



# Descriptive Epidemiology of the Radiographic Findings in Pediatric Osteomyelitis with a Focus on Plain Films: A Five Year Experience at a Tertiary Children's Hospital

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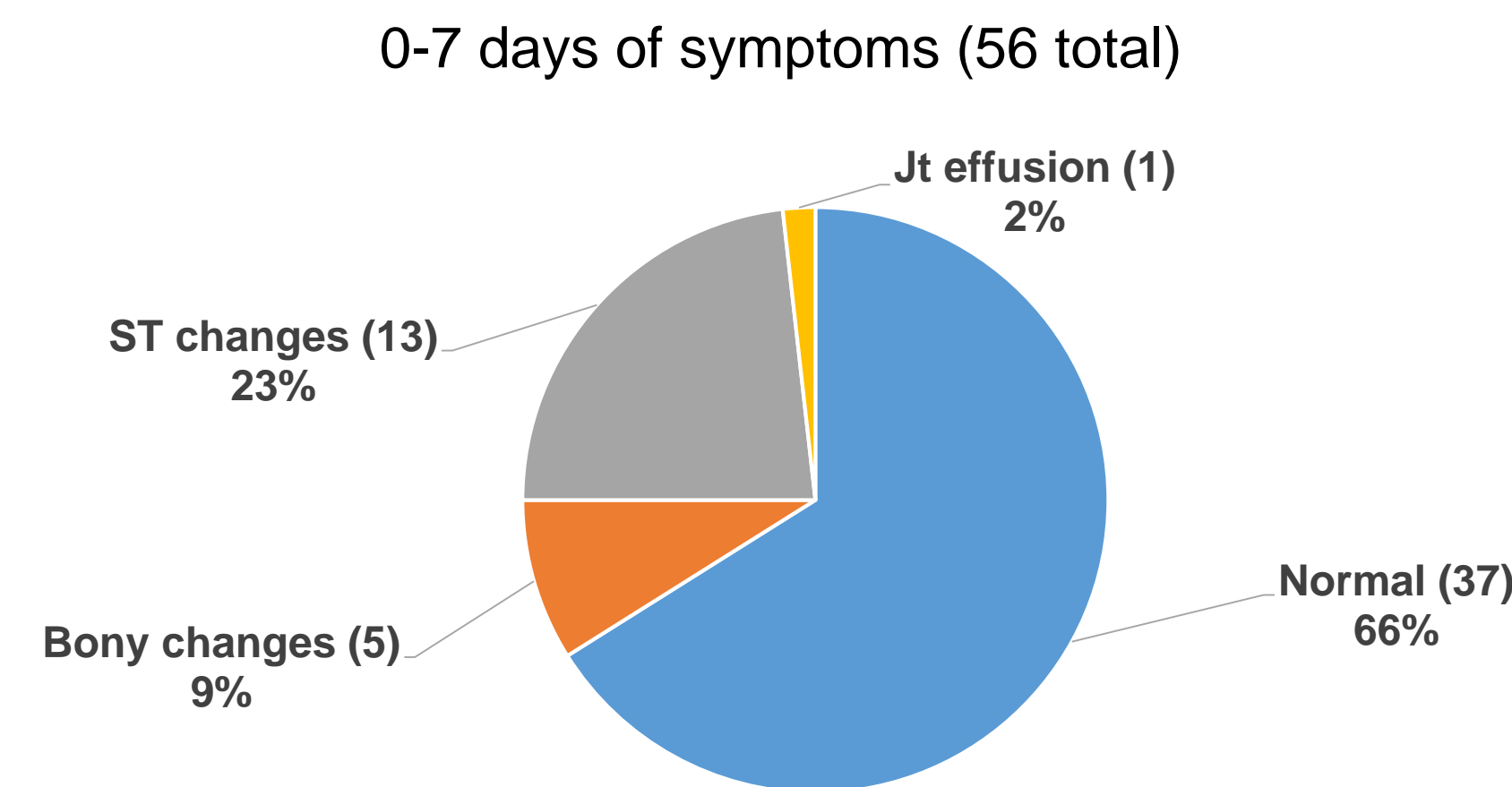
### Background:

MRI is the gold standard in the radiographic diagnosis of pediatric osteomyelitis (OM). Plain films (i.e. x-rays) are routinely recommended in the work-up of suspected musculoskeletal infection but have low sensitivity in acute disease. Here we describe the x-ray findings in a cohort of pediatric patients with acute and sub-acute osteomyelitis.

