# Management of acute crises in sickle cell disease

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# Conflicts of Interest

- *Bluebird Bio:* Advisory committee, Research Funding
- *Pfizer:* Advisory committee
- *Global Blood Therapeutics:* PI, advisory committee
- *ApoPharma:* Advisory committee
- *Novartis*: PI, Advisory committee

# Overview

- Acute pain crisis- general aspects of management
- Use of opioid analgesics
- Complex pain
- Management of acute pain from patient perspective
- Acute chest syndrome pathophysiology and management
- Conclusions

# Terminology

- Sickle crisis
- Acute painful crisis
- Acute painful episode
- Vaso-occlusive crisis (VOC)
- Vaso-occlusive event (VOE)

# Pain in Sickle cell disease

Platt et al, NEJM 1997; 325:11-16

**Pain episode**

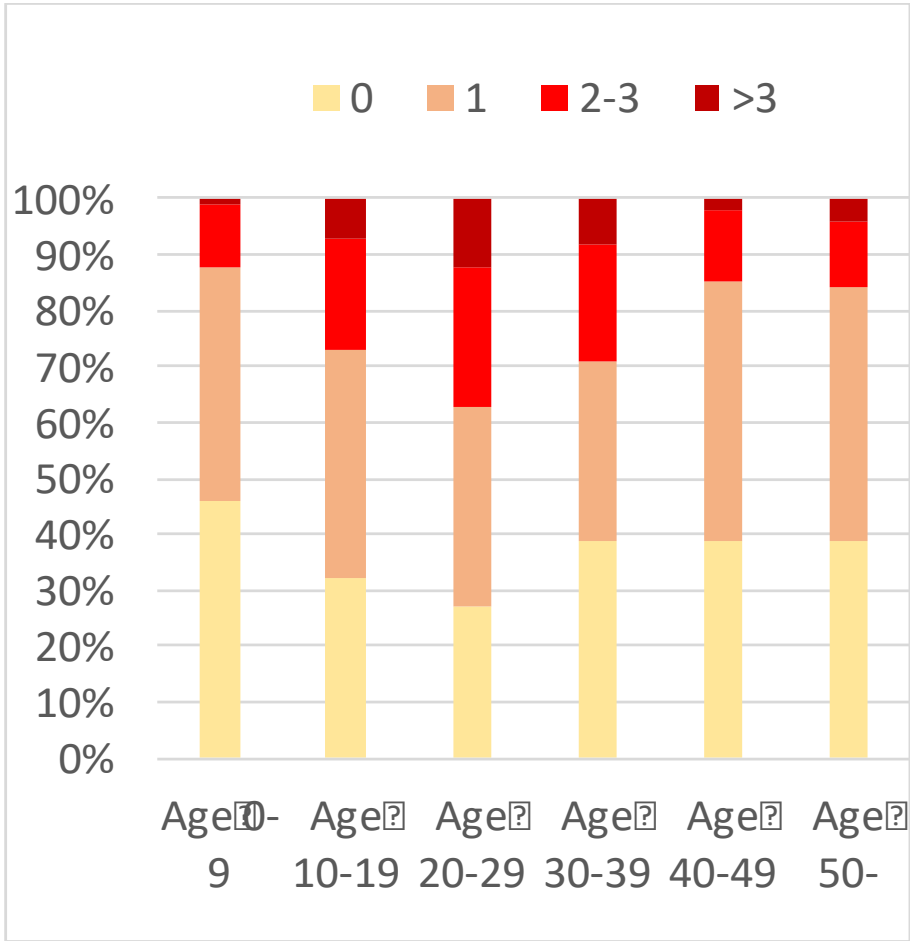
- Visit to a medical facility
- No other cause of pain
- >2 hours
- Excluded ACS, dactylitis, RUQ syndrome

