

X-ref For other Roundups in this issue that cross-reference with Research see: [Foot & Ankle Roundup 3](#); [Hip Roundups 7, 8](#); [Knee Roundup 8](#); [Paeds Roundup 6](#); [Shoulder & Elbow Roundup 4](#); [Spine Roundups 1, 2, 3](#); [Trauma Roundups 1, 2, 8](#).

Addressing gender differences in outcome measures

■ There has been a recent massive shift towards pragmatic studies, with some studies (both randomised and otherwise) no longer stratified by gender and race. This does give us some cause for concern, here at 360 HQ. It is well known that outcome measures are gender-, race- and population-specific, hence findings in, say, a mostly Caucasian male population cannot be extrapolated to other patient groups. In an important paper highlighting and quantifying the difficulties associated with assessing outcomes across gender, a study from [Zurich \(Switzerland\)](#) evaluated gender differences in patients undergoing total hip arthroplasty.¹ The study team included 300 patients, all of whom completed a range of scores pre- and post-operatively (OHS, WOMAC, and SF-12). There was a roughly even male:female distribution ($n = 132:129$). At presentation, the Oxford Hip Score (-1.9 points) and WOMAC scores (-6.3 points) suggested a poorer clinical picture while this had evened out by 12 months. The study authors concluded that women have, in general, poorer pre-operative outcome scores, regardless of age, BMI, SF-12 mental health scores, comorbidities and sociodemographic characteristics, however, these normalise post-operatively, with women catching up with their male counterparts by 12 months after surgery. This paper really does highlight to us the gender-specific nature of outcome scores and the difficulties associated with extrapolating scores between different

populations. There is of course an alternative explanation – women may be more stoical than men and only present for surgery by the time they are really in need of an operation. Clearly more work is needed here on this potentially crucial difference in either presentation patterns or score responsiveness.

Leucocyte esterase and periprosthetic joint infection X-ref

■ Unexpected infection in revision joint arthroplasty is a rare but serious complication that leads to gravely compromised revision arthroplasty outcomes. Diagnosis of a periprosthetic joint infection (PJI) is, however, anything but an exact science. Use of laboratory tests such as the erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) are sensitive but not specific, whereas local tests such as joint aspiration are specific but not sensitive. Recent advances in bedside testing has allowed for several more advanced molecular tests to become achievable in the operating theatre. One such test is the leucocyte esterase (LE) test which can be achieved as a point-of-care test using a test strip. The current study from Frimley Park (UK) assessed the accuracy of using a LE strip as an inexpensive and immediate test for the diagnosis or exclusion of PJI.² In this two-centre prospective study, aspirates from 30 total hip arthroplasties (THAs) and 79 total knee arthroplasties (TKAs) were analysed for LE activity. Of the initial cohort, 11 aspirates were excluded due to heavily blood stained fluid, making the test unreadable, so a total of 105 were analysed (79 KAs, 26 THAs). Aspirates were taken from a mixture of patients undergoing revision arthroplasty and those suspected of PJI at a mean of 38 months. The presence of PJI was defined by the Infectious Disease Society of America (IDSA) 2013 guidelines. Using this as a definitive definition (including histological and culture

results), 21 of the aspirates were classified as having a PJI (two THAs and 15 TKAs), giving the LE test an acceptable sensitivity (81%) and high specificity (93%). Based on these results it would not be unreasonable to take a negative LE strip result as excluding PJI and therefore eliminating the need for further diagnostic testing. These test strips provide an inexpensive, repeatable test that can easily be administered to help direct treatment, especially in a setting where experienced staff may be limited.

Chlorhexidine lavage does work X-ref

■ In the pursuit of lower infection rates, surgeons have tried all sorts of potential interventions. The use of detergents to fight infection is an intervention that will likely become more and more important in the antibiotic-resistant world of the future. Intra-operative lavage with bactericidal solutions (such as chlorhexidine or povidone-iodine) is in widespread clinical use but divides opinion. The argument that the damage to the soft-tissue envelope may in fact result in a higher infection rate is countered by the argument that the reduction in bacterial load is likely to result in lower infection rates. A basic science research paper from New York (USA) has sought to investigate this using an *in vitro* model of periprosthetic joint infection.³ The investigators used various concentrations of chlorhexidine lavage to establish the effectiveness of eradication of colony-forming units in their model of MRSA. The research team have established that at a 2% concentration, chlorhexidine gluconate is effective at disinfecting their infected implant model. While this study clearly isn't definitive on the topic, it does add a significant piece to the jigsaw; lavage with 2% chlorhexidine is clearly able to reduce the bacterial load of resistant infections including MRSA. Further clinical studies are clearly needed here. As the incidence of bacterial resistance

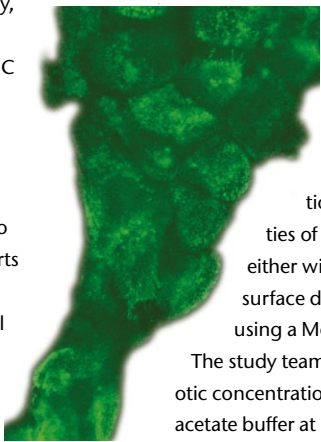
to antibiotics grows, it seems likely that disinfection is going to become increasingly important over the next few years.