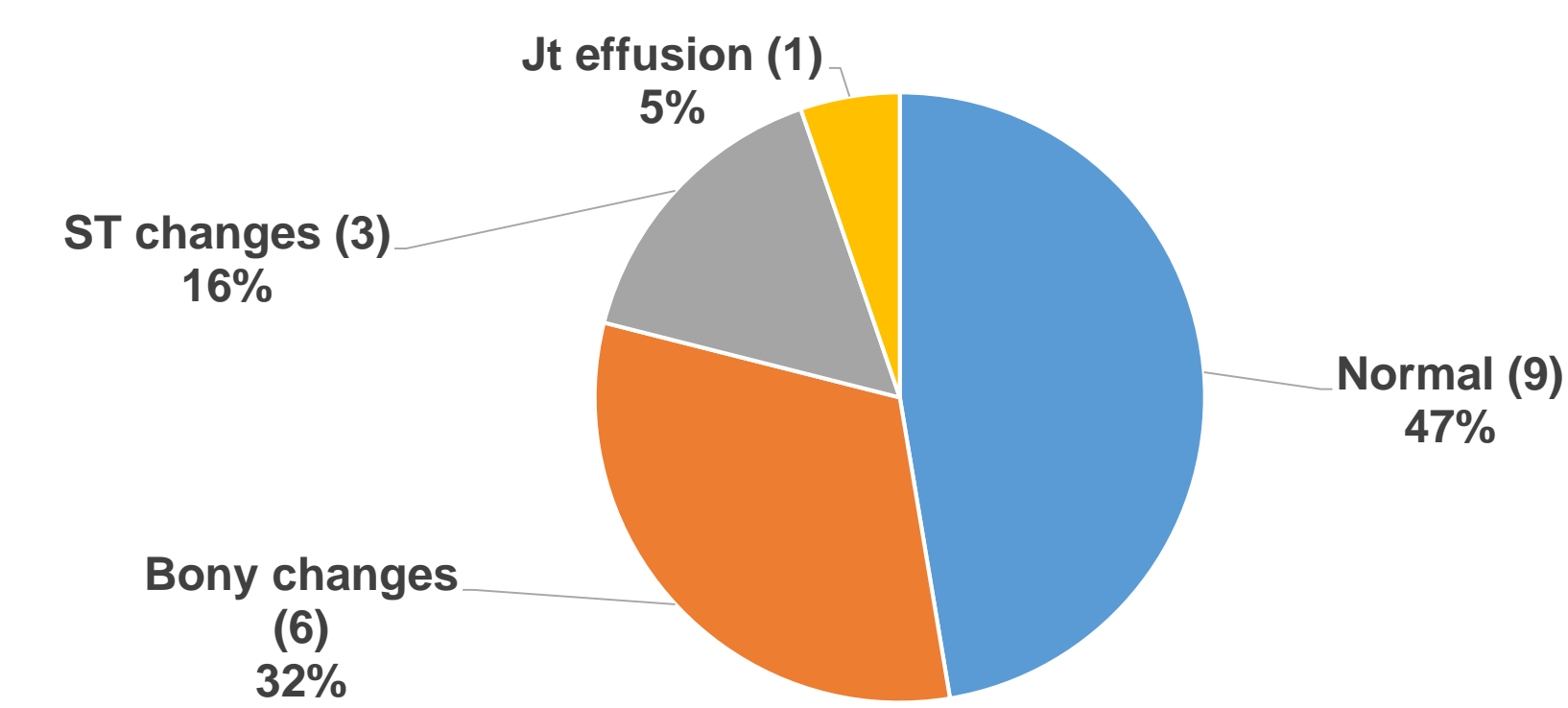
### Methods:

- Retrospective chart review of patients with hematogenously acquired acute and sub-acute osteomyelitis from 2011-2015
- Analysis of x-ray findings in association with disease severity and MRI results

