

CONSULT QUESTION

I'm interested in what best practices exist for orthopedic education for emergency medicine trainees, particularly in large academic centers. I am interested in how programs arrange their clinical experience to maximize training with patients (including negotiations how expectations are set with in-house ortho for who will be doing what procedures when), but also what educational resources are out there for the non-clinical setting (e.g., sim models / cases, FOAM, textbooks, etc.).

Thank you!

Listed below are all the resources we found out there about orthopedic education for EM trainees. Included are some online, asynchronous resources. The part of your question where we had difficulty finding specific data was how different institutions arrange their clinical experience. We spoke to Andrew King as he was lead author on a Jem post with a three year curriculum described. He informed us that his Meded Fellow is currently working on a MERC project with a survey of programs about their orthopedic rotations. This should help round out that part of the questions when it comes out.

Online Resources/FOAMed

Orthopedic Teaching - Northwestern

The EM educators at The Northwestern, Feinberg School of Medicine have created voluminous online resource to assist with orthopedic training for EM residents. Their website offers detailed teaching through a number of different approaches.

- There are more than 100 case-based presentations. Under the heading of 'Cases', the website user can pick a case within a variety of subheadings based on bone vs joint. It is possible to complete cases under the non-anatomic headings of 'bone-lesions' or 'pediatrics' as well.
- Along with this case-based approach, the learner may flip the perspective to click through the cases by diagnosis (under the heading of 'Search by Diagnosis'). This makes available the same content with a more directed approach (rather than scrolling through an undifferentiated case, queried by complaint).
- The website has select videos for teaching on the orthopedic exam as well as select procedures (such as arthrocentesis and compartment checks).
- The website has various pages and attached materials that teach on plain film interpretation as well as the basic principles of splinting.

Hyperlink to website:

<https://www.ortho-teaching.feinberg.northwestern.edu/>

ALiEM AIR Series

The Academic Life in Emergency Medicine learning modules (the AIR series) are familiar to many EM learners, as they provide curated and vetted FOAMed resources for EM learners. The ALiEM staff released a set of orthopedic practicals in 2016 - an Orthopedics Upper Extremity and an Orthopedics Lower Extremity Module, available by following the link below:

Upper Extremity: <https://www.aliem.com/2016/07/air-series-orthopedics-upper-extremity/>

Lower Extremity: <https://www.aliem.com/2016/07/air-series-orthopedics-upper-extremity/>

A separate, updated upper extremity module was added in August of 2019, available at: <https://www.aliem.com/2019/08/aliem-air-upper-extremity-2019-module/>

MedEd Portal has a few references of value:

1. Senior Medical Student–Led Interactive Small-Group Module on Acute Fracture Management

Published: September 23, 2016

A practical designed for knowledge acquisition in acute bony fracture management for 3rd year students during the compulsory Family Medicine clerkship. This resource has a PowerPoint presentation and an associated document to teaching on the basics of ortho trauma – the content would certainly be pertinent to EM residents looking to expand their orthopedic core content.

Hyperlink to publication:

<https://www.mededportal.org/publication/10463/>

2. Review of Acute Orthopedic Injuries

Published: June 27, 2011

This brief submission contains an abstract, though no study on the efficacy of the curriculum. The associated resources include a set of goals and objectives, followed by four separate PowerPoint presentations (in the form of a .pdf) to review injuries of the foot & ankle, the forearm to shoulder, the foreleg to pelvis, and the hand and wrist on the evaluation and management of common upper extremity and lower extremity complaints – the slides are nicely arranged with hyperlinks to the answers to the introductory questions/answers, followed by a detailed practical on the physical exam for upper extremity and lower extremity injuries, followed by detailed descriptions of injury patterns and their identification on exam and plain radiography.

Hyperlink to publication:

<https://www.mededportal.org/publication/8403/>

3. Evaluation of Common Musculoskeletal Injuries in the Urgent Setting

Published: December 7, 2016

This submission contains four separate PowerPoint-based modules on the common MSK complaints associated with the ankle, hip, shoulder and wrist. This learning module was presented to 43 IM, ortho and EM interns, and the mededportal publication provides data on how the learners performed with this novel curriculum. The PowerPoint appendices are easily found on the left side of the website, they include the curriculum, which many EM educators would likely find of value as they created curricula within their home programs. The slides are nicely arranged with a set of pre-test questions (with hyperlinks to the answer), followed by a detailed practical on the physical exam and plain radiography findings for ankle, hip, shoulder and wrist injuries

Published Resources/PubMed

1. Orthopedic Emergencies: Emergency Medicine Clinics of North America – Volume 33, Issue 2, May 2015. Chief Editor Amal Mattu MD

This EM clinics is familiar to most academic EM providers – this is a soup-to-nuts primer on all things orthopedics in the ED. It provides comprehensive content, if not a defined curricula. Full text access requires a prior subscription or a fee of \$31.50 (as of November of 2019)

Link to publication: <https://doi.org/10.1016/j.emc.2015.03.004>

2. An Evaluation of the Utility of an Orthopaedic Surgery Rotation for Emergency Medicine Residents. R I Med J (2013). 2016 Sep 1;99(9):35-7.

