AOTRAUMA
Pediatric

Faculty syllabus for 2.5 days

AOTrauma Course—Managing Pediatric Musculoskeletal Injuries

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Welcome to the AOTrauma courses in pediatric trauma and orthopedics in a new highly interactive format

Introduction

The AOTrauma Course—Managing Pediatric Musculoskeletal Injuries and the two optional AOTrauma Seminars—Special Pediatric Trauma Conditions and Pediatric Orthopedic Conditions are modular face-to-face educational events that constitute part of the overall AOTrauma Pediatrics curriculum, further complemented by expert modules/symposia and self-directed learning opportunities, eg, resources, webinars, videos.

Developed by the AOTrauma Pediatrics Education Taskforce

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Link to AOTrauma Pediatrics Curriculum website

https://aotrauma.aofoundation.org/Structure/education/educational-programs/pediatrics

Link to AOTrauma Pediatrics Faculty Support Package

https://aotrauma.aofoundation.org/Structure/faculty-center/Pages/faculty-center.aspx (login required)

Competency-based curriculum

The development of this course followed a backward planning process leading to a competency-based curriculum (12 competencies and associated objectives)—please refer to the Competency Booklet PDF.

This course may be approved to carry the AO Competency-Based Curriculum stamp. See separate document for criteria and more information.

Chairperson Guide

Check the Chairperson Guide in the Faculty Support Package for the course goal, overall learning objectives, target participants, faculty preparation, logistics, and much more about the specifics of this course.

Course modules

ALL AOTrauma Pediatrics educational events/activities (eg, course)
Opening session
Closing session

AOTrauma Course—Managing Pediatric Musculoskeletal Injuries	
Topic/Module 1	Fundamentals of managing pediatric fractures
Topic/Module 2	Assessment and planning
Topic/Module 3	Decision making
Topic/Module 4	Lower limb—femoral fractures
Topic/Module 5	Lower limb—knee injuries
Topic/Module 6	Lower limb—tibial, fibular, and ankle injuries
Topic/Module 7	Entire lower limb
Topic/Module 8	Upper limb—shoulder and humerus
Topic/Module 9	Upper limb—supracondylar fractures
Topic/Module 10	Upper limb—other elbow injuries
Topic/Module 11	Upper limb—forearm and wrist fractures
Topic/Module 12	Entire upper limb

For the AOTrauma Seminars content, refer to the separate documents:

AOTrauma Seminar—Special Pediatric Trauma Conditions	
Topic/Module 13	Managing the child and family
Topic/Module 14	Management of bone and joint infection in children
Topic/Module 15	Serious musculoskeletal injuries in children

AOTrauma Seminar—Pediatric Orthopedic Conditions	
Topic/Module 16	Slipped capital femoral epiphysis
Topic/Module 17	Deformity management
Topic/Module 18	Pathological bone (non-oncological aspects)

All AOTrauma Pediatrics educational events (eg, course)

Duration	Activity	Topic	Tools	Key teaching points	Who
INTRODUCTION SESSION (first session of the course)					
Approx. 20 mins	Meet and greet	Relaxed opening session (can be combined with registration) with coffee	Coffee	Faculty to welcome participants in their allocated table groups, identify current level of experience and where necessary reassign groups	All faculty and participants
Approx. 10 mins	Lecture	Introduction to course—can include welcome, introduction to agenda, discussion of learning objectives, housekeeping, regional/local aspects	PPT	Manage expectations of learners Outline the flow of the program and goals	Chairperson(s)

