



# The Journal of Bone & Joint Surgery

**Journal Club:** 11 July 2012

**Chairman:** J Doyle

**Attendees:** J Doyle, J Watson, M Choudhry, T Yareshi, J Mace, J Hines, S Javed, R Marappa, A Burton, H Mamoowala

Fairfield General Hospital and North Manchester General Hospital Journal Club (Pennine Acute Hospitals NHS Trust)

Chou DTS, Achan P, Ramachandran M.

**The World Health Organization '5 Moments of Hand Hygiene'**

J Bone Joint Surg [Br] 2012; 94-B:441-5

**Reviewers:** Jay Watson and Muhammad Choudhry

## Background

The last 8 years has seen an increase in healthcare associated infections, such infections having significant morbidity and financial implications throughout many specialities, including Orthopaedics. In order to reduce the burden of healthcare associated infections the World Health Organisation (WHO) launched '5 Moments of Hand Hygiene' claimed as evidence-based, logical and applicable to a wide range of settings, worldwide.

## Methods

The scientific evidence to support the WHO recommendations was critiqued by the authors and summarised separately for each of the individual 'moments', followed by a discussion. Note this was an 'Instructional Review' and not a formal systematic review or metaanalysis.

## Results / The Papers Discussion

The studies and systematic reviews referenced by the WHO included certain floors:

- Limited data regarding causation of disease, studies predominantly relate to pathogen transmission and colonisation
- Lack of statistical significance
- Presence of confounding factors
- Absence of randomisation
- High proportion of low-quality studies
- Use of non-standardised definitions
- Substandard surveillance methods

Only one of the five 'moments' is strongly supported by well-designed studies the remaining four supported by strong theoretical rationale and some experimental clinical or epidemiological studies.

Hand hygiene has an important role in reducing infection however hand hygiene guidelines must not divert us from all the many aspects of infection control:

- Ward cleanliness
- Basic nursing care (including staff experience and patient to nursing number ratios)
- Mixing of infected and non-infected patients due to bed and side-room shortages
- Transfers of patients from one unit to another in order to meet government-dictated treatment time targets

In the age of evidence-based practice, the adoption of such guidelines may create a feeling of distrust towards policymakers.

The authors illustrated the practicalities of implementing the WHO guidelines in such a regimented way, suggesting a single patient encounter could involve seven washes, when extrapolated this would be 150 hand washes on a morning ward round.

Skin irritation issues were highlighted, quoting contact dermatitis prevalence of 25% to 55% in healthcare workers and up to 85% in those with a history of skin problems. In addition skin damage can change the skin flora, resulting in more frequent colonisation by staphylococci and Gram-negative bacilli.

The factors affecting health care associated infections in developing countries cannot be compared directly with those in developed countries, a potential difficulty in worldwide recommendations for hand washing frequency.

## **Discussion**

### **Strengths**

- One of a kind
- Important issue due to the clinical and financial burden of hospital acquired disease
- Relevant as over 15000 hospitals signed up to the WHO hand hygiene campaign, implementing all hospital specialties and clinical settings
- Written by renowned authors from a major unit
- Keeps balanced comments
- Explains practicalities of 5 moments of hand hygiene in real life clinical settings

### **Limitations**

- Paper was an 'Instructional Review' not a systematic review nor metaanalysis of the data, therefore not providing us with a clear nor thorough overview of the literature
- Does not include all the studies and reviews regarding hand hygiene
- Biased review by one specialty doctors
- The evidence and studies are not critiqued by an independent author with a background in hospital acquired infections
- Paper finds fault in the little high quality evidence and randomisation, however the practicality and ethical backing of such studies is uncertain

**Conclusion**

In an age of evidenced based medicine such a review of the scientific backing behind one of our daily practices is valuable. The paper highlights certain flaws in the literature backing the WHO campaign however it does not provide us with the information on how many times we should be washing our hands nor how we should be carrying out research into this area. The paper was well written and we feel it raises interesting discussion on the universal approach to hand hygiene recommended by WHO.

Crawford SK, Lee LS, Izuka BH

**Closed treatment of overriding distal radial fractures without reduction in children**

J Bone Joint Surg [Am] 2012; 94:246-52

**Reviewers:** Tejas Yarashi and James Mace

**Summary****Purpose**

To present a case series from the American state of Hawaii of overriding distal radius fractures without anatomical reduction in children. The hypothesis put forward was as follows: "Our Hypothesis is that closed treatment of overriding distal radial fractures without manipulation results in excellent radiographic and functional outcomes in children"

**Methods**

The study design was a single surgeon retrospective consecutive case review of children under the age of 10 years, over a 5 year time period, institutional review board approval for the study was granted. Inclusion and exclusion criteria were clearly set out, as was the treatment protocol.