This is a study to demonstrate the efficacy of an off-service orthopedic rotation to teach on basic orthopedic knowledge. 16 PGY1 study respondents performed significantly better on core content questions around management of orthopedic issues, after the completion of an off-service rotation. This publication does not offer the curricular content, and ultimately is limited by evaluating an intervention group without any comparison. It is unclear if the off-service rotation was more or less effective than any other means for learning this material.

Link to publication: <http://rimed.org/rimedicaljournal/2016/09/2016-09-35-cont-gil.pdf>

3. Do Emergency Medicine Residency Graduates Feel Prepared to Manage Closed Fractures After Training? Acad Emerg Med. 2017 Jan;24(1):92-97. doi: 10.1111/acem.13064.

This anonymous online survey study examined just over 380 recent EM graduates on their comfort managing closed fractures in the ED, in independent practice after the completion of training. Approximately 56% of respondents felt either “not at all prepared” or “somewhat prepared” to manage closed fracture reductions at the completion of residency. Nearly 55% of respondents felt that it was during their time in independent practice that they became proficient with this injury treatment.

Link: <https://onlinelibrary.wiley.com/doi/epdf/10.1111/acem.13064>

4. Objectives to direct the training of emergency medicine residents on off-service rotations: orthopedics. J Emerg Med. 1990 Mar-Apr;8(2):215-23.

This article is nearly 30 years old, and was the third in a series of publications on the objectives for EM residents rotating off-service within the department of orthopedics. This piece is directly germane to

the consult question, however it was published when the field of emergency medicine was nascent. Consultants were unable to obtain this article through our home institution online archives, but it can be purchased by the consultor for the price of \$39.95 at the following link:

[https://www.jem-journal.com/article/0736-4679\(90\)90239-R/pdf](https://www.jem-journal.com/article/0736-4679(90)90239-R/pdf)

5. Educational Resource Utilization by Current Orthopaedic Surgical Residents: A Nation-wide Survey. J Am Acad Orthop Surg Glob Res Rev. 2019 Apr 30;3(4):e041. doi: 10.5435/JAOSGlobal-D-19-00041. eCollection 2019 Apr.

A survey of orthopedic residents demonstrated that the website 'Orthobullets.com' was the most common online resource used by orthopedic residents. It provides copious online content as well as a over 5000 practice questions, though not specifically geared to the EM provider. The subscription services range from a \$60 one time fee to ~\$400 fee when booked by the training program.

Link: www.orthobullets.com

The literature is replete with ultrasonographic training in the evaluation of musculoskeletal injuries, though that is not directly pertinent to the consult question.

6. Asynchronous eLearning Module in Orthopedics is an Effective Method of Knowledge Acquisition for Emergency Medicine Resident. Annals of EM, Vol 62, Vol 5, Nov 2013.

CORD Abstract performing pre and post testing post e-learning asynchronous orthopedic module with a rotation. Significant increase in knowledge.

<https://doi.org/10.1016/j.annemergmed.2013.06.049>

7. Needs Assessment for Revision of Orthopedic Curriculum for Emergency Medicine Resident

Image 1, Resident impressions of curricular efficacy in elements of orthopedic case management

Questions	Curriculum Not Effective (Response =1 or 2)	Curriculum Effective (Response =3 or 4)
The orthopedic block made me more confident in diagnosing orthopedic injuries	21.0%	78.9%
My medical knowledge was enhanced by the reading I did during the orthopedic block	10.8%	89.2%
I gained a sufficient amount of experience in performing provocative maneuvers to aid in diagnosing orthopedic injuries during my urgent care shifts on the orthopedic rotation	63.1%	36.9%
My urgent care shifts during the orthopedic block gave me sufficient experience in applying splints	29.0%	71.0%
My urgent care shifts during the orthopedic block gave me sufficient experience in joint reduction	79.0%	21.0%
I feel confident in performing joint aspiration from my experience on the orthopedic rotation	73.7%	26.3%

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5226759/>

8. A Formalized Three-Year Emergency Medicine Residency Musculoskeletal Emergencies Curriculum

A Curriculum out of Ohio State describing a 3 year curriculum describing didactics, reading and rotation.

https://jetem.org/msk_curriculum

9. The Benefits of an Emergency Medicine–Directed Orthopedic Rotation

CORD Abstract describing benefit of an ED based rotation rather than off-service.

<https://doi.org/10.1016/j.annemergmed.2012.07.054>

10. Evaluation of a Revised Orthopedic Curriculum for Emergency Medicine Resident

<https://doi.org/10.1016/j.annemergmed.2013.06.033>