### X-Ray Findings vs Duration of Symptoms



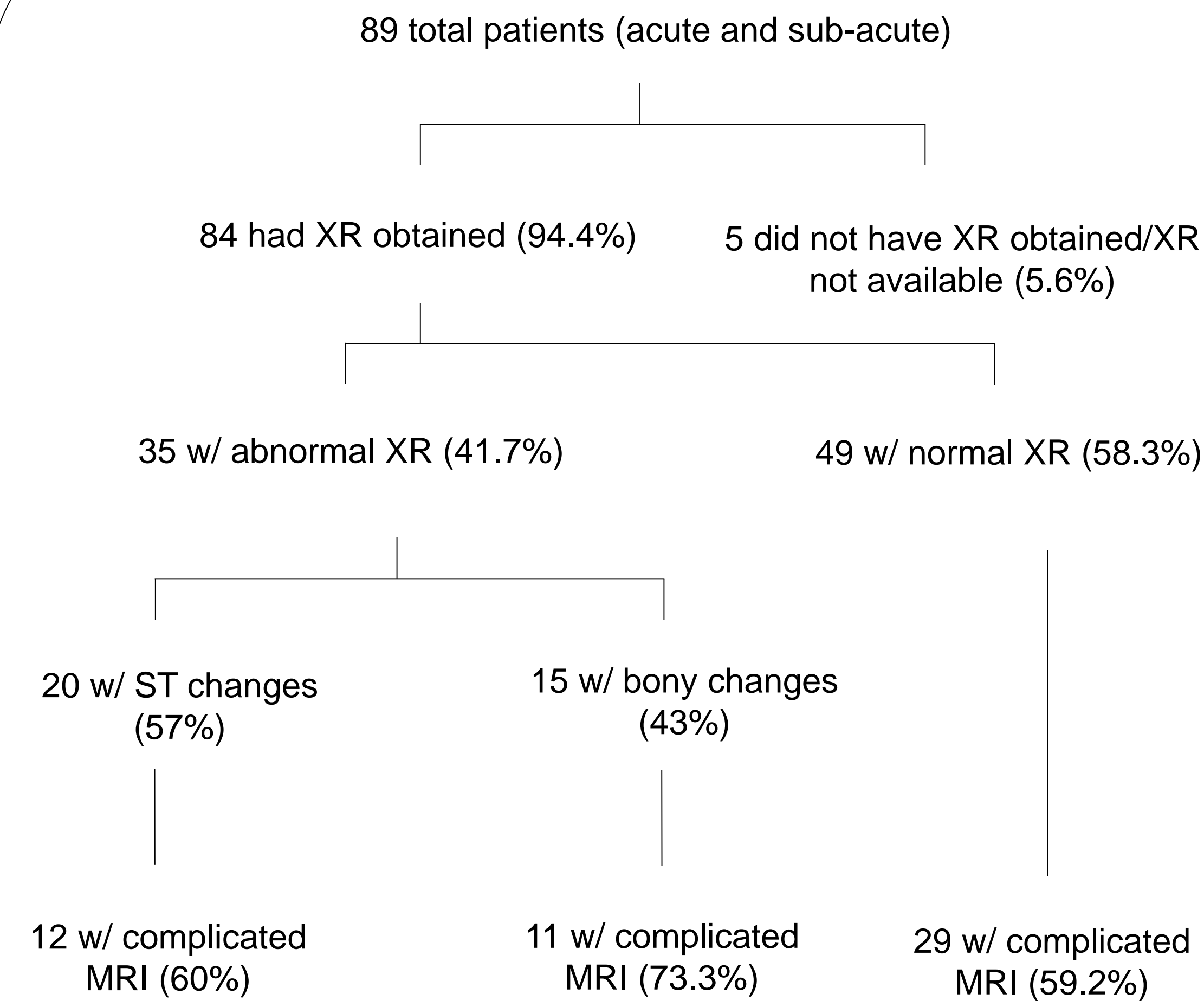
### 7-14 days of symptoms (19 total)