**3-10 episodes per year**

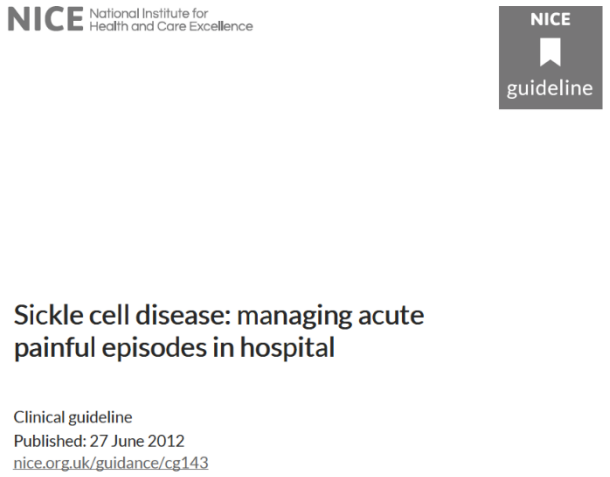
•5.9 % of patients

•32.9% of episodes

**Annual rate: HbSS**

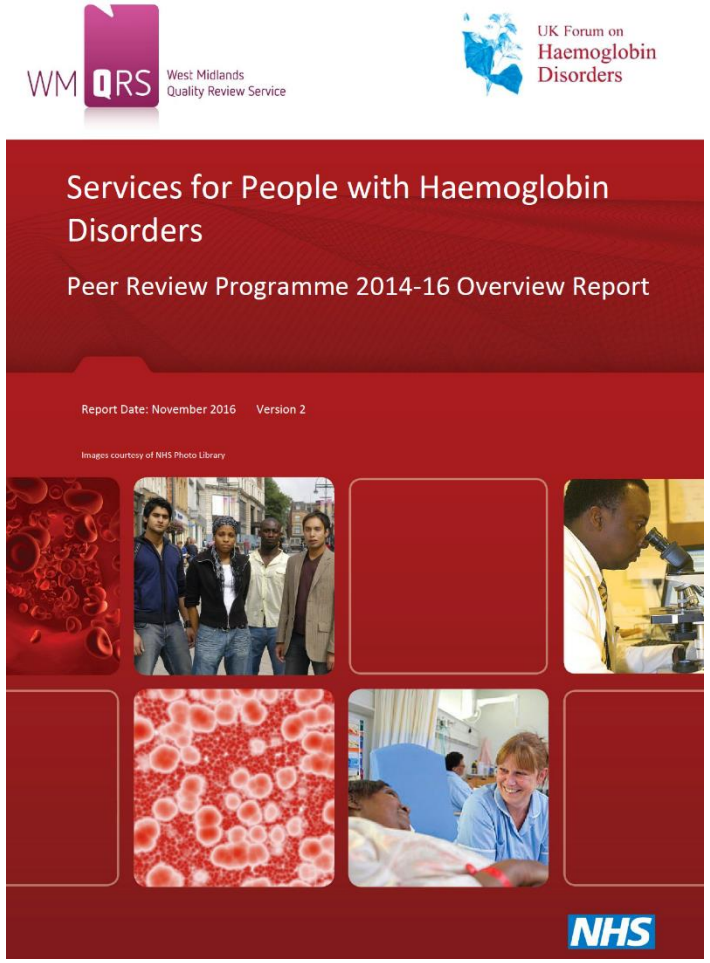


# UK National Institute for Health Care Excellence Guidelines 2012




- Offer analgesia within 30 minutes of presentation
- Assess the effectiveness of pain relief every 30 minutes until satisfactory pain relief, and at least every 4 hours thereafter
- Consider patient-controlled analgesia if repeated bolus doses of a strong opioid are needed within 2 hours.
- Monitor patients taking strong opioids for adverse events every 1 hour for the first 6 hours at least every 4 hours thereafter.
- Encourage the patient to use their own coping mechanisms

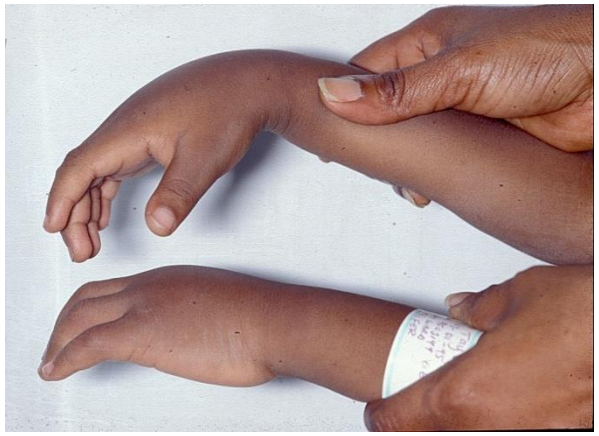
# Peer review of Specialist Centres in England

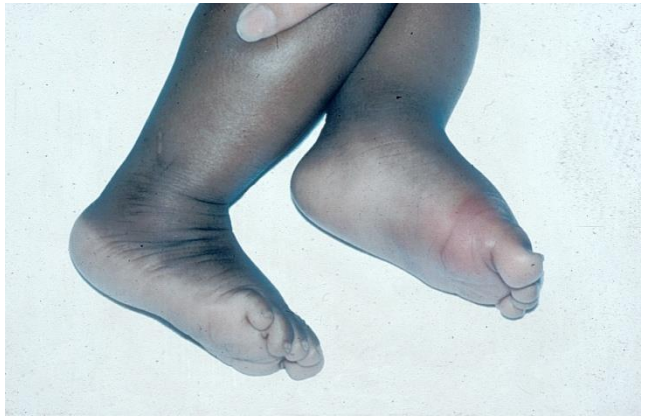



- Most trusts not able to provide analgesia within 30 mins
- Repeat audits showed no improvement
- Patient feedback: Unacceptable delays in receiving analgesia in ED's, lack of empathy amongst medical and nursing staff

# Avoid, or at least think carefully about……

- Unnecessary X Rays
- Hyperhydration
- Over-use of antibiotics
- Transfusion
- Urgent surgical intervention for swollen joint/limb, painful swollen abdomen





# Hospital management of acute pain episode: Staged analgesia plan

**Initial analgesia**
- ED/ACUTE CARE UNIT
- First 6 hours

**Continued analgesia**
- Acute medical/paediatric ward
- Average 3-5 days

**Withdrawl of analgesia**
- 24-48 hours prior to discharge

- *Initial dose within 30 mins of arrival*
- *Bolus dose: oral/im/iv/other*
- *Further bolus doses until pain score reducing*
- *Hourly observations: PS, RR, Sedation*

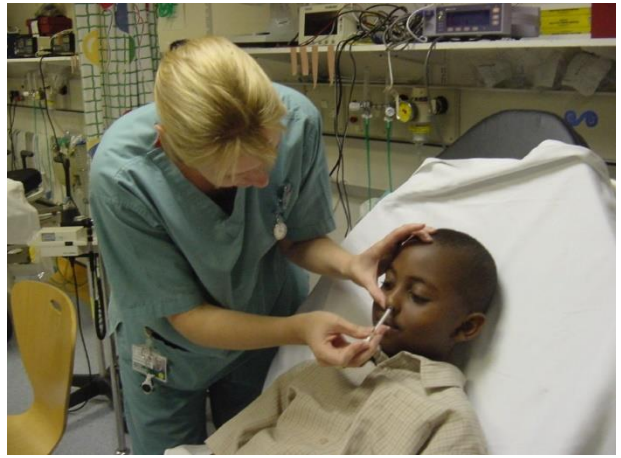
- *Breakthrough bolus po/sc/iv/ PCA demand*
- *Background if required: Long acting oral, iv or sc PCA*
- *Proactive analgesia*
- *4 hourly observations: PS, RR, Sedation*

- *Stop injections*
- *Reduce doses of background and breakthrough*
- *Convert to appropriate oral regime to be continued at home*

