

Clinical Toxicology Education in the United States

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Classifications

- Medical
- Pharmacy
- Nursing
- Subdivisions
 - Undergraduate
 - Postgraduate
 - Continuing Education

Undergraduate Medical

- Standards for Accreditation of Medical Education Programs (AAMC, LCME)
 - 130 weeks of instruction
 - Only pharmacology & therapeutics
 - Hours of instruction
 - Clinical rotations (?)
- Society for Academic Emergency Medicine (SAEM)
 - Emergency medicine model
 - Toxicology in 2nd and 4th years

SAEM Undergraduate EM Model

- Second Year Goals - pathophysiology, and pharmacology of common toxicologic and environmental emergencies
 - Acetaminophen
 - Alcohol
 - Salicylate
 - Cyanide
 - Tricyclic antidepressant toxicities
- Fourth Year Goals – 4 week EM rotation
 - Drug overdose
 - Toxic exposure

Burdick et al, Acad Emerg Med 1998;5:1105-10
DeBehnke et al, Acad Emerg Med 1998;5:1110-3

Association of American Medical Colleges

- Liaison Committee on Medical Education (October 2004)
- Standards for Accreditation of Medical Education Programs Leading to the M.D. Degree
 - 130 weeks of instruction
 - “pharmacology and therapeutics”
 - Pediatrics
 - Emergency Medicine

Program Requirements for Residency Education (ACGME)

- Emergency Medicine
 - Model of the Clinical Practice of Emergency Medicine
 - "Toxicologic disorders"
- Pediatrics
 - Emergency and Acute Illness Experience
 - 2 months EM, 2 months other
 - "Poisonings and ingestion"
- Preventative Medicine
 - General - Environmental health
 - Occupational Medicine – Toxicology

2003 Clinical Practice Model - Emergency Medicine

- Collaboration of ABEM, ACEP, CORD, EMRA, RRC-EM, SAEM
- Components
 - Assessment of patient acuity
 - Tasks to provide emergency medical care
 - Listing
 - Common conditions
 - Symptoms
 - Disease presentations

2003 Clinical Practice Model - Emergency Medicine

- Developing future medical school and residency curricula
- Certification examination specifications
- Continuing education objectives
- Research agendas
- Residency program review requirements
- Other documents for function of EM

2003 Clinical Practice Model - Emergency Medicine

- Patient Acuity Levels
 - Critical
 - Emergent
 - Lower Acuity
- Toxic effects of caustic (C,E)
- Liver Alcoholic (E)
- Bites and Envenomations (C,E,L)
- Radiation (C,E)
- Biologic Weapons (C,E)
- Tick-borne (E)
- Dystonic Reactions (E, L)
- Addictive Behavior (L)
- Toxic Effects of Gases Vapors (C,E,L)
- 17.0 Toxicologic Disorders

Postgraduate Medical Toxicology Rotations

- 134 Emergency Medicine residencies
 - Required 57%
 - Elective 17%
 - Both 3%
 - Unknown 22%
- Duration
 - 1 month 63%
 - ½ month 7%
 - Unknown 28%

Medical Toxicology Fellowship

- Clinical specialty (ABMS)
 - Monitoring, prevention, evaluation and treatment of injury and illness due to occupational and environmental exposures, pharmaceutical agents, as well as unintentional and intentional poisoning in all age groups.
- Requirements
 - Completion of ACGME-accredited residency
 - 24 months in length
 - Associated ACGME-accredited residency program
 - Emergency Medicine
 - Preventative Medicine
 - Pediatrics

Program Curriculum

- ACGME Competencies
- Core content (developed 1994, revised 2003)
- Clinical Experience
 - 12 months bed-side clinical care
 - Workplace and environmental exposures
- Regional Poison Center affiliation
- Planned educational conferences
- Pharmacology, pharmacokinetics and DI
- Maintain primary board specialization
- Communication and teaching experience

Medical Toxicology Major Core Content (2003)

- Medical Toxicology Core Content Task Force
 - Medical Toxicology Sub-board
 - Medical toxicology fellowship directors
 - American College of Medical Toxicology
 - Medical Directors Committee, AAPCC