Duration	Activity	Topic	Tools	Key teaching points	Who
75 mins	**MODULE 1—Fundamentals of managing pediatric fractures** • Define normal children's anatomy and physiology • Recognize the relevance of age in relation to injury pattern and optimum treatment of the whole child • Explain the relationship of age to modeling capacity and define acceptable limits of malunion • Recognize the importance of patient safety • Describe the impact of disturbance of growth in the management of pediatric fractures				
15 mins	1.1 Plenary session	Warm-up cases Promote understanding of modeling capacity	PPT cases from FSP on metaphyseal forearm fracture, humeral diaphyseal fracture, femoral diaphyseal fracture	Moderator does not give outcome of treatment as the cases will be revisited at end of module	All faculty at tables with roaming moderator(s)
20 mins	1.2 Lecture	The influence of growth and modeling in pediatric fractures	PPT of key slides available in FSP—to be adapted by presenter	Relationship of age/bone segment to remodeling capacity—scientific aspects	Expert faculty
20 mins	1.3 Lecture	What are the currently acceptable standards of treatment for pediatric fractures?	PPT of key slides available in FSP—to be adapted by presenter	Include safety, effectiveness, function, cost/benefit for child/family/health system According to local health economy resources, ie, independent of technique Are we there yet? How can we improve?	Expert faculty
10 mins	1.4 Plenary session	Reevaluation of warm-up cases	PPT cases from FSP	Give "solutions" to previously presented cases	All faculty at tables with roaming moderator(s)
10 mins	1.5 Lecture	Patient safety essential to the management of pediatric patients	PPT of key slides available in FSP—to be adapted by presenter	Communication, nonaccidental injury, analgesia, work-rounds, relationships, psychosocial and education aspects Serious failures of care are not solely due to inadequate surgical management, eg: • Inability to elicit history or perform examination, which is more difficult in children than in adults. • Failure to identify nonaccidental injury • Errors in prescribing medication that can prove fatal	Expert faculty

Duration	Activity	Topic	Tools	Key teaching points	Who
50 mins	**MODULE 2—Assessment and planning** • Identify how to utilize appropriate imaging and other assessment techniques with the correct frequency to plan management, monitor treatment and define outcomes • Describe available classification systems, how to use them and why • Describe available validated outcome measures for different injury patterns • Establish principles of recognized predictors associated with satisfactory long-term outcomes to avoid overinvestigation and/or overtreatment • Identify recognized predictors that demand longer-term review to avoid poor outcomes				
20 mins	2.1 Lecture	Optimizing investigations for children	Full PPT available in FSP	• Define adequate imaging including image quality and patient positioning for x-ray; CT, ultrasound, MRI, intraoperative arthrogram; radiation risk reduction of surgeon and patient. How much x-ray do we need? • Classification—assists diagnosis, prerequisite for planning, quality control, assessment of union • Follow-up and assessment of long-term outcome (define key assessment parameters)—do you need an x-ray?	Expert faculty
15 mins	2.2 Lecture	The AO Pediatric Comprehensive Classification of Long-Bone Fractures (PCCF) and the AO Comprehensive Injury Automatic Classifier (AOCOIAC)	Full PPT available in FSP	Link to AO classification and treatment algorithms	Expert faculty
15 mins	2.3 Plenary session	Summary	PPT 2 supracondylar humeral fractures Tibial diaphysis Triplane fracture	• Assessment of fractures highlighting the need for adequate x-ray investigations and reduce radiation exposure • Injury patterns: fractures to highlight the special features of the classification system	All faculty at tables with roaming moderator(s)

Duration	Activity	Topic	Tools	Key teaching points	Who
70 mins	**MODULE 3—Decision making**				
20 mins	3.1 Lecture	Strategy for managing injuries at different ages	Full PPT available in FSP	Choice of technique/method according to age, bone segment, development, and available infrastructure	Expert faculty
40 mins	3.2 Open small group discussions	Clinical decision making	PPT available in FSP	Use this session to also evaluate if learners are in the right groups! Based on modules 1–2 Address 3 age groups 0–3 y, 4–10 y, >10 y Give examples of injuries to the epiphysis, metaphysis, and diaphysis	All faculty at tables with roaming moderator(s)
10 mins	3.3 Plenary session	Summaries from each table	Flipcharts	Each table captures their discussions on decision making	All faculty at tables with roaming moderator(s)