# Which opioid?

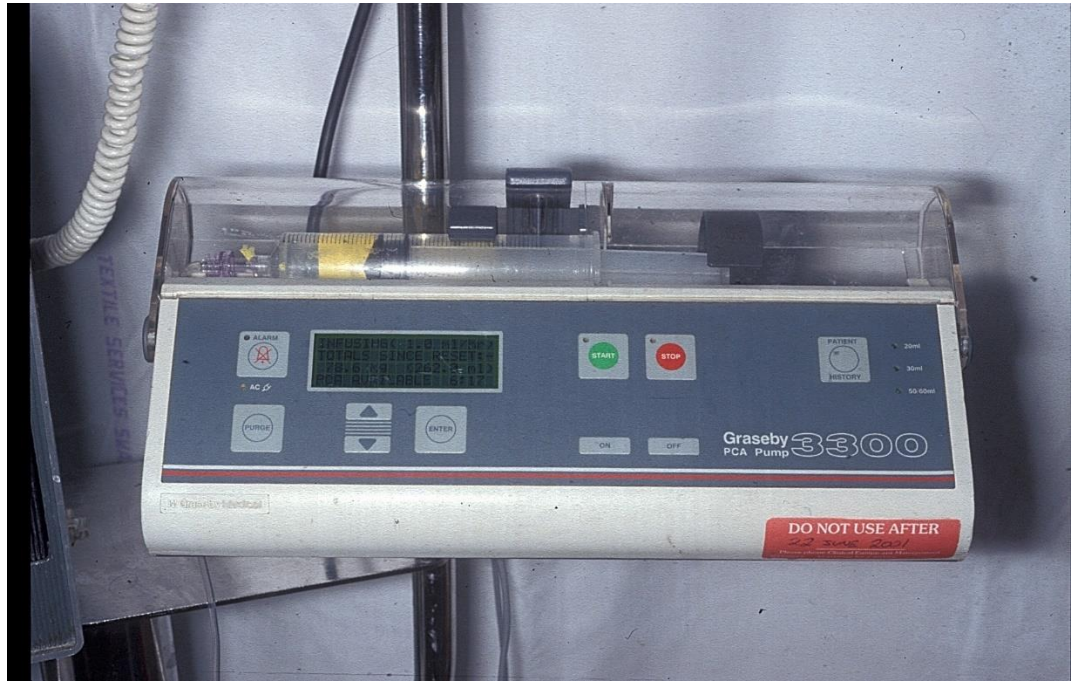
| | Advantages | Disadvantages |
|---|---|---|
| Morphine | Most experience in clinical practice and trials | • Drug/active metabolite accumulation<br>• Adverse effects<br>• ?ACS risk |
| Diamorphine | Highly soluble | Addictive potential |
| Oxycodone | • Inactive metabolites<br>• Better side effect profile | Addictive potential |
| Fentanyl | • Short half life<br>• Highly potent | • No tablet/liquid formulation<br>• Itching++ |

