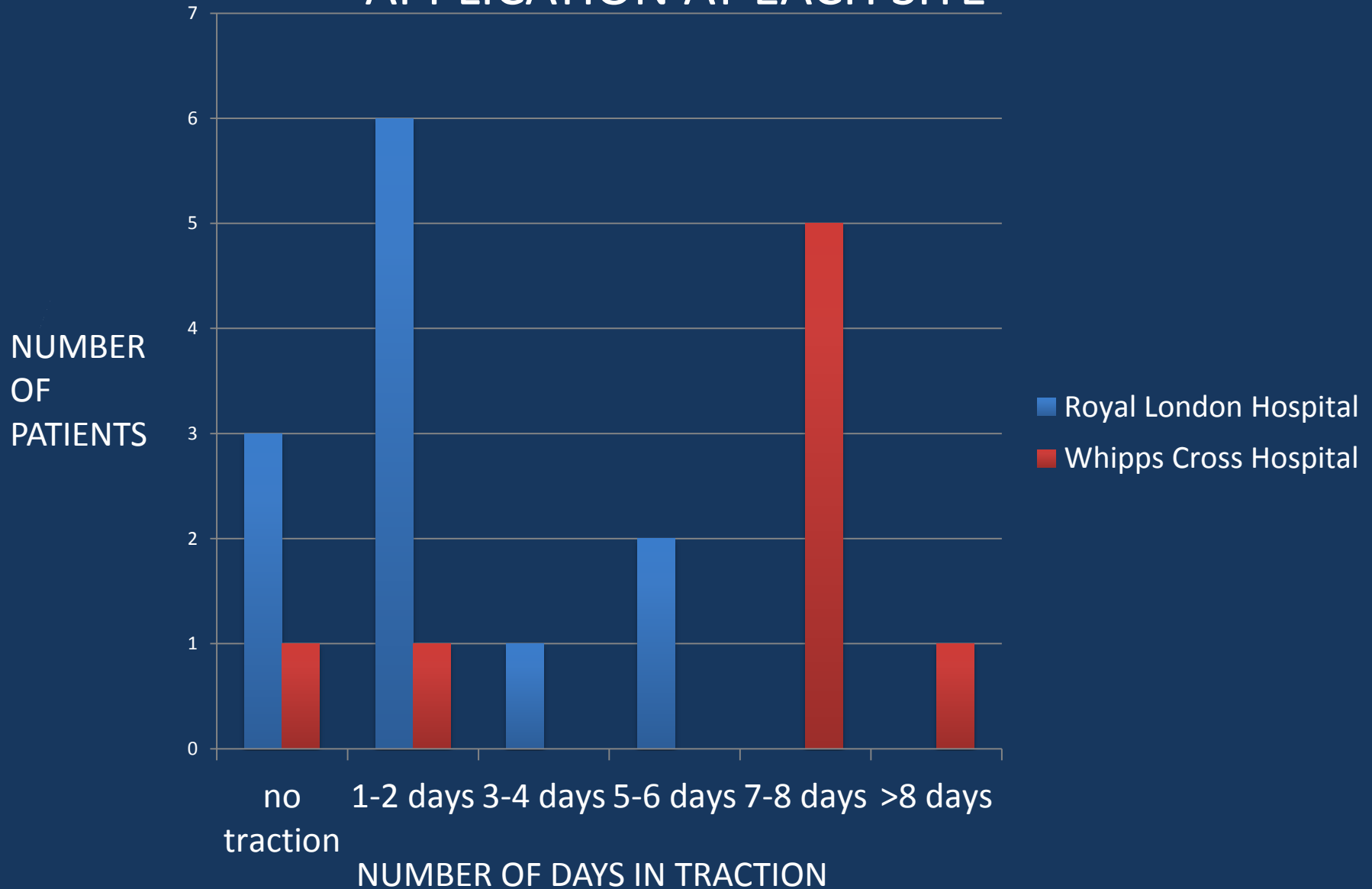
# Length of stay at each site - WCH

- Median length of stay = 8 days (2-15 days)
- 5 out of 8 children admitted to Whipps had inpatient stays of more than 7 days

