UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Pain in Children and Adolescents

2627-5-H4101D415

Aims

This Elective Course is primarily intended for fifth and sixth-year medical students enrolled in the Degree Program in Medicine and Surgery. The course is also open to third-year students of Nursing degree programs and fifth-year students of the Degree Program in Dentistry and Dental Prosthetics.
The course is delivered through interactive classroom teaching, case-based discussions, multidisciplinary learning activities, and supervised practical educational experiences conducted under faculty guidance.
The primary aim of the course is to provide medical students and students from other healthcare disciplines with the core non-specialist competencies required to recognize, assess, and manage the most common pediatric conditions associated with acute and chronic pain in neonates, children, and adolescents.
Particular emphasis will be placed on acquiring the fundamental knowledge necessary to:
• recognize common pain conditions across pediatric age groups;
• perform age-appropriate pain assessment;
• understand the general principles of pharmacological and non-pharmacological pain management;
• identify situations requiring prompt medical or nursing intervention;
• recognize clinical scenarios that require referral to specialists in Pediatric Pain Medicine, Pediatric Anesthesiology, Pediatric Palliative Care, or other relevant healthcare disciplines.
The course adopts a student-centered educational approach based on the principles of Problem-Based Learning (PBL), promoting active participation, critical thinking, and continuous interaction between students and faculty members. Through the discussion of real clinical cases and practical scenarios involving acute and chronic pediatric pain, students will be encouraged to integrate theoretical knowledge with clinical reasoning and decision-making skills, thereby developing competencies directly applicable to everyday clinical practice.

Contents

The course provides an introductory and clinically oriented overview of pediatric pain medicine, covering the main epidemiological, pathophysiological, diagnostic, and therapeutic aspects of pain in neonates, children, and adolescents.

Topics include the development and maturation of the nociceptive system, the neurobiology of pain, pain classification (nociceptive, neuropathic, and nociplastic pain), and the principles of clinical and multidimensional pain assessment across different pediatric age groups.
The course will also address the fundamental principles of pain management, including pharmacological and non-pharmacological approaches, with particular emphasis on multimodal strategies and the central role of patients and families in the care process.
Through the discussion of clinical cases and practical scenarios, students will explore the most common acute and chronic pain conditions encountered in pediatric practice, including procedural pain, postoperative and post-traumatic pain, chronic non-cancer pain, cancer-related pain, and the basic principles of pediatric palliative care.

Detailed program

Interactive Classroom Teaching (14 Hours)
Module 1 – Introduction to Pediatric Pain Medicine (2 Hours)
Learning Objectives
By the end of this session, students will be able to understand the clinical relevance of pain throughout childhood and adolescence and its impact on the biological, psychological, and social development of children.
Topics Covered
• Definition of pain according to the International Association for the Study of Pain (IASP)
• Epidemiology of pain in neonates, children, and adolescents
• Consequences of unrecognized or inadequately treated pain
• Pain as the fifth vital sign
• Ethical and legal principles in pain management
• Introduction to Italian Law 38/2010
• Organization of Pediatric Pain Therapy and Pediatric Palliative Care networks
Interactive Activities
• Guided discussion of clinical cases
• Brainstorming on barriers to the recognition and treatment of pain in pediatric patients
• Analysis of introductory clinical scenarios

Module 2 – Neurobiology and Pathophysiology of Pain (2 Hours)
Learning Objectives
To understand the development of the nociceptive system and the principal neurobiological mechanisms involved in pain perception and modulation.
Topics Covered
• Ontogenesis and maturation of the nociceptive system
• Development of ascending and descending pain pathways
• Transduction, transmission, and perception of nociceptive stimuli
• Peripheral sensitization
• Central sensitization
• Neuroplasticity and pain memory
• Pathophysiological characteristics of pain in neonates and preterm infants
• Long-term consequences of early exposure to pain
Interactive Activities
• Analysis of clinical cases involving neonates and children undergoing repeated procedures
• Discussion of selected scientific articles