Medical Toxicology Major Core Content Categories (2003)

- 1.0 Principles of Toxicology
- 2.0 Toxins and Toxicants
 - 2.1 Drugs
 - 2.2 Industrial, Household, and Environmental Toxicants
 - 2.3 Natural Products
 - 2.4 Warfare, Terrorism, and Riot Control Agents
- 3.0 Therapeutics
- 4.0 Assessment and Population Health
- 5.0 Analytical and Forensic Toxicology

Current Status

- 27 Medical Toxicology Fellowship programs
 - ACGME accredited
 - 21 emergency medicine
 - 4 preventative medicine
 - No pediatric programs
 - 3 inactive

Medical Undergraduate Education

- Limited
- Standards for Accreditation of Medical Education Programs
 - Addresses only pharmacology and therapeutics
 - No specific mention of toxicology

Society of Academic Emergency Medicine (SAEM)

- Undergraduate Emergency Medicine model
 - toxicology in the 2nd and 4th years
 - Estimated of 2 - 4 hours during pharmacology
 - Clinical rotation sometimes available.

Postgraduate Medical Education

- Residency and fellowship programs
- Residency programs that specifically address clinical toxicology
 - Emergency Medicine
 - Pediatrics
 - Preventative Medicine

Emergency Medicine Residency Curriculum Guidelines

- Require didactics and clinical information be provided on toxicology
- 41 of the 49 toxicologic disorders ranked Critical (e.g. life-threatening)

SAEM Emergency Medicine Model for Clinical Practice

- Model curriculum
- Emergency Medicine residency programs
 - Contain a certain specified number of hours of didactic content
 - 4 week toxicology rotation
 - Required (60%)
 - Optional (20%)

Pediatric Residency

- Require poisonings and ingestion
- Covered in the 4 months of emergency and acute illness experience.
- No requirement for subspecialty training
- Elective toxicology rotation

Preventative Medicine Core Content Requirements

- Occupational Medicine and Environmental
 - Specify competency in toxicology
 - Hazardous outbreaks

Medical Toxicology Fellowship Programs

- Medical Toxicology an ABMS subspecialty in
 - Emergency Medicine
 - Preventative Medicine
 - Pediatrics
- ACGME accredited programs
 - 21 emergency medicine
 - 4 preventative medicine
 - No pediatric programs

ACGME

Medical Toxicology Fellowships

- Emergency Medicine
- Preventative Medicine
- Candidates must complete an ACGME-approved residency
- 24 month programs
 - Affiliated with an ACGME-accredited residency in
 - Emergency Medicine
 - Preventative Medicine
 - Pediatrics
 - Faculty certification in Medical Toxicology (or equivalent)
 - Association with a regional poison center

ACGME

Medical Toxicology Fellowships

- Key curriculum elements
 - Planned educational conferences
 - Clinical experience
 - Acute
 - Occupational/environmental
 - Education on pharmacokinetics and drug interactions
 - Progressive teaching responsibilities

Pharmacy

Undergraduate Education

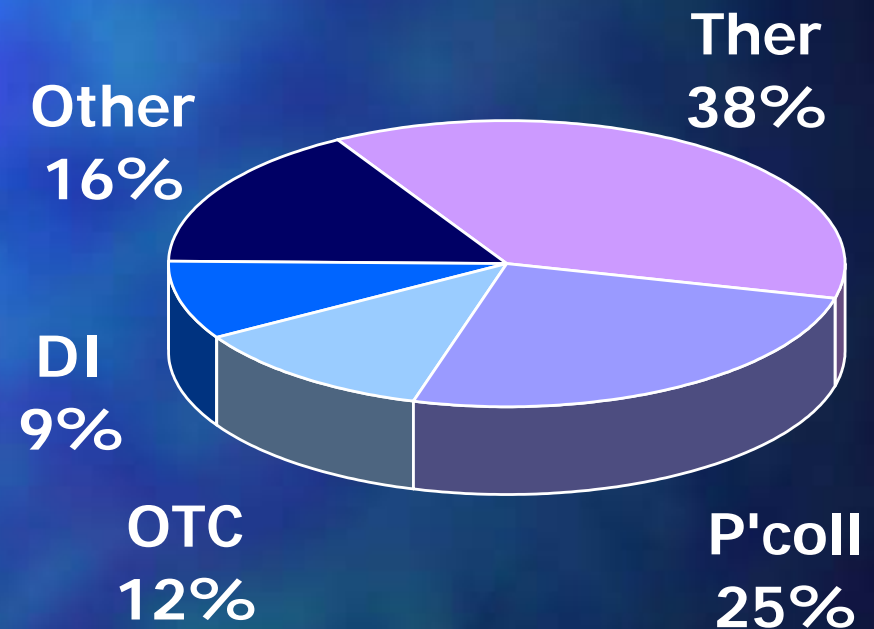
- ACPE Revised Standards and Guidelines
 - Toxicology listed
 - Pharmaceutical Sciences
 - Not in the Clinical Sciences
- No centralized listing of course work
 - Surveyed all 91 colleges of pharmacy
 - Dean or surrogate
 - ABAT Diplomates
 - SurveyMonkey web-based tool
 - 60/92 responded (65%)

