Supplementary Material

1. Introduction
BACH is a new classification system for long-bone osteomyelitis that uses the multidisciplinary approach to stratify patients. The included variables are bone involvement (B), antimicrobial options (A), coverage of the soft tissues (C), and the host status (H). Based on the BACH classification, patients may be classified as either uncomplicated, complex, or few options available.

2. Individual variables
B: Bone involvement
The bone involvement variable can be made based on a combination of clinical information, examination findings, and radiological imaging. The optimum method to make this classification preoperatively is using clinical imaging software that allows 3D assessment of the infection (user accuracy: 95.7% (95% confidence interval 90.8 to 100.0)). This information should be combined with the clinical history, examination, and alternative imaging to assess for either the involvement of a joint or the presence of a nonunion.

- B1: cavitary involvement (including cortical, medullary and non-segmental corticomedullary);
- B2: segmental involvement (including infective nonunion);
- B3: any bone infection involving a joint.

A: Antimicrobial treatment options
The antimicrobial options are classified from the results of susceptibility testing on deep tissue samples or biopsy. Patients who are yet to receive susceptibility testing or those with culture-negative osteomyelitis are classified as Ax. Patients where all isolates are sensitive to 80% or more of susceptibility test results and resistant to three

susceptibility test results or fewer are classified as A1. Patients with one isolate that is sensitive to less than 80% of susceptibility tests performed or resistant to four or more susceptibility tests performed are classified as A2. In addition, the classification of A2 should include isolates that have resistance to appropriate antibiofilm antibiotics in the presence of an implant (Gram-positive resistance to rifampicin and Gram-negative resistance to fluoroquinolones). Patients with one isolate that has sensitivity to zero or one antibiotic susceptibility test results are classified as A3.

These classifications are made based on the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) criteria for defining multidrug-resistant (MDR: A2), extensively drug-resistant (XDR: A3), and pan-drug-resistant (PDR: A3) isolates in the case of *Staphylococcus aureus, Enterococcus* spp., Enterobacteriaceae, *Pseudomonas aeruginosa*, and *Acinetobacter* spp., and have been adapted to be comprehensive and applicable by a non-specialist.

- Ax: Unknown or culture negative;
- A1: Isolate sensitive to $\geq$ 80% of susceptibility tests *and* resistant to $\leq$ 3 susceptibility tests;
- A2: Isolate sensitive to $<$ 80% of susceptibility tests *or* resistant to $\geq$ 4 susceptibility tests *or* resistant to antibiofilm antibiotics in the presence of an implant;
- A3: Isolates are sensitive to $\leq$ 1 susceptibility test.

C: Coverage of the soft tissues
The coverage of the soft tissues should be classified based on clinical assessment. It can be classified by the orthopaedic surgeon or, if available, the plastic surgeon. Cases involving the medial tibia, knee, and elbow should have a low threshold for being classified as C2, as these cases
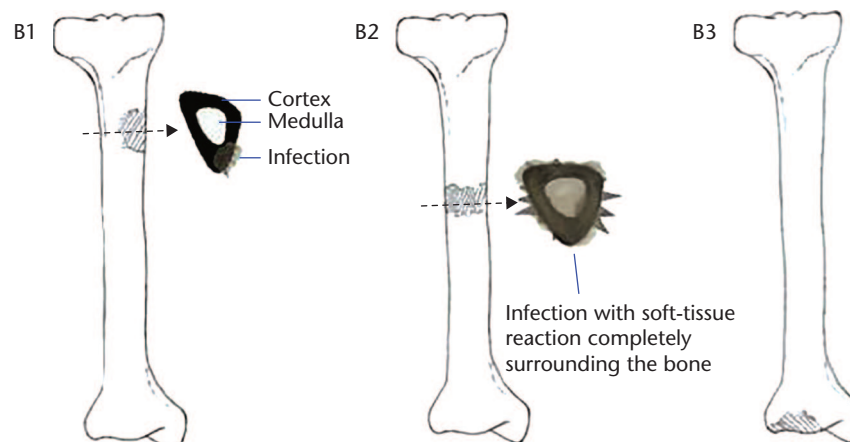

Fig. a

Visual representation of the bone involvement variable in the BACH classification. B1 is a cavitary infection, B2 is segmental, and B3 is osteomyelitis that extends into a joint.

commonly necessitate plastic surgical expertise. Other cases that should have low threshold for referral should include those where previous free or local tissue transfer procedures have been performed.

- C1: Direct closure possible: Plastic surgical expertise not required to provide adequate soft-tissue coverage;
- C2: Direct closure not possible: Plastic surgical expertise required to provide adequate soft-tissue coverage.

H: Host status

The host status should be classified based on the clinical assessment of the treating surgeon or physician. Those that are deemed H3 due to anaesthetic concerns should undergo a formal anaesthetic assessment and, if H3 is confirmed, offered options to suppress the infection. H1 patients are fit and well (no previous comorbidity) or have comorbidity that is well controlled. H2 patients have comorbidity that is either poorly controlled or have comorbidity that has resulted in secondary end-organ damage (for example). Patients who have had previous osteomyelitis debridement surgery should be deemed an H2.

- H1: Patient fit and well *or* Patient has well controlled comorbidity;
- H2: Patient with poorly controlled comorbidity *or* Evidence of any end-organ damage *or* Recurrent osteomyelitis after previous debridement;
- H3: Patient who is unfit for surgery *or* Declines an operation.

3. The BACH classification system

	$\underline{B}$one involvement	$\underline{A}$ntimicrobial options	$\underline{C}$overage by soft tissue	$\underline{H}$ost status
Uncomplicated	B_1 Cavitary infection without joint involvement (including cortical, medullary and non-segmental cortico-medullary)	A_x Unknown / culture negative osteomyelitis A_1 All isolates: • Sensitive to ≥ 80% of susceptibility tests and resistant to ≤ 3 susceptibility tests	C_1 Direct closure possible: Plastic surgery expertise not required	H_1 Well-controlled disease or Patient is fit and well
Complex	B_2 Segmental infection without joint involvement B_3 Any bone infection with associated joint involvement	A_2 Any isolate: • Sensitive to < 80% of all susceptibility tests performed or • Resistant to ≥ 4 susceptibility tests or • Resistant to antibiofilm antibiotics in the presence of an implant	C_2 Direct closure not possible: Plastic surgery expertise required	H_2 Patient with poorly controlled comorbidity or Severe comorbidity (with evidence of end-organ damage) or Recurrent osteomyelitis after previous debridement
Limited options		A_3 Any isolate: • Sensitive to 0 or 1 susceptibility test performed		H_3 Unfit for definitive surgery despite specialist intervention or Patient declines surgery

Fig. b

The BACH classification system for long bone osteomyelitis. The four key variables are headers with the corresponding criteria for making the classification in each. The green band denotes 'uncomplicated' osteomyelitis that can be managed at a non-specialist centre, the amber band denotes 'complex' osteomyelitis that should be managed at a centre with specialist expertise, and the red band is 'limited options available'. The overall complexity of the osteomyelitis is determined by the band of the most severely classified variable.