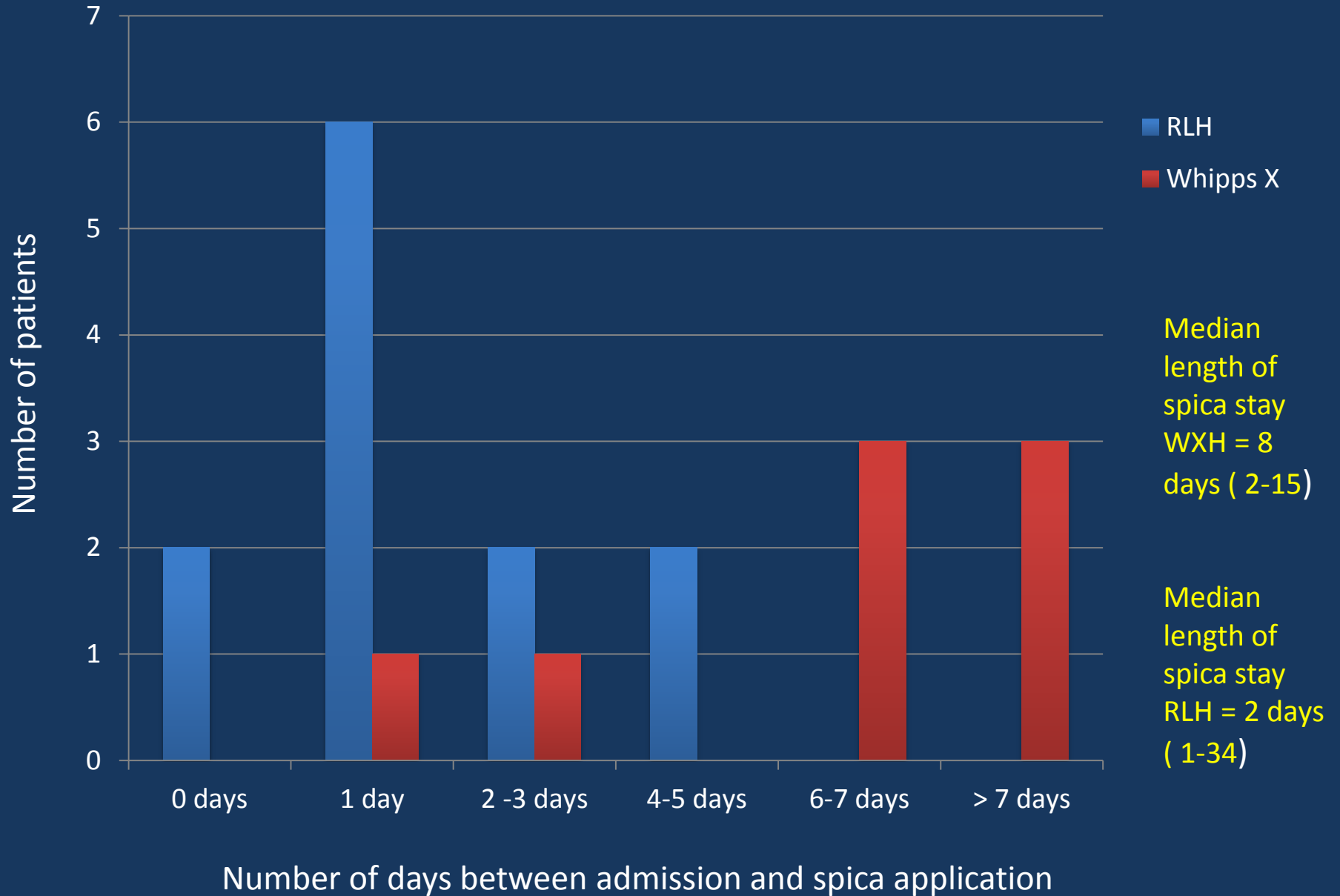
## Reasons for WCH stays > 7 days:

- All accounted for by time between skin traction and hip spica application

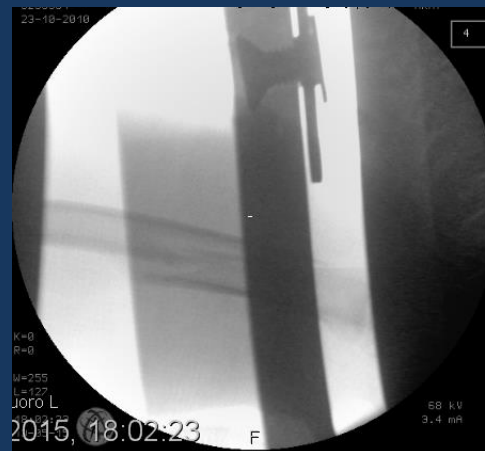
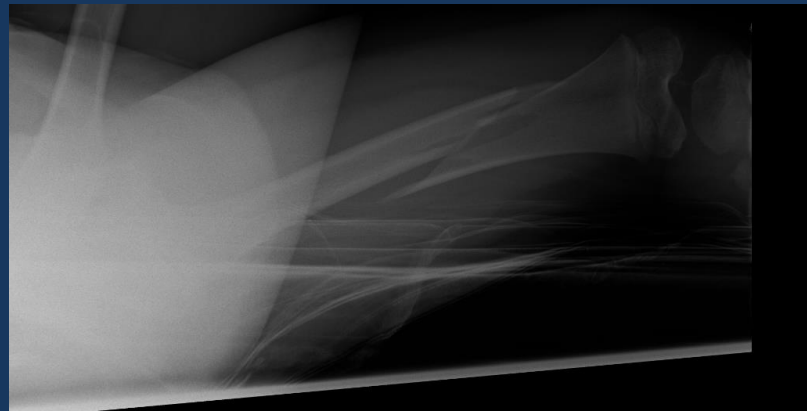
# LENGTH OF TIME IN SKIN TRACTION BEFORE HIP SPICA APPLICATION AT EACH SITE



# LENGTH OF TIME BETWEEN ADMISSION AND SPICA APPLICATION



- 4yo M admitted 12/5/15 after fall in park. Left femur fracture. 13/5/15 – hip spica with wedging and discharged next day.





- XR 1/52 later satisfactory
- XR 2/52 later – loss of position as swelling subsided
- Revised to submuscular plating 1/6/14 after loss of position



- 3yo M 15/11/14 ped v car. Polytrauma pt – t/f GOSH for head injury/ chest injuries. Skin traction. Returned RLH 20/11/14 . Hip spica 23/11/14.



- XR 1 week later revealed displacement. Submuscular plating performed.



# Cost of traction prior to hip spica

- Hip Spica application HRG code reimbursement £5437 + daily rate if LOS >29 days
- £406 per emergency paediatric bed day (DOH reference costs)
- RLH (12) -14 extra bed days in 3 patients. £5684.
- Whipps Cross (8)-36 extra bed days in 6 patients. £14,616.

## Trustwide

- Early spica (11)
- Late spica (9) £20300 extra bed costs

## Unknown

- x2 cases requiring early reoperation for fracture displacement have required surgery if they had late spica after traction.

# Discussion

- Overall good compliance with guidelines
- Cases of non-compliance appropriate
- Increased length of stay associated with delayed hip spica application at increased cost of extra bed days
- From experience at RLH, we generally recommend early spica application even when shortening of  $>2\text{cm}$  present – earliest available trauma list
- Only level V evidence of early spica vs traction and delayed spica
- If traction used, correct traction techniques should be used eg to protect bony prominences
- Daily inspection to monitor for pressure sores until hip spica application
- Consider transfer of patients to RLH if unable to perform early spica at Whipps