Duration	Activity	Topic	Tools	Key teaching points	Who
180 mins	**MODULE 4—Lower limb—femoral fractures** • Evaluate the range of treatment options for epiphyseal, metaphyseal and diaphyseal femoral fractures • Define indications for and principles of femoral traction • Perform the technique for elastic nailing of femoral fractures and discuss limitations • Perform the technique for ALFN in adolescents • Compare and contrast treatment options in children of different ages, ie, casting, traction, plating, external fixator, intramedullary devices				
10 mins	4.1 Plenary session	Warm-up cases	PPT cases from FSP	Proximal metaphyseal, length unstable diaphyseal, distal metaphyseal fractures Moderator does not give outcome of treatment as the cases will be revisited at end of module	All faculty at tables with roaming moderator(s)
75 mins	4.2 Focused small group discussions	Treating femoral fractures in children and adolescents	PPT available from FSP	• Proximal femoral fractures Excluding SCFE • Femoral fractures—how to treat children up to 3 years of age Include traction, hip spica, elastic nailing • Femoral fractures—how to treat children older than 3–4 years of age Address elastic nail and end caps, conventional nailing, external fixator, plating • Femoral fractures in older children/young adolescents—ALFN • Distal femoral metaphysis and epiphysis	All faculty at tables with roaming moderator(s)
10 mins	4.3 Plenary session	Reevaluation of warm-up cases	PPT cases from FSP	Give the "solutions" to the previously presented cases	All faculty at tables with roaming moderator(s)
30 mins	4.4 Practical exercise	PE1—ESIN in the femur: retrograde and anterograde techniques (half-group)	Info from word data	If number of sets is sufficient, run back to back. Otherwise split group and faculty repeats practical	All faculty
10 mins				Table moderators reset the practical during break	
30 mins	4.5 Practical exercise	PE2—ALFN (half-group)	Info from word data		All faculty
15 mins	4.6 Lecture	Summary of femoral fractures	Take-home messages in PPT available. Moderator to summarize discussions	Including attainment of objectives and take-home messages	Chairperson or moderator

Duration	Activity	Topic	Tools	Key teaching points	Who
80 mins	**MODULE 5—Lower limb—knee injuries** • Relate mechanisms to patterns of injury around the knee • Ensure identification of early recognition of pediatric knee injuries • Evaluate different treatment methods for complex knee injuries • Describe the treatment options • Anticipate complications and evaluate options for management				
10 mins	5.1 Plenary session	Warm-up cases	PPT cases from FSP	Tibial spine injuries, physeal fractures, metaphyseal fractures Moderator does not give outcome of treatment as the cases will be revisited at end of module	All faculty at tables with roaming moderator(s)
45 mins	5.2 Focused small group discussions	Treating knee injuries in children of different ages	PPT cases from FSP	• Injuries in a younger child Tibial spine fractures, injuries to the extensor mechanism including patella fracture/dislocation • Injuries in the older child Include ACL and meniscal tear • Injuries of the proximal tibia Include tuberosity, crush trauma of the epiphysis, proximal metaphyseal injury • Traumatic patellar dislocation with osteochondral lesion	All faculty at tables with roaming moderator(s)
10 mins	5.3 Plenary session	Reevaluation of warm-up cases	PPT cases from FSP	Give "solutions" to the previously presented cases	All faculty at tables with roaming moderator(s)
15 mins	5.4 Lecture	Summary of knee injuries	Take-home messages in PPT available. Moderator to summarize discussions	Including attainment of objectives and take-home messages	Chairperson or moderator

Duration	Activity	Topic	Tools	Key teaching points	Who
105 mins	**MODULE 6: Lower limb—tibia, fibula, and ankle injuries** • Recognize the range of treatment options of tibial diaphyseal fractures • Describe the presentation of compartment syndrome • Describe the pattern of triplane fractures • Apply principles of fracture reduction and fixation that maintain the function of the physis				
10 mins	6.1 Plenary session	Warm-up cases	PPT cases from FSP	Cases: tibial diaphysis Moderator does not give outcome of treatment as the cases will be revisited at end of module	All faculty at tables with roaming moderator(s)
45 mins	6.2 Focused small group discussions	Tibial diaphysis and distal tibial fractures	PPT available in FSP	Addresses challenges, nonoperative treatment (casting), operative treatment (ESIN and its problems), ExFix, plating, tillaux/two-plane fractures, triplane fractures, unstable ankle fractures Alerts to danger of compartment syndrome!	All faculty at tables with roaming moderator(s)
10 mins	6.3 Plenary session	Reevaluation of warm-up cases	PPT cases from FSP	Give "solutions" to the previously presented cases Include attainment of module objectives and take-home messages	All faculty at tables with roaming moderator(s)
40 mins	6.4 Practical exercise	PE 3—Triplane fractures			All faculty