# Routes of administration of opioids



Intranasal diamorphine


Buccal fentanyl




i.v. PCA

# Efficacy monitoring- pain score

VAS – visual analogue scale

**How severe is your pain?**

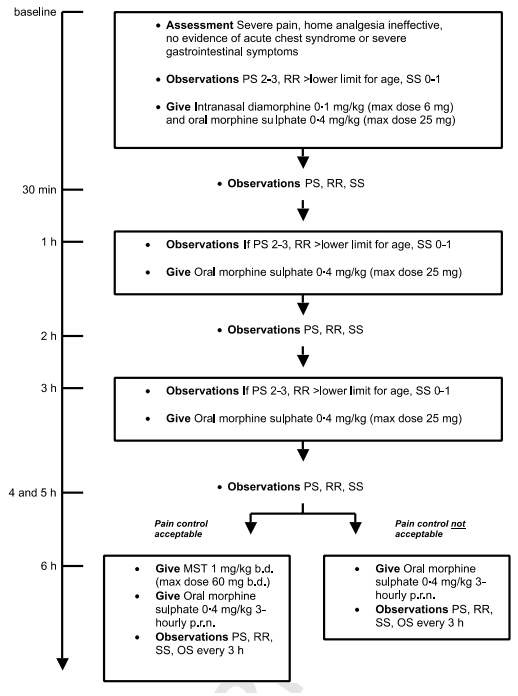
No pain

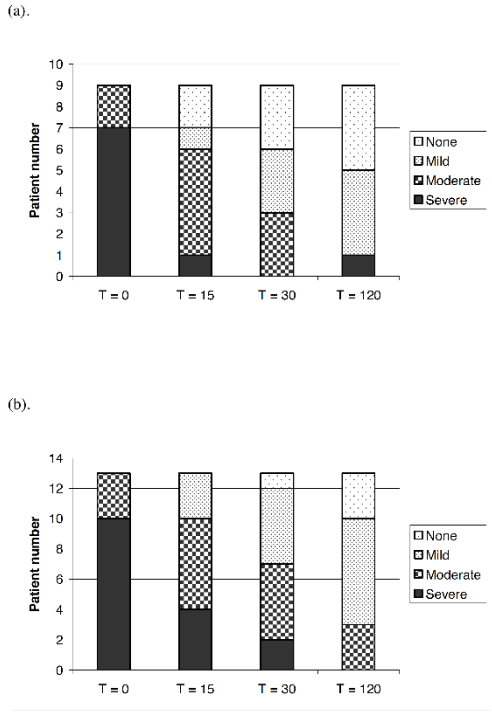
Worst pain imaginable

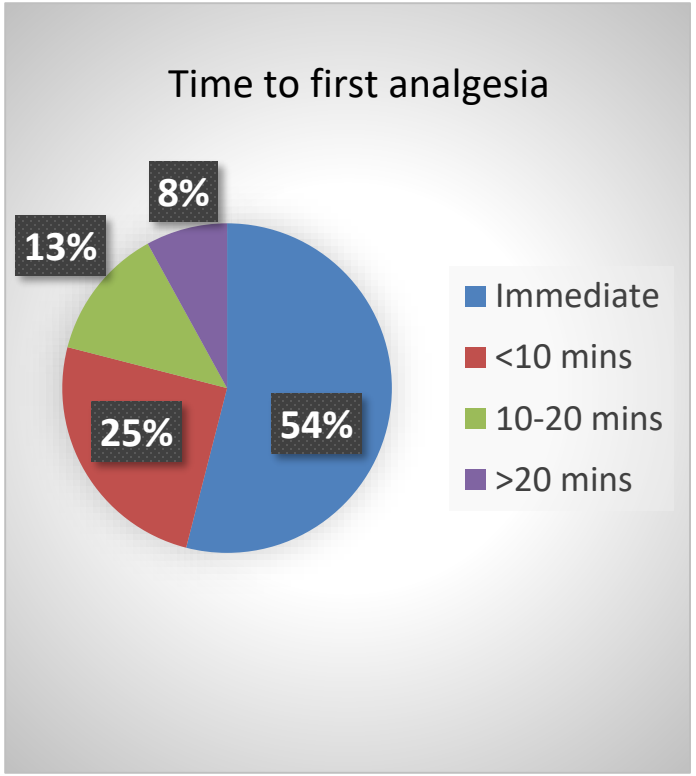
# Safety monitoring

- Sedation score: AVPU
- Respiratory rate
- Oxygen saturation-pulse oximetry
- Opiate adverse effects: pruritis, constipation, urinary retention, cognitive effects

# Intranasal diamorphine and oral morphine protocol for children

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Barts Health NHS
NHS Trust

Scape **S**ickle **C**ell **A**nalgesia **P**rotocol **E**valuation

b+tlc BARTS CHARITY
Funding extraordinary healthcare

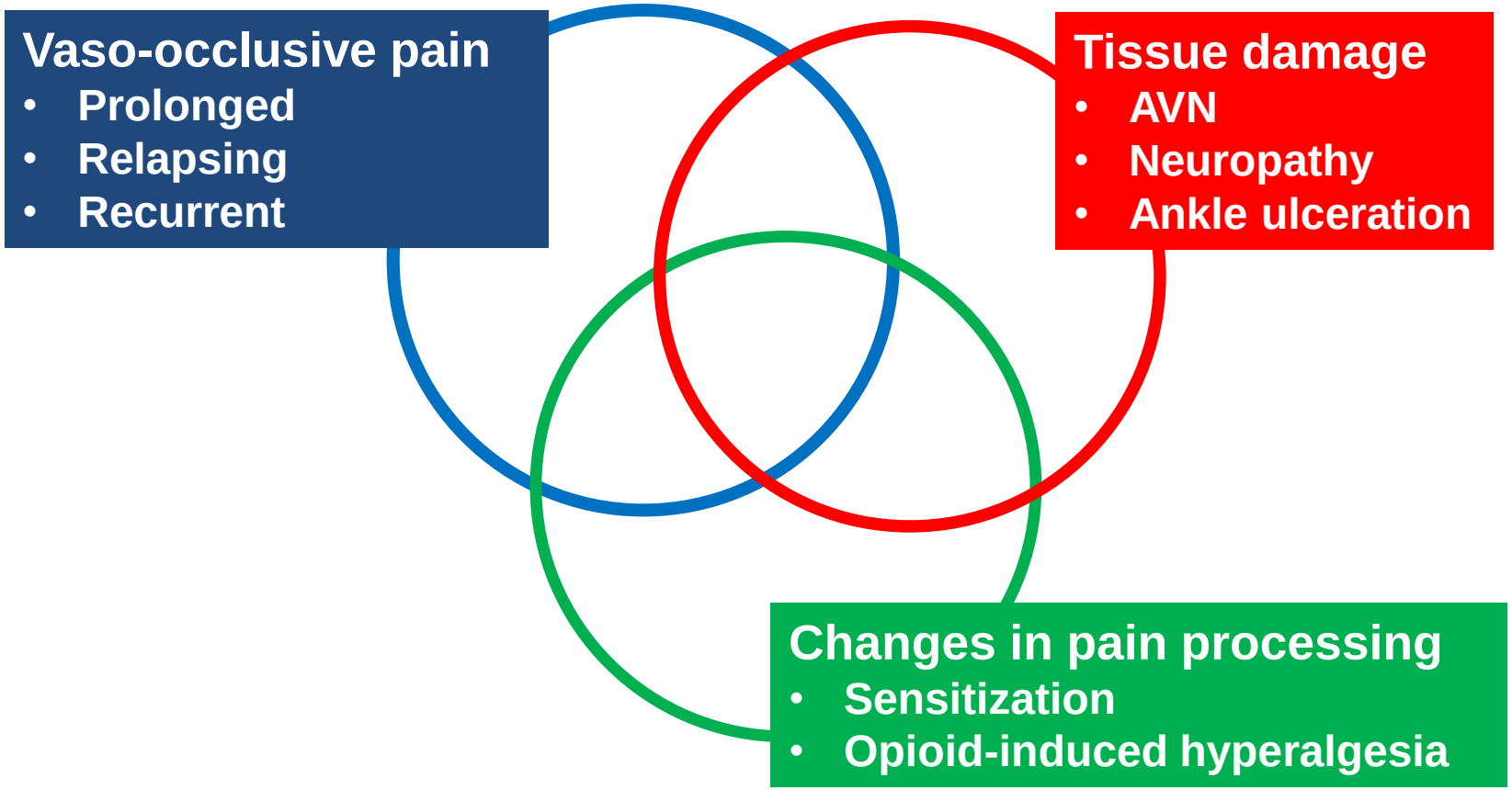
- Phase I/II evaluation of sub lingual fentanyl combined with oral oxycodone for adolescents and adults with acute painful crisis
- Questionnaire to assess patient satisfaction with overall hospital management
- e-learning module for staff educational