Hyponatraemia and orthopaedic surgery

■ The incidence of hyponatraemia is not insignificant in orthopaedic surgery, with patients suffering from both pre- and post-operative hyponatraemia. This is most commonly seen in the peri-operative period for physiologically fragile orthogeriatric patients such as those with neck of femur fractures. There is little evidence to guide clinicians in avoiding the development of, and sequelae associated with, peri-operative hyponatraemia. We had high hopes when a manuscript from authors in [Hershey \(USA\)](#)⁴ crossed the desks at 360 HQ. The study concerns the outcomes of 1067 consecutive patients admitted to a single tertiary referral centre. The authors completed a retrospective chart review and aimed to examine the prevalence, timings, outcomes and causes of hyponatraemia. They present some useful data concerning the impact of both pre- and post-operative hyponatraemia. Patients admitted with hyponatraemia made up 7% of their series and stayed 1.3 days longer in hospital, costing \$2,200 more to treat. The impact was less significant but more commonly seen (30% of patients) for post-operative patients (staying 0.5 days longer and costing \$1,800 more). Factors identified associated with the development of hyponatraemia included age, spinal surgery, hip surgery and excessive use of Ringer's lactate. While the data presented are useful, there was little insight given to the reader as to the cause of hyponatraemia in the majority of patients, and other than avoiding operating on some patients, there was little to guide the practising clinical orthopaedic surgeon as to the best strategies to avoid and manage what can be a costly and serious complication.

dGEMRIC: a useful investigation?

■ MRI scanning is different to other imaging techniques in that the acquisition sequences can be altered to dramatically affect the information gathered. The dGEMRIC sequences are gadolinium-enhanced sequences that are specifically designed to tune the recorded signal to the water content in articular cartilage. Of interest in research studies and in common use in basic science studies, we were delighted to see an attempt at clinical validation cross the desks at 360 HQ. Surgeons in Westmont (USA) aimed, with their study, to determine whether pre-operative dGEMRIC indices of chondral damage correlated with patient-reported outcomes following hip arthroscopy at two years.⁵ The study reports the outcomes of an initial cohort of 56 patients (64 hips) with a short two-year follow-up. The results from this study would suggest that patients with a pre-operative dGEMRIC index of ≥ 323 msec had significantly greater improvement in patient-reported outcomes and VAS pain scores after hip arthroscopy. This fits well with previous work suggesting that those patients with a dGEMRIC index of < 390 msec were at considerable risk of failure following periacetabular osteotomy. The authors postulated that the difference in values may be due to the age of the patients who took part. Currently there is no consensus in the literature regarding appropriate dGEMRIC cut-off thresholds that predict outcomes following hip preservation surgery. Despite the small size of this study, the authors were able to report findings which may well prove to have an impact on patient selection, moving on considerably the scientific basis for offering hip preservation surgery. This



study suggests that use of dGEMRIC in centres providing a hip preservation service may help to achieve more predictable outcomes in this developing field.

The 'teabag' improved spacer

■ Some research projects fit into the 'blindingly obvious' category – so obvious that perhaps it is surprising the research was done at all. But this of course is always with hindsight. We were taken with a simple concept from **Sheffield (UK)**.⁶ Reasoning that surface area relates to elution, the team undertook a basic science study to evaluate the advantages

(or otherwise) of dimpling the surface of handmade antibiotic spacers. This *in vitro* study measured the elution of known quantities of antibiotic cement either with or without a surface dimple produced using a McDonald dissector.

The study team measured antibiotic concentration in ammonium acetate buffer at regular intervals to two weeks following the start of the experiment. Their results suggest that utilising the 'teabag' technique on the cement spacer increases the surface area and therefore increases the effectiveness of eluting antibiotics. A simple and elegant technique that could improve the effectiveness of cement spacers with minimal effort and no cost.

Anticipating AKI X-ref

■ Acute kidney injury (AKI) is, as far as medical diagnoses go, rather trendy at present. The advent of automated patient records and validated algorithms to grade AKI on routine blood tests using the estimated glomerular filtration rate (eGFR) has moved renal injury into the mainstream. The ramifications of AKI in the context of peri-operative orthopaedic care are yet to be fully evaluated, and not only are the implications of AKI uncertain, it is also not entirely clear who

is at risk of AKI. In a simple but important study, researchers in **Dundee (UK)** set out to establish if they could develop and validate a score predicting the risk of AKI in patients undergoing orthopaedic surgery.⁷ Their study (in common with most 'develop a score' methodologies) involved developing a predictive risk model in just over 6000 patients in one hospital, then validating it in a separate cohort of just over 4000 patients. They used linear regression models to establish what the predictors of AKI might be and then developed a multivariate model to predict risk of AKI. The model's predictive value was determined to be 'good' and poor prognosticators included older age, male gender, diabetes, polypharmacy, lower eGFR, ACE inhibitors and increasing ASA grade. As the mortality was also found to be increased with the development of AKI, there is certainly some benefit in being able to identify patients at risk early in their admission.

Regional variation in infection-causing organisms in the UK X-ref

■ A study that needs repeating once in a while is the 'which bugs do we tend to culture' study. Although seemingly 'done before', the variety of infective organisms changes, as do their sensitivities, and regional and temporal variations are well described. As time has gone on these studies have evolved from simply large case series into what we see here from **Warwick (UK)**, large epidemiological studies with linkage of several large data sets.⁸ The research team in Warwick used the data collated by Public Health England's national surgical site infection database, which records mandatory reporting of surgical site infections in every NHS institution in the UK. Their study concerned the data of 189 858 arthroplasties performed across the British Isles and 1116 episodes of infection. In addition to this, the authors undertook a questionnaire to

establish what the local prophylaxis policy was in each hospital (with 100% response). There were significant variations between the prophylaxis regimens, type and incidence of infections. The authors conclude that the widespread variation in prophylactic antibiotic protocols cannot be justified given that seven causative organisms are responsible for around 90% of periprosthetic infections.

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