Duration	Activity	Topic	Tools	Key teaching points	Who
70 mins	**MODULE 7—Entire lower limb**				
60 mins	7.1 Open small group discussions	Pediatric lower limb injuries	PPT cases from FSP	Base on content/issues raised in modules 4–6 and focus on specific treatments/injury patterns	All faculty at tables with roaming moderator(s)
10 mins	7.2 Plenary session	Summaries from each table	Flipcharts	Each table captures entire lower limb discussions	All faculty at tables with roaming moderator(s)

Duration	Activity	Topic	Tools	Key teaching points	Who
65 mins	**MODULE 8—Upper limb—shoulder and humerus** • Identify indications for operative intervention • Describe assessment of injuries associated with musculoskeletal trauma around the shoulder, eg, peripheral nerve injury, brachial plexus injury, vascular injury, labral tears				
10 mins	8.1 Plenary session	Warm-up cases	PPT cases from FSP	Moderator does not give outcome of treatment as the cases will be revisited at end of module	All faculty at tables with roaming moderator(s)
30 mins	8.2 Focused small group discussions	Shoulder girdle and humerus	PPT cases from FSP	• Shoulder girdle injuries Include scapula, clavicle proximal humerus including sterno-clavicular and acromio-clavicular, gleno-humeral, physeal injuries and dislocations • Humeral diaphysis	All faculty at tables with roaming moderator(s)
10 mins	8.3 Plenary session	Reevaluation of warm-up cases	PPT cases from FSP	Give "solutions" to the previously presented cases	All faculty at tables with roaming moderator(s)
15 mins	8.4 Lecture	Summary of module		Including attainment of objectives and take-home messages	Chairperson or moderator

Duration	Activity	Topic	Tools	Key teaching points	Who
170 mins	**MODULE 9—Upper limb—supracondylar fractures** • Define the indications for internal fixation in pediatric elbow fractures • Explain the classification of supracondylar fractures • Apply different methods of fixation • List the treatment options and perform the most common techniques • Anticipate, identify, and manage complications, eg, cubitus varus, vascular and peripheral nerve injuries, compartment syndrome				
10 mins	9.1 Plenary session	Warm-up cases	PPT cases from FSP	Moderator does not give outcome of treatment as the cases will be revisited at end of module	All faculty at tables with roaming moderator(s)
60 mins	9.2 Focused small group discussions	Supracondylar fractures	PPT cases from FSP	• Traction—is there a place for it? Optional according to geographical region • Blount method Focus on complications or advantages/disadvantages • Advantages of different wiring techniques Comparison of stability between crossed, lateral divergent, multiple wires including risks • Radial external fixator/anterograde ESIN Address when/why traditional methods are ineffective	All faculty at tables with roaming moderator(s)
20 mins	9.3 Plenary session	Vascular/peripheral nerve injuries	PPT cases from FSP		All faculty at tables with roaming moderator(s)
10 mins	9.4 Plenary session	Reevaluation of warm-up cases	PPT cases from FSP	Give "solutions" to the previously presented cases	All faculty at tables with roaming moderator(s)
10 mins	9.5 Lecture	Summary of module		Including attainment of objectives and take-home messages	Chairperson or moderator
60 mins	9.6 Practical exercise	PE 4—Supracondylar fractures		Address cross K-wires, divergent lateral K-wires, radial external fixator	All faculty