# High health care utilization

- Increased rate of complications of SCD
- Reactive coping strategies
- Passive or aggressive interactions with health professionals
- Increased home opioid usage
- Symptoms of depression

Carroll et al, Am J Haematol 2009 ; Brown et al, J Pain and Sympt Management 2015;
Maxwell and Streetley, BMJ 1999 ; Smith et al, Ann Int Med 2008;
Jonassaint et al, BJ Haem 2016

# Chronic pain in SCD



# Managing patients with complex pain

- Involvement of multi-disciplinary team
- Individualized acute management protocol
- Education about adverse effects of opioids
- Careful management of opioid use- one prescriber
- Explore non-pharmaceutical interventions
- Regular scheduled post-discharge follow-up

# Management from the patient's perspective

Renedo *et al. BMC Health Services Research* (2019) 19:876
https://doi.org/10.1186/s12913-019-4726-5

BMC Health Services Research

RESEARCH ARTICLE Open Access

## Not being heard: barriers to high quality unplanned hospital care during young people's transition to adult services – evidence from 'this sickle cell life' research

Alicia Renedo[1], Sam Miles[1], Subarna Chakravorty[2], Andrea Leigh[3], Paul Telfer[4], John O. Warner[5] and Cicely Marston[1*]

- Participants reported significant problems with the care they received in A&E during painful episodes, and in hospital wards as inpatients during unplanned healthcare.
- They experienced delays in being given pain relief and their basic care needs were not always met.
- Participants said that non-specialist healthcare staff did not seem to know enough about SCD and when they tried to work with staff to improve care, staff often seemed not prepared to listen to them or act on what they said.
- Participants said they felt out of place in adult wards and uncomfortable with the differences in adult compared with paediatric wards.
- Because of their experiences, they tried to avoid being admitted to hospital, attempting to manage their painful episodes at home and accessing unplanned hospital care only as a last resort.

# Measuring patient satisfaction with treatment of acute pain episode

bjh research paper

## Development and validation of the Satisfaction with Treatment for Pain Questionnaire (STPQ) among patients with sickle cell disease

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Received 11 December 2018; accepted for publication 23 April 2019
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**Summary**

A brief measure of patient satisfaction with treatment for pain is needed to help improve the treatment of painful episodes caused by sickle cell disease (SCD), especially during and after the transition from paediatric to adult care. Focus groups of 28 adolescent and adult patients were consulted about the content, clarity and relevance of 30 potential items, resulting in an 18-item version. This was validated by analysing questionnaire responses from 120 patients aged 12–53 years. Confirmatory factor analysis and item analysis indicated five subscales with high internal reliability: 'Communication and Involvement' (6 items, $\alpha = 0{\cdot}87$); 'Respect and Dignity' (3 items, $\alpha = 0{\cdot}82$); 'Pain Control' (3 items, $\alpha = 0{\cdot}91$); 'Staff Attitudes and Behaviour' (4 items, $\alpha = 0{\cdot}88$); and 'Overall Satisfaction' (2 items, $\alpha = 0{\cdot}85$) plus a Total Satisfaction score (18 items, $\alpha = 0{\cdot}96$). High negative correlations with the Picker Patient Experience Questionnaire, a measure of problem experiences, indicated good convergent validity. Lower satisfaction scores among patients aged over 18 years, those admitted via the emergency department, those treated by non-specialist hospital staff, and those reporting more breakthrough pain indicated good concurrent validity. The questionnaire provides a convenient brief measure that can be used to inform and evaluate improvements in healthcare for adolescent and adult patients with SCD, and could potentially be adapted for other painful conditions.

Keywords: sickle, pain, treatment, patient, satisfaction.

| | Min-max | Mean (SD) |
|---|---|---|
| Communication & Involvement | 7-30 | 23.39 (4.54) |
| Respect & Dignity | 3-15 | 10.99 (2.87) |
| Pain Control | 3-15 | 10.69 (3.22) |
| Staff Attitudes & Behaviour | 4-20 | 14.77 (3.83) |
| Overall Satisfaction | 2-10 | 7.73 (2.09) |
| Total Satisfaction | 21-90 | 67.57 (15.13) |

# Acute Chest Syndrome

- Acute pulmonary illness specific to SCD
- Characterised by chest pain, fever, cough, dyspnoea
- Presence of new pulmonary infiltrates on chest X-ray

# Typical clinical features

Vichinsky et al, Blood 1997: 89: 1787-92

## Young children

- Fever, cough, middle  and upper lobe involvement.
- Often (but not always) non-progressive