Soft tissue (ST) changes defined by "swelling" or "edema" on XR

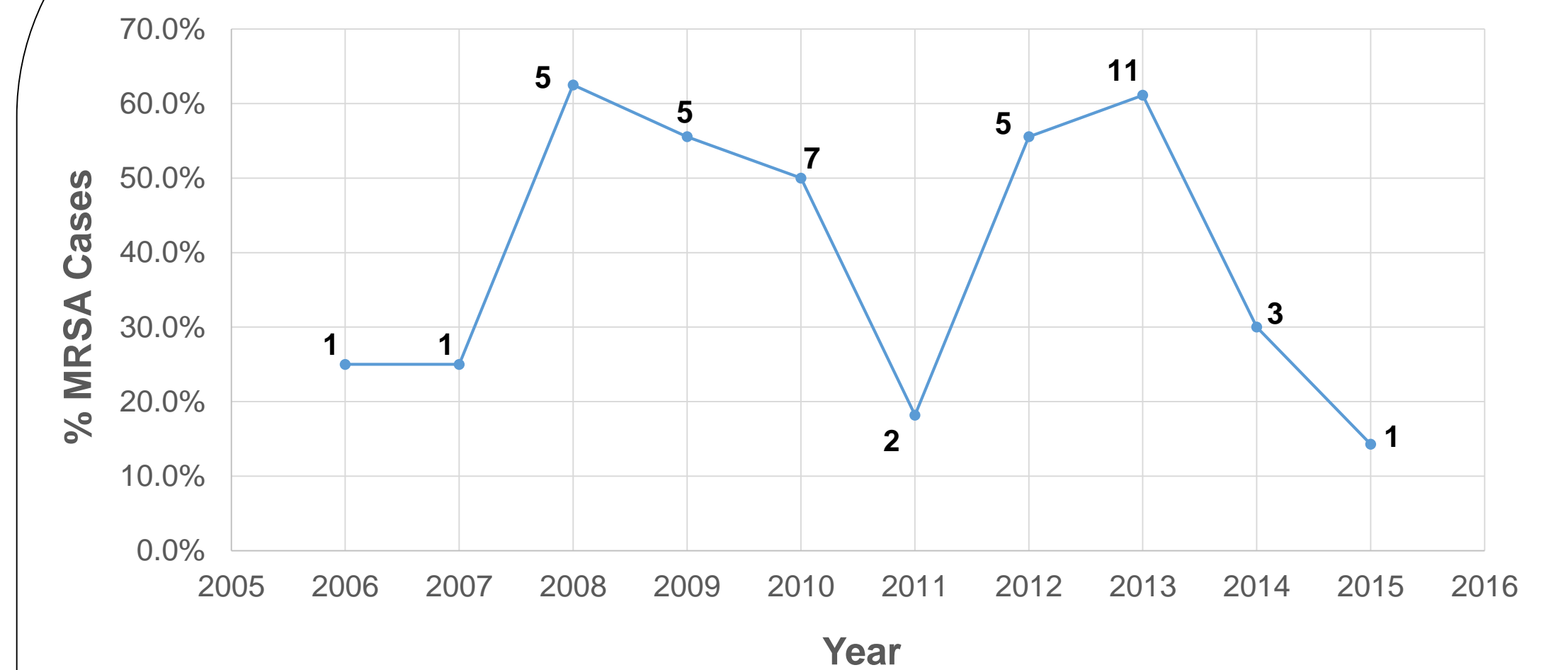
Bony changes defined as "fractures," "bony lesions," "lucencies," or "cortical irregularities" on XR

