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## High number of negative radiographs for suspected tibial shaft fracture adds expense and increases patient throughput time in the emergency department

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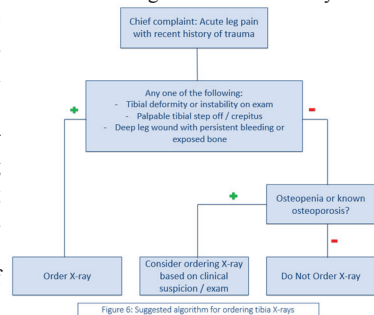
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**Purpose:** The diagnosis of tibial shaft fractures (OTA 42A-C) is commonly made by emergency department (ED) providers prior to orthopedic consultation. Due to the subcutaneous anatomy of the tibia, a comprehensive history and physical examination are often sufficient for fracture diagnosis, with radiographs serving as a secondary aid. A high rate of negative X-Rays increases cost and inefficiency in the ED. This study aims to define the rate at which tibial radiographs are negative for suspected fracture.

**Methods:** At a Level I trauma center, a prospective database was retrospectively evaluated for ED radiographs taken from 2014 to 2016. Only radiographs obtained for suspected fracture of the tibial diaphysis were included. From this, the rate of negative diagnostic studies and the associated costs, ED throughput time, resource utilization, and radiation exposure were calculated.

**Results:** During the study period, 734 tibia radiographs were performed for diagnosis of tibial shaft fracture without suspected adjacent articular pathology. Of these, 565 (76.9%) were negative for tibial shaft fracture. Patient charges were increased by these radiographs through both higher radiology charges (\$598 per tibia radiographic series) and higher professional charges. The mean time to obtain a tibia X-ray series in the ED was 57 minutes (SD: 47 minutes; Median: 47 minutes). The radiation exposure from a tibia radiographic series was 15 millirems.

**Conclusion:** At this institution, a large proportion of the radiographs obtained for suspected tibial shaft fracture are negative. The resources and time spent acquiring these radiographs places higher demands on physicians and staff while increasing charges and radiation exposure to patients. In addition, these negative radiographs add throughput time in the ED, thereby potentially contributing to ED overcrowding. The authors propose a systematic approach to maximize the diagnostic efficiency of tibia radiographs and subsequently improve resource allocation in the ED.



### Biography

Safa Fassih is a US-based physician pursuing a career in orthopedic total joint arthroplasty. His research focuses not only on total joint arthroplasty but also on improving the procedural and financial efficiency of the healthcare system. This specific analysis was based upon his experience at a level 1 trauma center, in which he recognized that there was significant emergency department overcrowding on a regular basis, so he sought to minimize any factors that may be contributing to this problem. He noticed that tibia X-rays were frequently ordered for suspected tibial shaft fracture and were negative most of the time. He collaborated with a US board-certified orthopedic traumatologist to identify the extent of this problem and offer a potential solution.

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