



Unlocking Precision Diagnosis: The Advantages of Bone Biopsy in Detecting Osteomyelitis

Steven Magilen, MD, CEO/CMO, Carol Johnson, FNP-BC, WCC, MBA, Ed.D., April Scata-Penny, ARNP, Jennifer Wolverton-Wade RN, BSN, CLT, CWS, Kristi Laplante LPN WCC, Stephanie Williams, Max Brackett CIO

Abstract

Explore the intricacies of osteomyelitis detection by examining the optimal wound depth over a bone. Osteomyelitis arises from infections that reach the bone, with the risk of becoming life-threatening if not promptly and adequately diagnosed. While relatively rare in the general population, it has been our company's findings that the elderly in nursing homes face a higher-than-average incidence due to missed diagnoses. Proper and proactive osteomyelitis diagnosis is crucial, particularly in advanced age and diabetic mellitus populations, preventing complications in susceptible areas such as legs, feet, and pelvic bones. Traditionally, diagnosing osteomyelitis can be challenging for the elderly in a SNF setting due to varied factors, i.e. insurance, transportation and/or compliance. Laboratory study findings, including white blood count, X-ray, MRI, and scans are usually timely but often insufficient. Bone biopsy, often overlooked outside acute settings, offers a strong correlation between open wounds over bones and the depth of tissue available, enabling timely and precise diagnosis. This approach of bedside bone biopsy allows for prompt and targeted treatment, improving patient outcomes and possible reduction of long-term complications.