### X-Ray Findings vs Complicated MRI

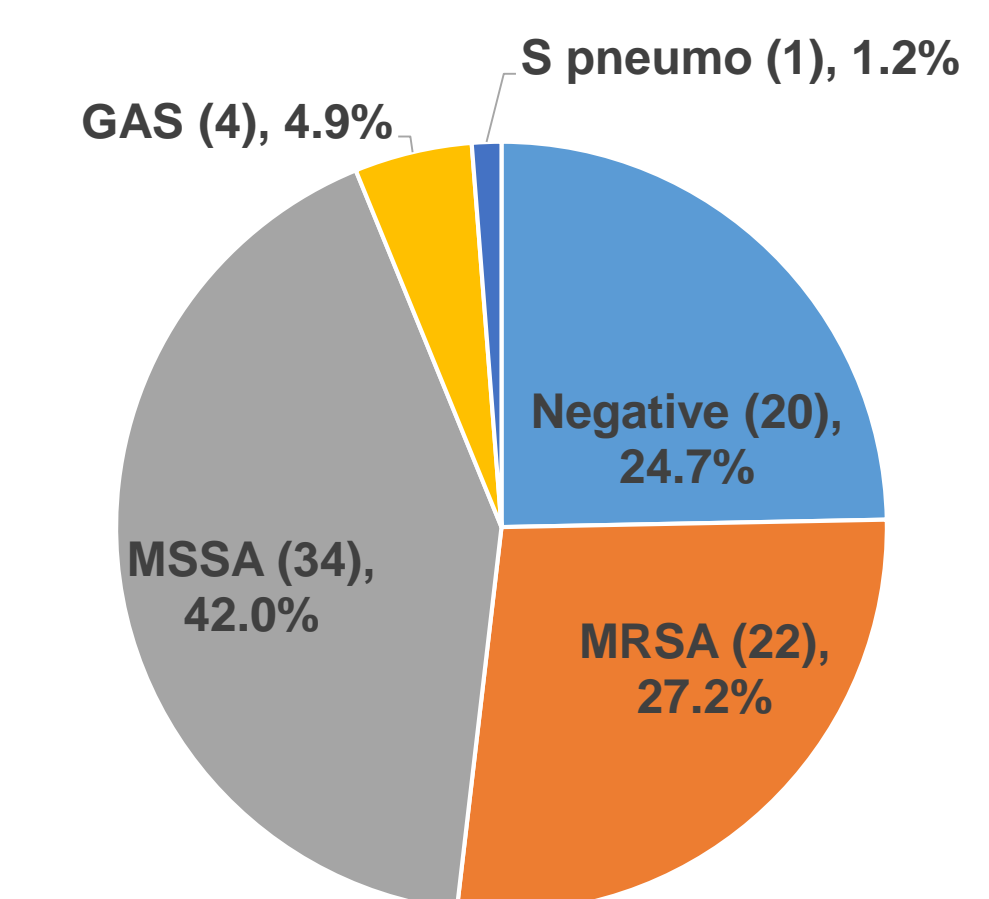


Complicated MRI defined as OM with the presence of subperiosteal abscess or intramedullary abscess