Informed consent was sought from parents/guardians, at which time radiographs of long term follow up and remodelling of previous patients were used to illustrate treatment. Treatment consisted of a closed moulded cast applied without analgesia or sedation under fluoroscopic guidance in the outpatients department within 72h of injury by the senior author. Cast change was dependent upon assessment at predefined follow-up intervals, total cast immobilisation was discontinued at clinical and radiological evidence of union. Final follow up was at 1 year.

A cost analysis was performed and cost savings were calculated against other methods of treatment.

At final follow up a simple, non-validated, assessment of function and strength were collected, along with a simple patient satisfaction with treatment survey.

**Results and statistical methods**

Total of 54 patients

Raw radiographic data was used with mean average and standard deviation calculated. Average age was 6.9y. The ulnar fracture was complete in 16 patients and plastically deformed in 29. Average and standard deviation of time in cast was 42 +/- 6.7 days. 7 patients underwent failed manipulation, 1 patient refused treatment by the suggested methods and sought treatment elsewhere.

The following measurements were measured immediately after moulded cast application: radial shortening was 5 +/-2.5mm; sagittal angulation 4.0 +/- 4.1 deg; Coronal angulation 0.75 +/-3.1 deg. Measurements from the final radiographs (1y follow up): sagittal angulation 2.2 +/- 2.7 deg; coronal angulation 0.75+/- 1.4 deg.

Cost analysis against other recognised treatments:

- Office visit with short arm cast (this treatment).	\$1027
- Closed reduction with sedation in the emergency room.	\$4846
- Closed reduction under general anaesthetic.	\$6415
- Closed reduction and pin fixation under general anaesthetic.	\$8742

No objective deficit in strength or movement at the wrist were noted at final follow up, all parents were satisfied with treatment and stated they would choose the same treatment if given the chance to choose again.

## Discussion

### Strengths

- Simple treatment programme.
- Provides a very powerful message on the ability of distal radius fractures to remodel.
- Provides evidence of remodelling in both coronal and sagittal planes.
- Received ethical (institution review board) approval.

### Weaknesses

- Retrospective single surgeon series, with no control group.
- Cost analysis assumes access to fluoroscopy in clinic.
- The fact 1 patient refused to consent to conservative treatment and sought treatment elsewhere suggests selection bias.
- 7 patients underwent failed closed manipulation under sedation/anaesthetic, this suggests selection bias.
- No measurement or comment on residual shortening at final follow up
- Functional assessment of movement and grip strength at final follow up were not validated and did not have very robust definitions.
- No inter/intra observer variability given for radiographic measurements.
- Cost analysis may not be applicable to typical UK based practice.

## Conclusions

This study presents some interesting and enlightening information regarding the potential for remodelling (in coronal as well as sagittal planes) and functional recovery with conservative treatment in the paediatric population. However, due to the study design and the lack of robust and validated outcomes it must be

interpreted with caution. We felt the technique of using cases showing potential remodelling may be useful in some cases of loss of reduction after manipulation. With the results of this study now published perhaps it can pave the way for a well powered prospective, randomised trial with more robust functional endpoints.

Bosker BH, Ettema HB, Boomsma MF, Kollen BJ, Maas M, Verheyen CCPM

**High incidence of pseudotumour formation after large-diameter metal-on-metal total hip replacement.**

J Bone Joint Surg [Br] 2012;94-B:1556-61

**Reviewers:** Joanne Hines and Saqib Javed

**Summary**

We were interested to review this paper as several patients have recently been recalled back following metal on metal (MoM) total hip replacement (THR). Previous studies have demonstrated that peri-articular soft tissue masses, otherwise known as pseudotumours can occur after MoM THR. Previous studies have reported an incidence of pseudotumour formation in MoM THR varies from 1% – 4%. The aims of this study were to assess the incidence of pseudotumour formation and to identify risk factors for their formation in a prospective cohort study.

**Methods**

The study design was deemed a 'prospective cohort study'. Patient selection made from a single centre, double blinded block randomised study assessing the effects of different surgical hip approaches for THR between January 2005 and November 2007.

Exclusion criteria included: body mass index (BMI) > 30kg/m<sup>2</sup>, previous surgery on the ipsilateral side and age >75 years. All patients received a modular THR comprising of a Bi-Metric porous-coated uncemented stem with a metal-on-metal femoral head and a Biomet Recap acetabular component. Assessment for symptoms was made using the Harris Hip Score (HHS), a patient-centred Short-Form health survey (SF-36), and Hip Disability and Osteoarthritis Outcome Score (HOOS).

All patients underwent pelvic and hip radiographs, and a CT of the pelvis and knee. If a peri-articular mass was identified on CT, the patient had an MRI and was offered an ultrasound-guided biopsy. Serum levels of cobalt and chromium were measured at follow-up.

The parameters evaluated for risk factors included age, gender, diameter of femoral component, side, surgical approach, inclination and anteversion of acetabular component, anteversion of stem, combined anteversion of acetabular component and stem, hip centre line-edge distance, metal ion levels, groin pain, clicking sensations, VAS score, HSS, SF-36 and known allergies to antibiotics or nickel.

