INTRODUCTION

• Chronic wounds requiring hospitalization often harbor a high bacterial burden that negatively impacts tissue healing.1
• Knowledge of a wound’s bioburden is currently obtained via culture analysis of wound swabs. This knowledge greatly impacts clinician treatment decisions. However, 24-48 hours can pass before results are available and false negatives rates are high.
• Real-time, point-of-care detection of critical bacterial colonization relies primarily on visual inspection and clinical signs and symptoms. Fluorescence imaging has recently been used to detect bacterial fluorescence in wounds at the bedside. This pilot study aimed to assess its effects on clinician decisions and patient care.
• This 7 week pilot study aimed to assess the effects of bacterial fluorescence images on clinician decisions and patient care.

METHODS

Bacterial Fluorescence Imaging (MolecuLight i:X)

• When excited by 405 nm violet light, tissues fluoresce green while bacterial fluorescence red (porphyrin-producers, e.g., Staphylococcus aureus) or cyan (pyoverdine-producing Pseudomonas aeruginosa).
• This enables real-time, point-of-care detection and localization of bioburden within and around wounds.1

RESULTS

Bacterial Fluorescence Imaging Led Clinicians to target sampling to fluorescence-positive regions

Case 1: Pressure Injury - Coccyx

Patient: 77 year old male who sustained a right sided Subdural hematoma and was transferred from another hospital. He had been “Tound down.”

Past Medical History: Diabetes Type II

He had sustained a very large pressure injury and originally had a large black eschar in the buttock region. This eschar area was debrided and a week later the area was imaged with fluorescence. There clearly appeared to be an area of bright red fluorescence and this was then debrided.

72 hours later, repeat fluorescence imaging was deemed negative for heavy bioburden and NPWT was commenced.

Bacterial Fluorescence Imaging Prevented Discharge of Patients Requiring Systemic Antibiotics

Case 2: Pressure Injury - Coccyx

Patient: A 93 year old living in assisted living, uses a walker. Opting to get out of bed without her walker resulted in a fall where she sustained a fracture to her left hip.

Past Medical History: osteoarthritis, chronic anemia myelodysplastic syndrome, asthma

Following surgery there were difficulties with managing on her her sides which resulted in a hospital acquired pressure injury.

At the time of fluorescence imaging, plans were underway to send her to another hospital. The patient was exceedingly anxious and looked for reassurance that her infection was “gone”. Her wound received fluorescence imaging and then the photos were revealed to her which offered reassurance in terms of bacterial burden. This occurred at each dressing change – the patient noted “I no longer need ativan, as long as you use your wound tool – I am reassured.”

Real-time bacterial fluorescence imaging engaged patients in their care and offered reassurance

Case 3: Cat Bite

Patient: 63 year old male, attempted to pull back his cat as he was about to fight with another cat – and his own cat turned on him and bit him on his lower leg.

Past Medical History: unremarkable and no allergies

3 weeks after “cat bite” patient developed a painful right leg wound and abscess development. Cultures taken and immediate antimicrobial wound therapy included daily application of cadexomer iodine. Swabs of red/pink region confirmed heavy growth of Staph aureus, Pasteurella multocida, mixed anaerobes

Images Negative for Bacterial fluorescence allowed for confidence with skin grafted

Case 6: Skin Graft

Patient: 36 year old male, who sustained numerous orthopaedic trauma and injuries. He developed a wound along the ulnar aspect of proximal forearm. The plastic surgeon deemed a skin graft was required.

Past Medical History: unremarkable

Fluorescence images were negative for bacterial fluorescence and thus graft applied with confidence within 36 hours. Swabs confirmed “no growth” of bacteria

CONCLUSIONS

• Positive effects of bacterial fluorescence imaging on patient care and wound management were noted in six areas:
  1. Led clinicians to target sampling to fluorescence-positive regions, which resulted in heavy growth of one or more pathogenic bacterial species from all swabs eliminating risk of false negatives
  2. Prevented imminent discharge of patients requiring systemic antibiotics
  3. Guided selection of antimicrobials and directly influenced antimicrobial stewardship practices
  4. Guided the extent and location of wound debridement, sparing non contaminated tissue
  5. Engaged patients in their care by educating them on caring for wounds and also provided reassurance in cases of wounds without contamination
  6. Images negative for bacterial fluorescence allowed for confidence when skin grafted

• These results highlight the potential of bacterial fluorescence imaging used in conjunction with best clinical practices, to positively impact patient care and bacteria management, guiding clinician treatment decision at the point-of-care in cases where bacterial contamination could impede wound healing.

REFERENCES

1. Bower PG et al. Wound Microbiology and associated approaches to wound management. Critical Care Medicine, 2001

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