Module 3 – Pain Classification (2 Hours)
Learning Objectives
To distinguish the main categories of pain and understand their diagnostic and therapeutic implications.
Topics Covered
• Definition and characteristics of nociceptive pain

• Definition and characteristics of neuropathic pain
• Definition and characteristics of nociplastic pain
• Acute pain and chronic pain
• Breakthrough pain
• The biopsychosocial model of pain
• Biological, psychological, and social factors influencing the pain experience
Interactive Activities
• Presentation of clinical cases
• Small-group activities to identify predominant pain mechanisms
• Plenary discussion

Module 4 – Pain Assessment in Neonates, Children, and Adolescents (2 Hours)
Learning Objectives
To acquire the competencies required to perform multidimensional pain assessment across different pediatric age groups.
Topics Covered
• Pain-focused history taking
• Clinical examination of the child with pain
• Behavioral and physiological indicators of pain
• Pain assessment tools for neonates:
o Neonatal Infant Pain Scale (NIPS)
o Premature Infant Pain Profile–Revised (PIPP-R)
• Pain assessment tools for infants and children:
o FLACC Scale
o Faces Pain Scale–Revised (FPS-R)
o Wong–Baker FACES Pain Rating Scale
• Self-report assessment tools for adolescents:
o Numeric Rating Scale (NRS)
o Visual Analogue Scale (VAS)
• Multidimensional and biopsychosocial pain assessment
• Evaluation of the impact of pain on function, quality of life, and school participation
Interactive Activities
• Pain assessment simulations
• Discussion of clinical videos
• Practical application of pain assessment scales

Module 5 – Pain Management: Pharmacological and Non-Pharmacological Approaches (2 Hours)
Learning Objectives
To understand the principles of multimodal pain management in pediatric patients.
Topics Covered
Pharmacological Management
• Principles of multimodal analgesia
• Paracetamol (Acetaminophen)
• Non-steroidal anti-inflammatory drugs (NSAIDs)
• Opioids
• Adjuvant medications
• Monitoring treatment efficacy and safety
Non-Pharmacological Management
• Therapeutic education for children and families
• Distraction techniques
• Cognitive-behavioral interventions
• Clinical hypnosis
• Virtual reality
• Rehabilitation and physical activity
• Integrated psychological interventions

Interactive Activities
• Discussion of clinical cases
• Simulation of therapeutic decision-making
• Analysis of multimodal treatment strategies

Module 6 – Acute Pain: High-Frequency Clinical Scenarios (2 Hours)
Learning Objectives
To apply the principles of pain assessment and management in common acute clinical settings.
Topics Covered
• Procedural pain
• Pain associated with blood sampling and vaccinations
• Pain related to invasive procedures
• Postoperative pain
• Post-traumatic pain
• Perioperative analgesia
• Principles of pediatric locoregional anesthesia
• Prevention of chronic postsurgical pain
Interactive Activities
• Problem-Based Learning (PBL) using clinical scenarios
• Multidisciplinary discussion of clinical cases
• Analysis of care pathways

Module 7 – Chronic Pain, Cancer Pain, and Pediatric Palliative Care (2 Hours)
Learning Objectives
To understand the characteristics of persistent pain and pain associated with oncological and life-limiting conditions.
Topics Covered
Chronic Non-Cancer Pain
• Headache disorders
• Functional abdominal pain
• Persistent musculoskeletal pain
• Juvenile fibromyalgia
• Complex Regional Pain Syndrome (CRPS)
• Central sensitization syndromes
Cancer-Related Pain
• Disease-related pain
• Treatment-related pain
• Principles of pain management in children with cancer
Pediatric Palliative Care
• Definition and fundamental principles
• Identification of patient and family needs
• Symptom management
• Interdisciplinary approach
Interactive Activities
• Discussion of complex clinical cases
• Analysis of real-world care scenarios
• Integrated final discussion and assessment of acquired competencies

Prerequisites

The course is intended for fifth- and sixth-year medical students and is also open to third-year Nursing and Midwifery students and fifth-year Dentistry students.