Objectives

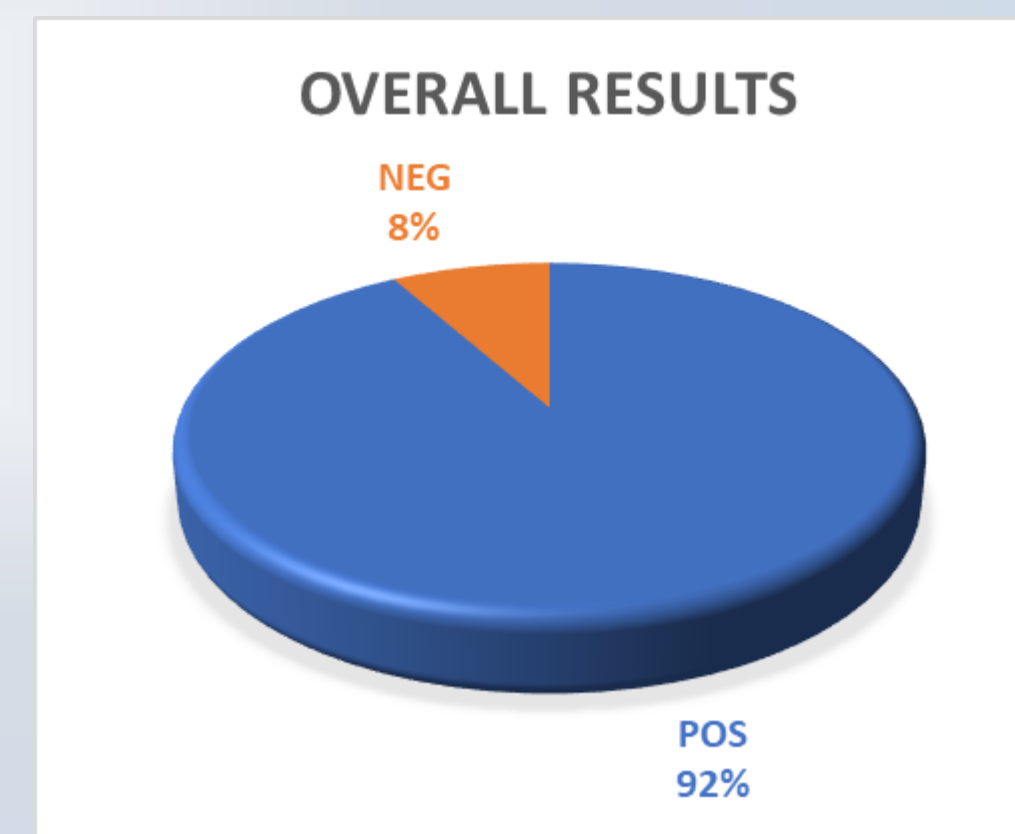
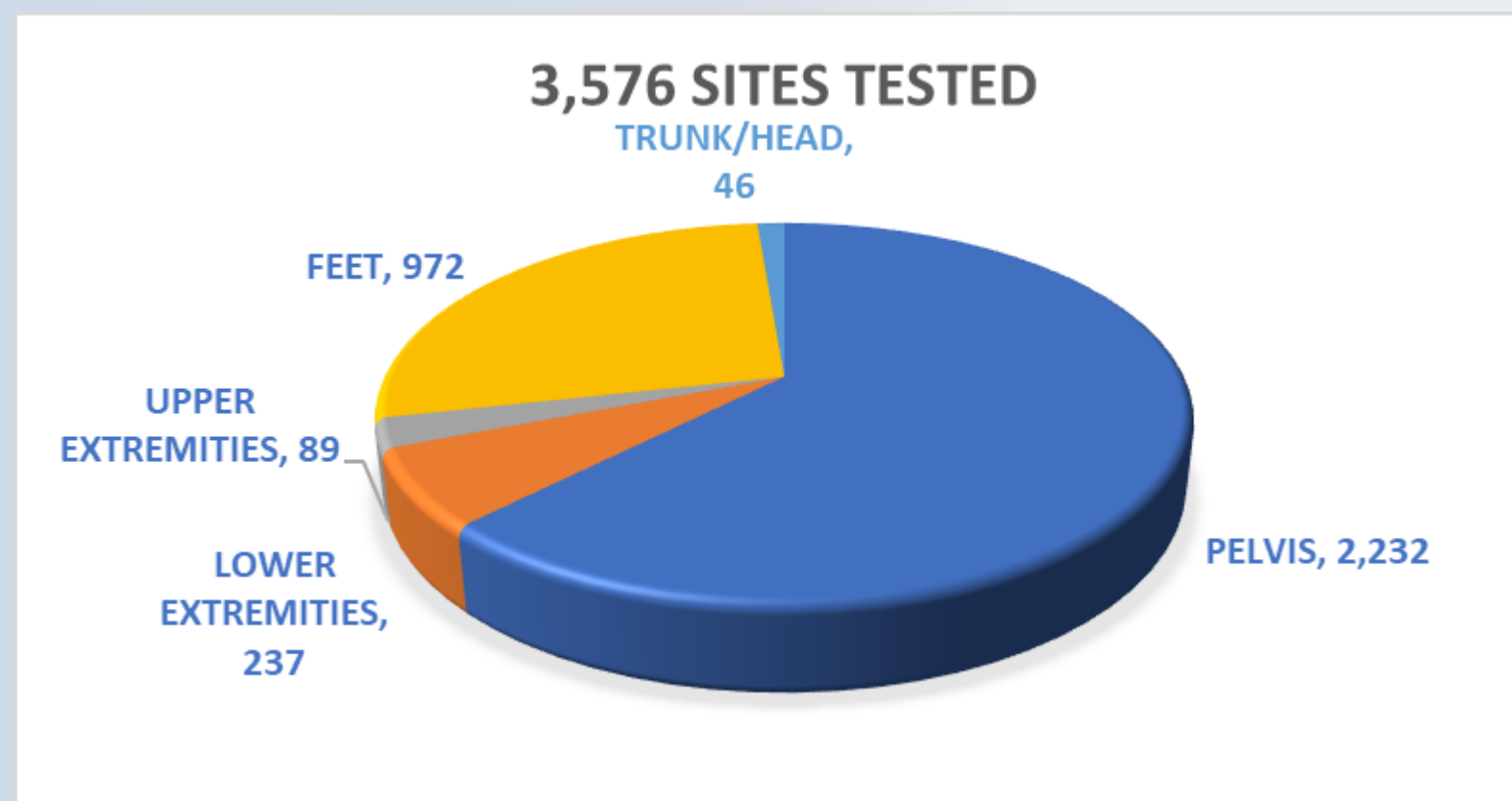
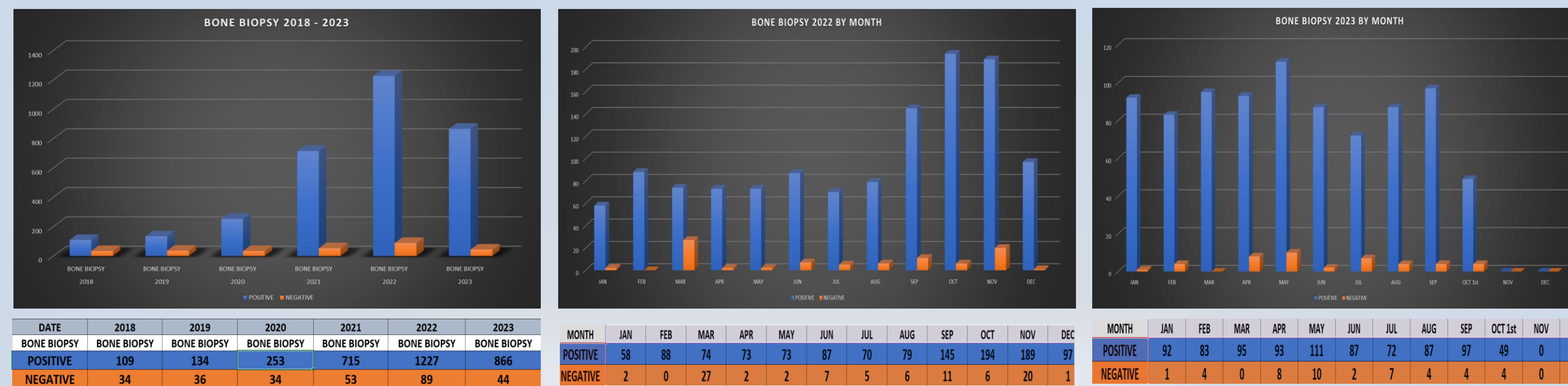
Osteomyelitis can develop in a matter of days, and if left untreated, or undertreated, can develop into chronic infection spreading across surrounding bones and soft tissue. With early identification, residents in the nursing home setting are more likely to access best practice treatment. When the biopsy is completed at first suspicion due to minimal depth to bone tissue ratio and presentation, rather than only waiting for lab confirmation, long term effects resulting in chronic pain, quality of life issues, amputation and a heightened financial burden on the medical community can be avoided. The objective of this study was to determine the accuracy rate of bone biopsy at bedside due to early presentation and minimal to no tissue coverage with the accuracy rate of diagnostic findings.