### MRSA Prevalence in OM Cases 2006-2015



### Blood Culture and Direct Sample Results for Acute Patients



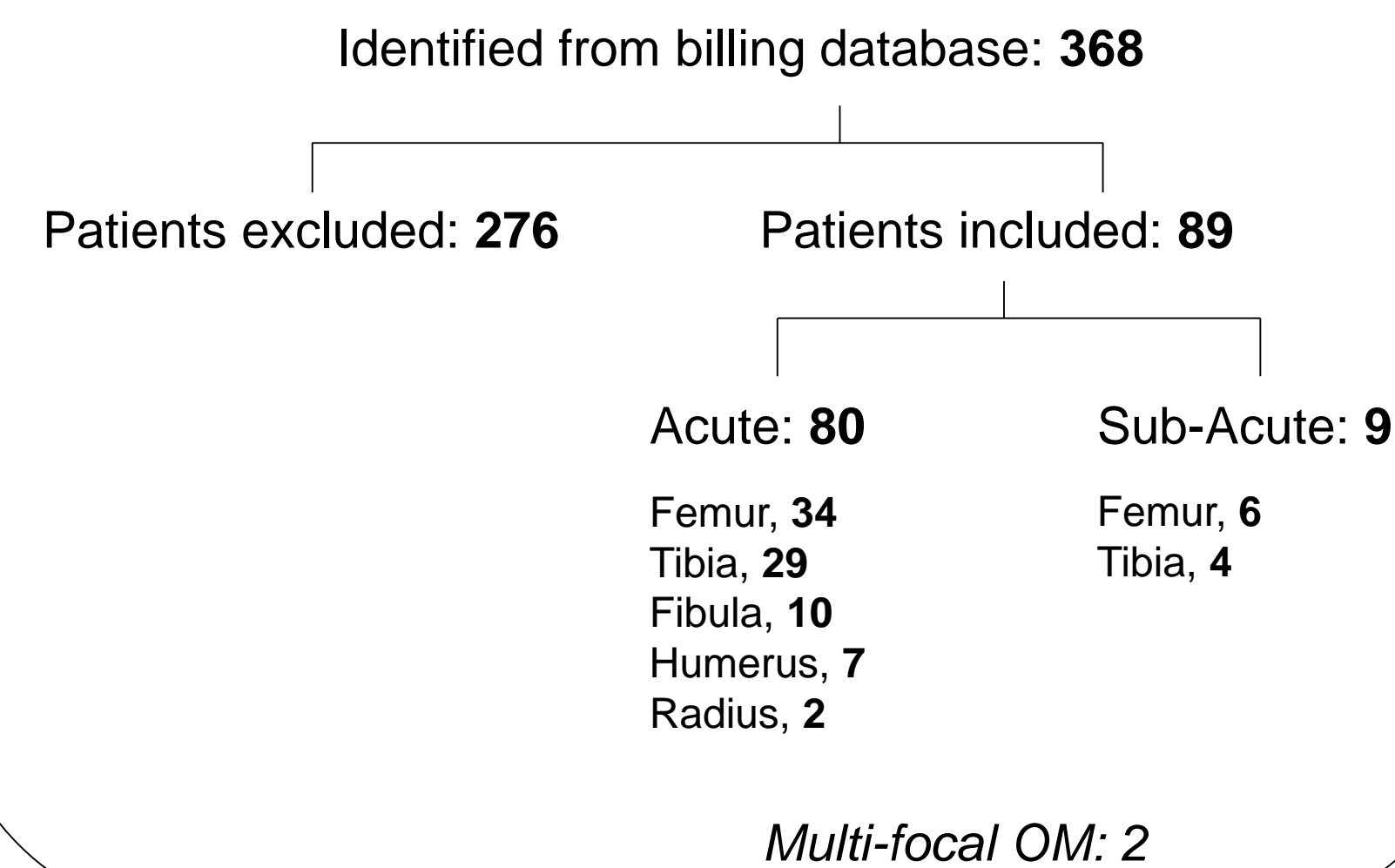
### Inclusion Criteria

- Diagnosis of acute or sub-acute OM
- MRI-defined OM
- Inpatients
- Long bone infection (excluding hands and feet)
- Hematogenous acquisition
- No significant underlying medical disease

### Exclusion Criteria

- Incorrectly billed, no MRI, no OM on MRI
- OM in axial skeleton, non-long bones
- Head and neck infections
- Cerebral palsy, meningomyelocele, paraplegia/quadruplegia
- Recent surgery or trauma at affected site
- Lower extremity OM in spina bifida pts
- Outpatient population
- Surgically implanted hardware
- CRMO, Crohn's disease
- Age <3 months
- Congenital anomalies

### Breakdown of 2011-2015 Patients



### General Data (acute patients)

Age of Diagnosis (yrs)	Duration of Symptoms (days)	Length of Stay (days)
Mean: 7.39 Median: 7.38	Mean: 10.9 Median: 7.5	Mean: 7.86 Median: 7

### Inflammatory Markers (acute patients)

ESR (mm/hr)	CRP (mg/dL)	WBC (k/cumm)
Mean: 62.3 Median: 65	Mean: 10.9 Median: 7.5	Mean: 13.7 Median: 12.4

### Presence of complicated MRI by pathogen

Pathogen	% with complicated MRI
MRSA (22)	63.6%
MSSA (33)	45.5%
S. pyogenes (4)	75%
S. pneumoniae (1)	100%
Sterile/none (17)	29.4%

### Conclusions:

Patients with longer duration of symptoms were more likely to have abnormalities on plain film. A surprising number of patients with acute disease had abnormal bony findings on x-ray. Bony findings on x-ray may be associated with bony findings on MRI. Plain films may continue to play a valuable role in the diagnostic workup of OM.

### References:

- Paakkonen, M. and H. Peltola, *Bone and joint infections*. *Pediatr Clin North Am*, 2013. **60**(2): p. 425-36.
- Karmazyn, B., *Imaging approach to acute hematogenous osteomyelitis in children: an update*. *Semin Ultrasound CT MR*, 2010. **31**(2): p. 100-6.
- Hatzenbuehler, J. and T.J. Pulling, *Diagnosis and management of osteomyelitis*. *Am Fam Physician*, 2011. **84**(9): p. 1027-33.

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