**Results**

119 patients (120 hips) were studied, but following exclusion and patients being lost to follow-up due to reasons such as refusal to continue with trial, death due to other illnesses, 107 patients (108 hips) were followed up.

A total of 42 pseudotumours were found in 108 hips (39%). Twenty-eight of these went on to have ultrasound guided biopsies. Sixty-five patients (66 hips) were not found to have pseudotumours on CT. Of these, 14 were symptomatic and subsequently had an MRI scan, which showed no pseudotumours.

There was a fourfold risk of developing a pseudotumour in patients with a raised serum cobalt level  $>5 \mu\text{g/l}$ . No other risk factors were identified and no relationship found between the development of a pseudotumour and the size or position of the acetabular or femoral components. There was a statistically significant correlation between serum cobalt levels and the largest diameter of the pseudotumour.

## Discussion

### Strengths

- The question asked by the authors is relevant due to the high number of MoM THR/resurfacing which have been implanted over the last 10-15 years
- The study is clinically relevant
- The abstract is informative and highlights the salient points well
- Study criteria including exclusions are clearly stated
- The statistical analysis used was appropriate and clearly stated. The data was subject to rigorous analysis
- This was a prospective study – recall error is reduced due to longitudinal observation over time at regular intervals
- Consecutive patients were used
- The study design was a prospective cohort study but patient selection was made from a single centre, double blinded block randomised study assessing the effects of different surgical hip approaches. Therefore the study has been through an ethical approval
- There were no conflicts of interest
- There was a low loss to follow up
- Standardised implants were used throughout
- Validated outcome measures used have been independently validated and widely used
- First study to examine all MoM patients with CT/MRI
- Discusses previous studies and draws comparisons
- Highlights the importance of conducting further studies to raise awareness and develop better surveillance methods to allow closer monitoring of all patients with MoM THR
- Using a P of  $<0.1$  to decide which variables to use in multivariate analysis decreases the risk of coincidence when analysing the risk factors
- Outcomes are clearly defined
- Definition of pseudotumour was provided
- Definition of 'symptomatic' patient provided
- Similar scores in pseudotumour and non-pseudotumour groups early on – emphasises the need for better surveillance measures before pseudotumours lead to significant local tissue destruction. Increases awareness of possible risk factors.
- Acknowledges that tissue samples for histological analyses were not ideal

### Limitations

- Study type 'prospective cohort study' perhaps controversial. Patients identified pre-operatively but for a separate RCT. The original study protocol was changed before the group followed up as a retrospective addition. This would have implications on the level of evidence.
- No power calculation
- Relatively short follow up - some studies show that pseudotumours can develop up to 15y post op – need long term f/u results in order to get an idea of true incidence
- Study does not state whether this was a single surgeon or multiple surgeon cohort
- No information about operating surgeons is provided
- Not a multi-centre trial therefore reducing generalisability
- One type of MoM implant (Biomet) only assessed

- Methodology somewhat complicated particularly with regards to choosing the cohort of patients from the RCT
- No comparison group e.g. compare complication rates and functional outcomes to other studies, not just pseudotumour rates
- No information on radiologists experience in detecting pseudotumours
- No information on revision criteria. Only 13 revisions yet 42 patients had a pseudotumour and majority of patients in this group were symptomatic with raised ion levels
- No data on post-operative complications from revisions
- CT – high dose of radiation and those with positive CT scans also went on to have MRI anyway
- Intensive screening protocol undertaken in this study. Currently no MRI or USS is recommended unless raised ion levels, symptomatic or DePuy ASR implants. This screening protocol is not cost effective or reproducible in a NHS setting
- Not stated why metal ions >5micrograms/litre chosen and from which guideline
- Sample size is relatively small
- Logistic regression analysis being performed on lots of risk factors for a relatively small sample size is not ideal and increases the probability of a chance association
- According to this study component positioning did not influence development of pseudotumour yet other studies have proven this. Can this be accurately determined from this cohort of patients (relatively small sample size and lots of risk factors assessed) as we know that mal-positioning of components leads to increased ion levels and therefore pseudotumour.
- 52 males in the study – 16 had a pseudotumour and 38 did not in the study. The numbers do not add up!
- Were biopsies really required when an MRI diagnosis is usually sufficient (USS biopsy was offered to all patients)

## Conclusion

This paper raises some important points, especially with regards to better surveillance methods in detecting pseudotumours before they become too large leading to local tissue destruction. The screening protocol proposed by the authors is not cost effective in a NHS setting. Clearly a balance needs to be struck and as with all algorithms, they are not absolute, and provide a useful adjunct to guide clinical decision making. However, this paper despite some shortcomings raises awareness of the problem and reinforces the idea that all patients who have undergone MoM THR should be recalled and reviewed.