Duration	Activity	Topic	Tools	Key teaching points	Who
95 mins	**MODULE 10—Upper limb—other elbow injuries** • Describe the late complications of lateral condyle fractures, eg, nonunion, malunion, tardy ulnar nerve palsy • Recognize cubitus varus deformity from overgrowth, avascular necrosis from excessive surgical dissection • Avoid missing the Monteggia lesion • Perform intramedullary rod fixation of radial neck fractures				
10 mins	10.1 Plenary session	Warm-up cases	PPT cases from FSP	Nonunion, malunion, growth arrest, missed Monteggia lesion Moderator does not give outcome of treatment as the cases will be revisited at end of module	All faculty at tables with roaming moderator(s)
45 mins	10.2 Focused small group discussions	Other elbow injuries	PPT cases from FSP	• Lateral condyle, medial condyle and medial epicondyle fractures Focus on surgical approach, reduction and fixation techniques • Radial neck fracture treatment according to the Métaizeau technique—video available on request • Monteggia lesion	All faculty at tables with roaming moderator(s)
20 mins	10.3 Plenary discussion	Nonunion, malunion, growth arrest, missed Monteggia lesion	PPT cases from FSP	For more complex cases "InQuizition" format (see educational methods in Chairperson Guide)	All faculty at tables with roaming moderator(s)
10 mins	10.4 Plenary session	Reevaluation of warm-up cases	PPT cases from FSP	Give "solutions" to the previously presented cases	All faculty at tables with roaming moderator(s)
10 mins	10.5 Lecture	Summary of module		Include attainment of objectives and take-home messages	Chairperson or moderator

Duration	Activity	Topic	Tools	Key teaching points	Who
140 mins	**MODULE 11—Upper limb—forearm and wrist fractures** • Explain how the forearm functions as a multi-axial joint, ie, flexion, extension, pronation, supination • Explain the methods of stabilization and fixation according to the level of fracture in the forearm and wrist • Describe the indications for surgical treatment • Perform ESIN techniques for forearm • Discuss the indication for and application of other techniques				
10 mins	11.1 Plenary session	Warm-up cases	PPT cases from FSP	Moderator does not give outcome of treatment as the cases will be revisited at end of module	All faculty at tables with roaming moderator(s)
15 mins	11.2 Lecture	What is current (state-of-the-art) treatment?	PPT available in FSP—can be adapted by presenter		All faculty at tables with roaming moderator(s)
45 mins	11.3 Focused small group discussions	Treating forearm and wrist fractures	PPT cases from FSP	Focus on avoidance of complications to ensure healing and restore function • Distal radius • Guidelines for operative or nonoperative treatment Assessment: stability, fracture level, both bones, deformity/displacement	All faculty at tables with roaming moderator(s)
10 mins	11.4 Plenary session	Reevaluation of warm-up cases	PPT cases from FSP	Give "solutions" to the previously presented cases	All faculty at tables with roaming moderator(s)
20 mins	11.5 Lecture	Summary of module		Include attainment of objectives and take-home messages	Chairperson or moderator
40 mins	11.6 Practical exercise	PE 5—Elastic nailing of forearm and radial neck fractures			All faculty

Duration	Activity	Topic	Tools	Key teaching points	Who
70 mins	**MODULE 12—Entire upper limb**				
60 mins	12.1 Open small group discussions	Pediatric upper limb injuries	PPT cases from FSP	Content/issues raised in modules 8–11 focus on treatments/injury patterns	All faculty at tables with roaming moderator(s)
10 mins	12.2 Plenary session	Summaries from each table	Flipcharts	Each table captures their discussions on entire upper limb	All faculty at tables with roaming moderator(s)

All AOTrauma Pediatrics educational events (eg, courses)

Duration	Activity	Topic	Tools	Key teaching points	Who
50 mins	**Closing session**				
30 mins	Panel discussion	Closing session with all faculty		Participant-generated QandA to be collected on paper during the day OR offer reflection—give time before last break to generate questions in informal groups, moderator collects, bundles questions	All faculty
Approx. 20 mins	Lecture	Summary of entire course		Summarize the whole course learnings and close. Can include attainment of course objectives and take-home messages, acknowledgments, regional/local outlook, evaluations	Chairperson(s)