

**Intramedullary Devices for Diaphyseal Femur and Tibia Fractures:
A Comparison Analysis of Different Generations of Intramedullary Fixation**

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Purpose: Reamed intramedullary fixation of closed diaphyseal femur and tibia fractures has become the gold standard of treatment as nail design has improved. New elements have been added to intramedullary nail (IMN) designs including multiple locking hole options to increase the versatility of the nail for treatment of more complex fractures. However, these new elements greatly increase the cost of the implant. The goal of this study was to compare two generations of IMNs to see if the increased cost is justified by differences in healing rates or complications in diaphyseal lower extremity fractures.

Methods: We retrospectively reviewed 102 consecutive closed diaphyseal femur and tibia fractures (AO/OTA classification 32 and 42) from 2008 through 2013 treated with one of two generations of IMN by one manufacturer (Group A with traditional uniplanar locking bolts and Group B with multiplanar with fixed-angle locking options). Primary outcomes were fracture healing and implant-associated complications. The published list price was used to determine cost of the implants.

Results: There were 50 IMNs in Group A and 52 in Group B. There were no significant differences between the number of tibias and femurs between groups. There were no differences in the OTA fracture classification between groups. Time to healing was not significant between groups (3.8 months and 3.6 months, respectively). There were 4 delayed unions in Group A and 7 in Group B. Two nonunions were observed in Group A and 5 in Group B. There were no broken nails. A broken/backed-out screw was observed in 5 cases in Group A and in 4 cases in Group B. All-cause reoperations occurred in 10 patients in Group A and 9 patients in Group B. The newer generation nails cost between 34% (retrograde femur), 56% (antegrade femur), and 49% (tibia) more than the earlier generation nails.

Conclusion: The use of the newer generation nails for diaphyseal fracture patterns may not be necessary based upon the data we have analyzed. A protocol for use of these more expensive devices could be developed so they are reserved for more complex or unstable fractures that extend into the metadiaphysis, where the multiplanar and fixed-angle locking options may be of benefit.