## Older children and adults:

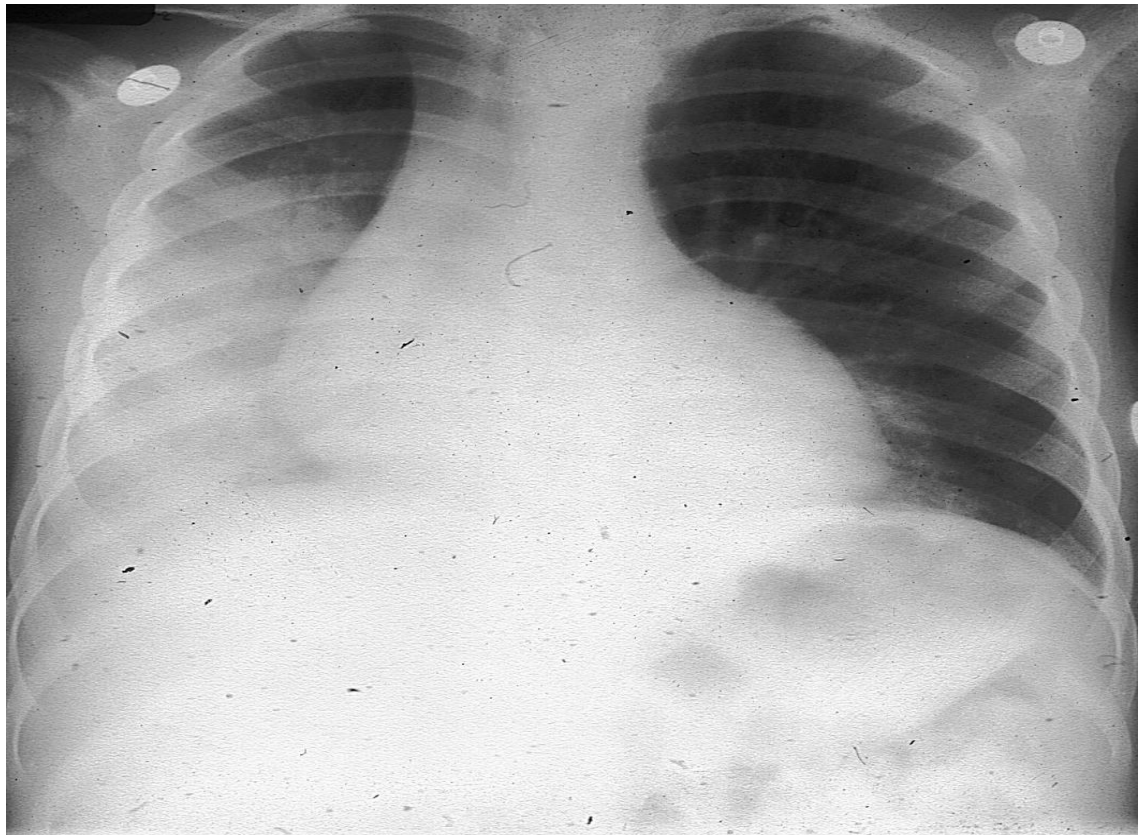
- Pain (often developing during painful crisis), dyspnoea, lower lobe and multi-lobe involvement.
- Often rapid progression to resp failure

# Warning signs of impending ACS

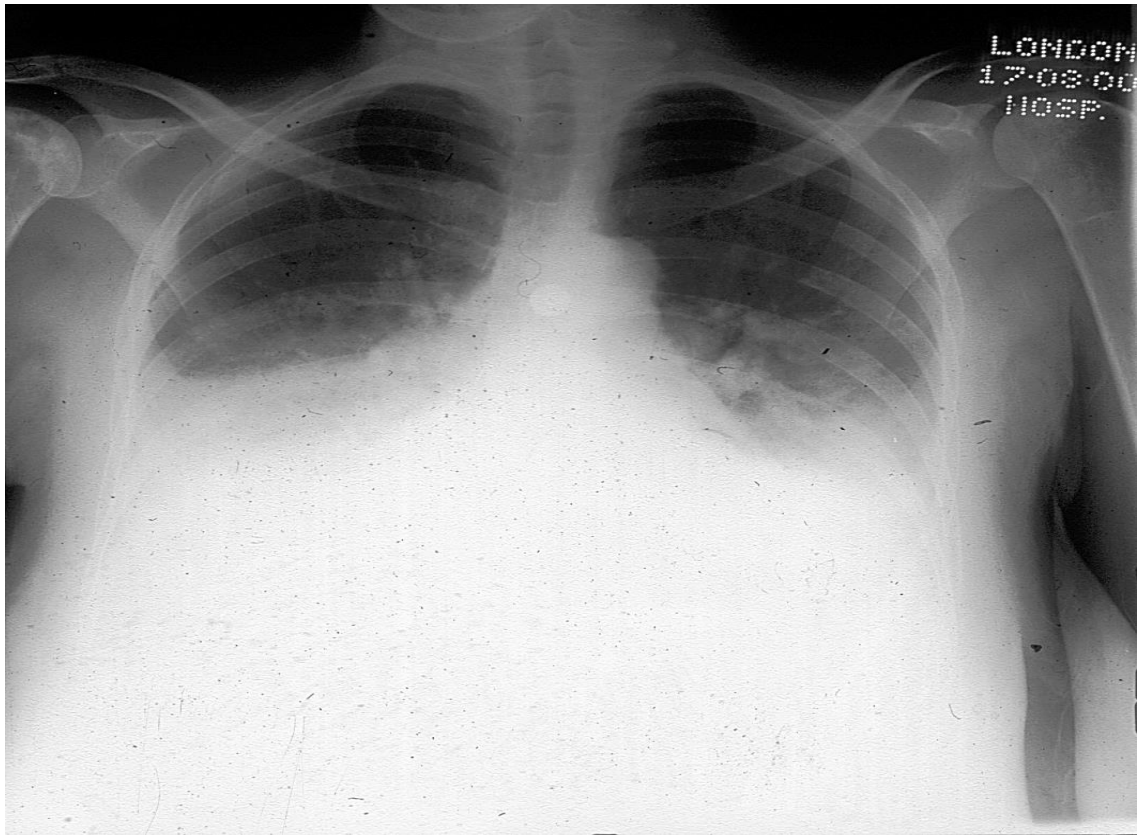
- Increased pain, involving chest
- NEWS/PEWS score alert
  - Increasing respiratory rate
  - Increasing pulse rate
  - Decreasing oxygen saturations
- New chest signs: crepitations, decreased breath sounds, signs of consolidation