Participants are expected to have the basic knowledge normally acquired during undergraduate training in biomedical and clinical sciences, particularly in human physiology, general pharmacology, and basic pediatrics.
The course is designed as an introductory and multidisciplinary educational experience on pain in neonates, children, and adolescents and is therefore suitable for students from different healthcare disciplines.

Teaching form

The course adopts a student-centered and highly interactive educational approach aimed at integrating theoretical knowledge with clinical reasoning and practical patient care.
Teaching activities will follow a progressive learning pathway, starting from the fundamental concepts of pain physiology, pathophysiology, and assessment in neonates, children, and adolescents, and gradually moving toward the analysis and discussion of real clinical cases and complex healthcare scenarios.
Lectures will be highly interactive and will be complemented by guided discussions, small-group activities, and Problem-Based Learning (PBL) exercises. Through this methodology, students will actively participate in identifying clinical problems, developing diagnostic hypotheses, and discussing appropriate management strategies.
Special emphasis will be placed on the early recognition of common acute and chronic pain conditions in pediatric patients. The course aims to provide future physicians, nurses, midwives, and dentists with the competencies required to perform an appropriate initial assessment and to initiate timely and effective interventions.
Educational activities will also focus on helping students distinguish between pain conditions that can be appropriately managed by non-specialist healthcare professionals and those requiring referral to specialized services, including Pediatric Pain Medicine, Pediatric Anesthesiology, Pediatric Palliative Care, Child Neuropsychiatry, Psychology, or other members of the multidisciplinary care team.
The overall teaching approach is designed to promote not only knowledge acquisition but also clinical decision-making skills, communication abilities, and an understanding of the role of different healthcare professionals in the care of children and adolescents experiencing pain.

Textbook and teaching resource

Teaching materials will be provided by the faculty throughout the course and will be selected according to the topics covered in each module.
Educational resources will include:
• review articles and original research papers selected from the national and international scientific literature;
• clinical practice guidelines, consensus statements, and recommendations issued by major national and international scientific societies in the fields of pain medicine and pediatric palliative care;
• educational materials prepared by the faculty, including lecture slides, summary documents, clinical cases, and topic-specific learning resources;
• guided consultation of institutional websites and online resources relevant to pediatric pain assessment and management;
• selected chapters from reference textbooks addressing the pathophysiology, assessment, and treatment of pain in neonates, children, and adolescents.
These materials will support classroom activities and provide opportunities for independent study, helping students consolidate their knowledge and apply it to the clinical cases and healthcare scenarios discussed during the course.

Semester

The course will be delivered during the second semester of the academic year, according to the official academic calendar approved by the Degree Programs.
The educational activities are primarily intended for fifth and sixth-year students enrolled in the Degree Programs in Medicine and Surgery and Dentistry and Dental Prosthetics, as well as third-year students enrolled in the Nursing and Midwifery degree programs.
Teaching sessions will be scheduled in accordance with the academic timetable and organizational requirements of the respective Degree Programs, with the aim of facilitating participation by students from the different healthcare professions involved.

Assessment method

Assessment of student learning will be aimed at verifying the achievement of the course learning objectives and the ability to apply acquired knowledge to clinical practice.
The final assessment will consist of two components:
• a multiple-choice written examination (MCQ) designed to evaluate theoretical knowledge related to the pathophysiology, assessment, and management of pain in neonates, children, and adolescents;
• a clinical case discussion, aimed at assessing the student's ability to apply clinical reasoning to common acute and chronic pediatric pain scenarios, identify appropriate management strategies, and recognize situations requiring referral to specialized services.
The final evaluation will consider not only theoretical knowledge but also the student's ability to integrate clinical, healthcare, and multidisciplinary perspectives in the assessment and management of pediatric patients experiencing pain.

Office hours

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