Methods

Conducting a retrospective study on wounds in various locations on the body of 3,500 patients, using data back to 2018, we analyzed positive Osteomyelitis test results of bone biopsies completed compared to bedside biopsies performed due to initial suspicion. Bedside bone biopsy, sent to pathologists, facilitated effective osteomyelitis diagnosis, preventing unnecessary delay in care.

Results

Preliminary findings revealed a remarkable overall average over 90% positivity rate for acute and chronic osteomyelitis within the critical depth range, across various locations.



EARLY DETECTION OF OSTEOMYELITIS CAN BRING BETTER OUTCOMES FOR YOUR RESIDENTS



Conclusion

Wounds over bony areas with low depth-to-bone [D2B] measurements in high-risk populations indicated an elevated suspicion of bone infection. Unlocking this approach of bedside bone biopsy to become standardized for precision diagnosis. The results show a direct correlation to wounds that stall in healing and/or are presenting a high rate of confirmation for osteomyelitis. Future studies will focus on quantification of the depth-to-bone correlation to osteomyelitis.

Join us in reshaping diagnostic protocols!

References

Bury, D.C., Rogers, T.S., Dickman, M.M., Osteomyelitis: Diagnosis and Treatment, American Academy of Family Physicians 2021; 104(4):395-402, <https://www.aafp.org/pubs/afp/issues/2021/1000/p395.pdf>

Calhoun, J.H., Manning, D., Shirtliff, D. Seminars in Plastic Surgery, Osteomyelitis of the Long Bones, 2009 May; 23(2): 59-72. <https://doi.org/10.1055/s-0029-1214158>

Colston, J., Atkins, B., Bone and joint infection, 2018 Apr; 12(2):150-154 DOI: 10.7861

Elmarsafi, T., Kumar, A., Cooper, P.S., Steinberg, J.S., Evans, K.K., Attinger, C.E., Kim, P.J., Concordance Between Bone Pathology and Bone Culture for the Diagnosis of Osteomyelitis in the Presence of Charcot Neuro-Osteoarthropathy, The Journal of Foot and Ankle Surgery, Volume 57, Issue 5, September-October 2018, pages 919-923, <https://doi.org/10.1053/j.jfas.2018.03.016>

Hatzenbuehler, J., Pulling, T.J., Diagnosis and Management of Osteomyelitis, American Academy of Family Physicians, 2011;84(9):1027-1033. <https://www.aafp.org/pubs/afp/issues/2011/1101/p1027>

Pierce, J.L., Perry, M.T., Wessell, D.E., Lenchik, L., Ahlawat, S., Baker, J.C., Banks, J., Caracciolo, J.T., DeGeorge, K.C., Demertzis, J.L., Garner, H.W., Scott, J.A., Sharma, A., Beaman, F.D., ACR Appropriateness Criteria Suspected Osteomyelitis, Septic Arthritis, or Soft Tissue Infection (Excluding Spine and Diabetic Foot):2022 Update, American College of Radiology 2022; 19:S473-S487, <https://doi.org/10.1016/j.jacr.2022.09.013>

Senneville, E., Albalawi, Z., Van Asten, S.A., Abbas, Z.G., Allison, G., Aragon-Sanchez, J., Embil, J.M., Lavery, L.A., Alhasan, M., Oz, O., Uckay, I., Urbancic-Rovan, V., Xu, Z., Peters, E.J.G., New international guidelines tackle diabetic foot infection diagnosis, treatment, Infection Disease Society of America, (2023, October, 13). <https://diabetes.acponline.org/archives/2023/10/13/1.htm>

Tardaguila-Garcia, A., Sanz-Corbalan, I., Garcia-Morales, E., Garcia-Alvarez, Y., Molines-Barroso, R.J., Lazaro-Martinez, J.L., Diagnostic Accuracy of Bone Culture Verses Biopsy in Diabetic Foot Osteomyelitis, Adv Skin Wound Care. 2021 Apr 1;34(4):204-208. <https://doi.org/10.1097/01.ASW.0000734376.32571.20>

Unger, E., Moldofsky, P., Gatenby, R, Hartz, W., Broder, G., Diagnosis of osteomyelitis by MR imaging, American Journal of Roentgenology, 1988 Mar;150(3):605-10. <https://doi.org/10.2214/ajr.150.3.605>

Walker, E.A., Beaman, F.D., Wessell, D.E., Cassidy, R.C., Czuczman, G.J., Demertzis, J.L., Lenchik, L., Motamedi, K., Pierce, J.L., Sharma, A., Ying-Kou Young, E., Kransdorf, M.J., ACR Appropriateness Criteria Suspected Osteomyelitis of the Foot in Patients with Diabetes Mellitus, American College of Radiology 2019; 16:S440-450 <https://doi.org/10.1016/j.jacr.2019.05.027>

Quality Surgical Management