# Radiology

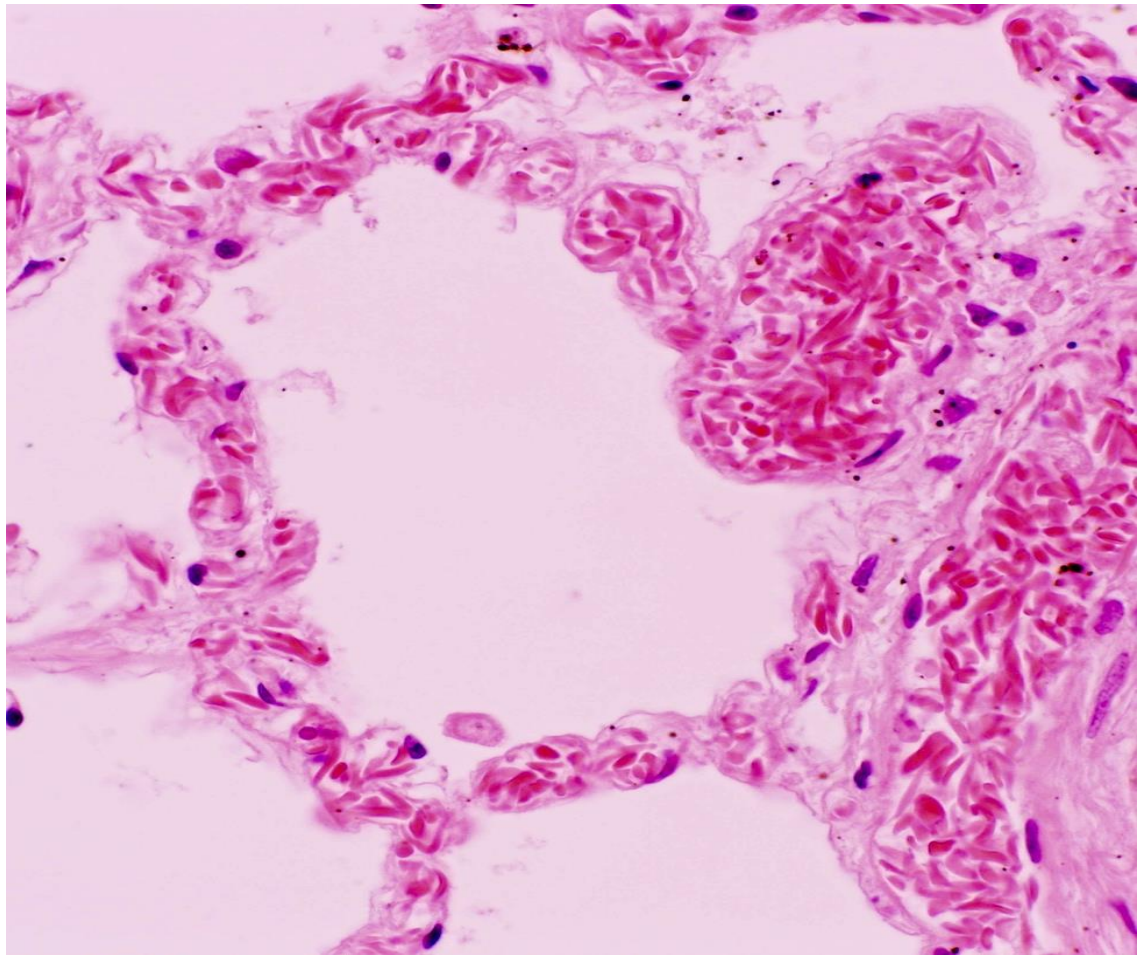
**4 YR OLD**

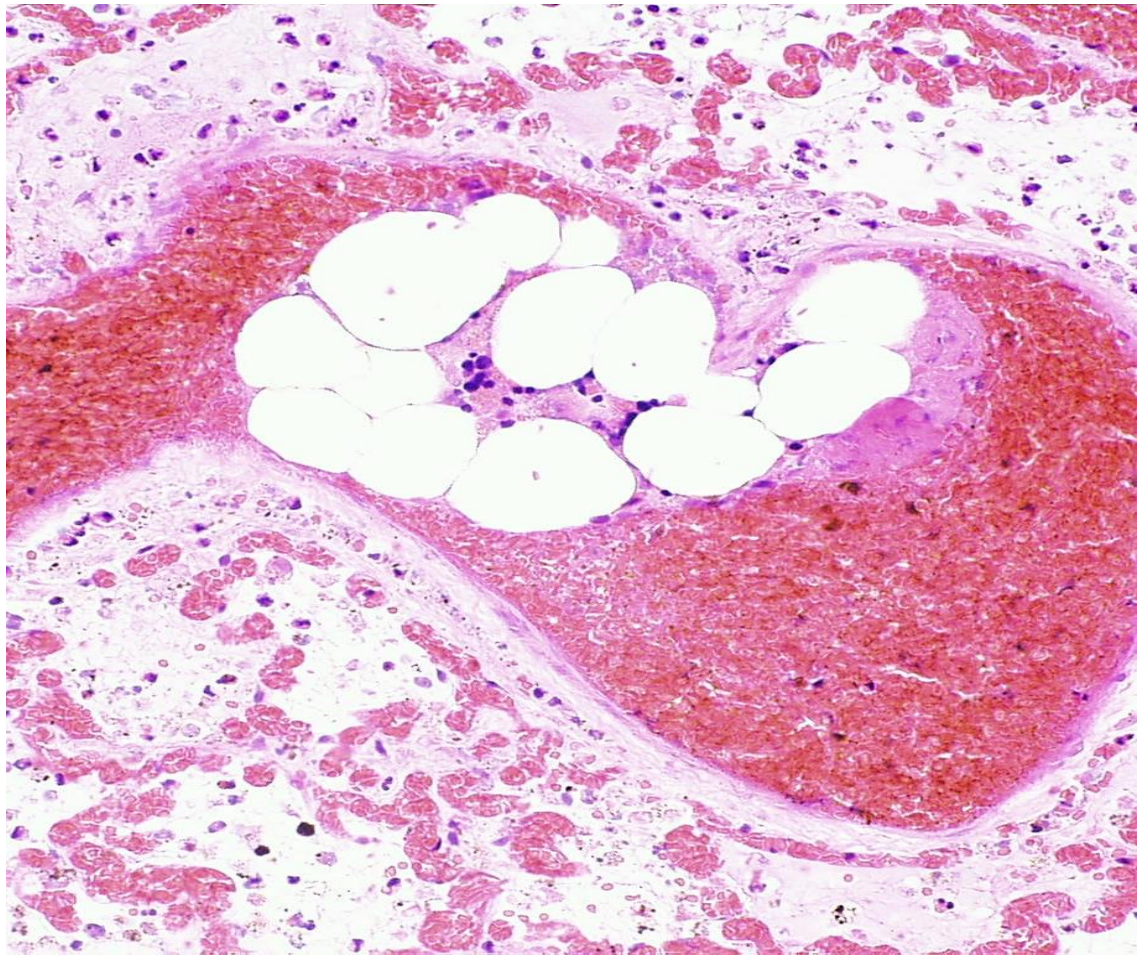


**ADULT**



# PM Histopathology





# ACS-supportive treatment

- Carefully monitored analgesia: Consider fentanyl PCA
- Oxygen: Maintain saturation>95%
- Physiotherapy and incentive spirometry
- Careful fluid balance
- Antibiotics
- Bronchodilators
- May require CPAP, ventilation on ITU

# Acute chest crisis: transfusion

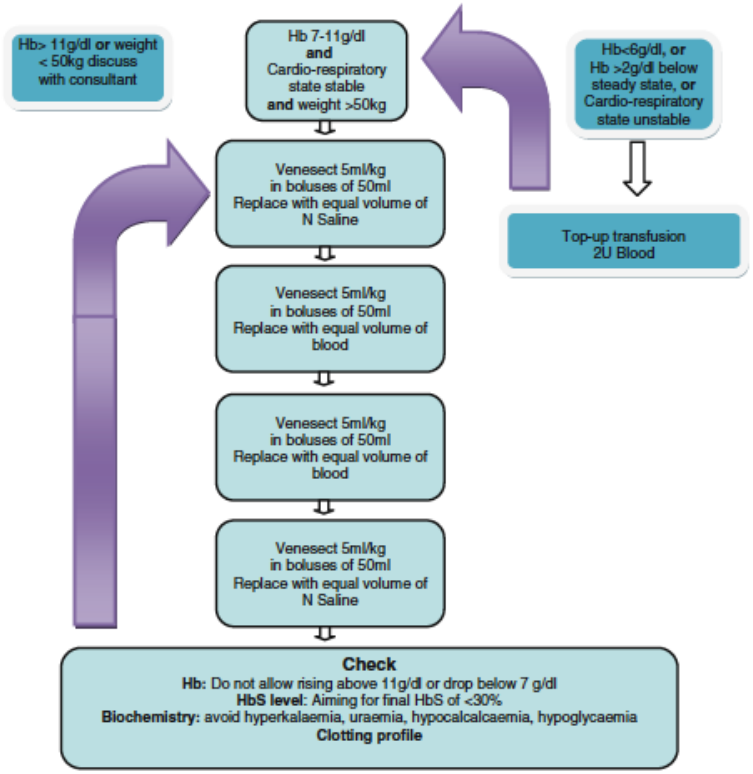
- Mild: may not require transfusion
- Moderate: top-up transfusion or partial exchange: Hb should not be allowed beyond 11g/dl
- Severe: Exchange transfusion, HbS <30%, Hb not above 11g/dl

# Organizing treatment of severe ACS

- Arrange HDU/ICU transfer. If not possible consider manual exchange on ward
- Get blood as soon as possible:
  - speak to transfusion lab
  - no need for fresh blood
  - re-issue phenotype matched blood from stock
- Start exchange as soon as possible
  - No need to wait for HbS%

# Emergency exchange transfusion procedures

## Manual exchange protocol



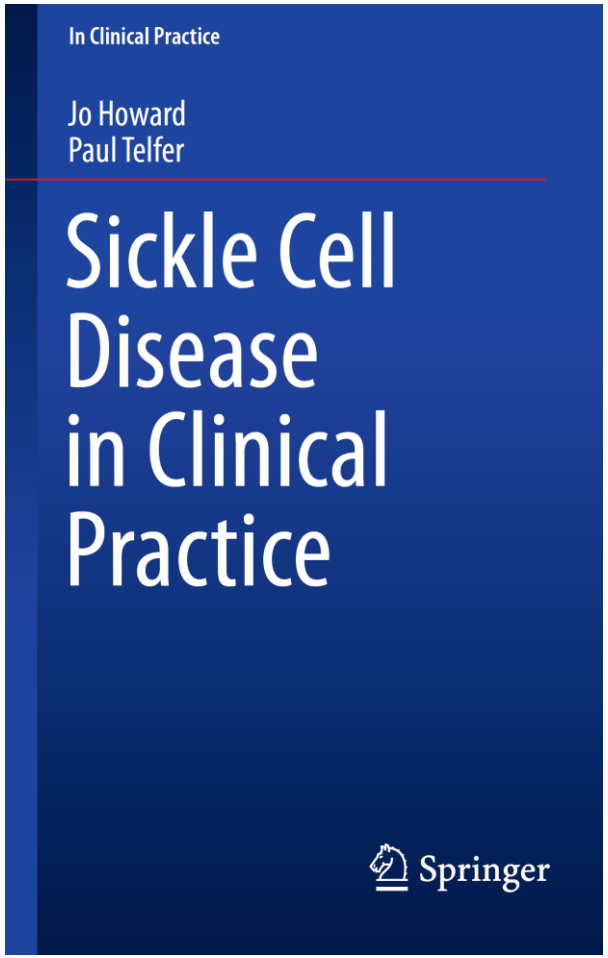

## Automated exchange

# Conclusions

## Responsibilities of the sickle cell specialist

- Nurture a long-term relationship of understanding and trust with patient/parent
- Ensure responsible use of opioid analgesia from an early age
- Coordinate a multidisciplinary approach to treatment and prevention of pain
- Lead an institutional approach to planning of safe, effective and robust acute management pathways

# Additional resources

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