Survey Questions

- Offer standalone course in clinical toxicology?
 - Required or elective
 - What professional year
 - Hours of instruction
- Offer in other courses
 - Which ones
 - Hours of instruction
- Experiential rotations
 - Location
 - Required or elective
 - Length

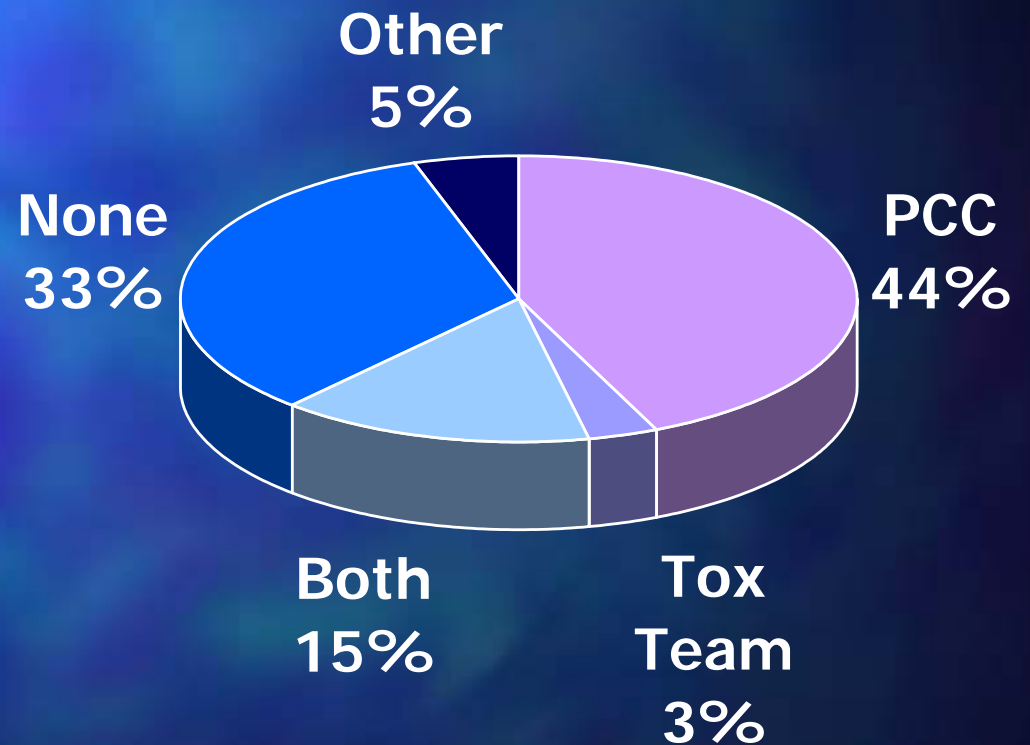
Pharmacy Undergraduate Education

- Standalone course
 - 57% offer
 - Required by 39%
 - P3 year (70%)
 - 2 semester/quarter hours
 - 30 hours of instruction
- Integrate into other courses (62%)
 - Average 22 hours (2-160 hrs)
 - Who teaches?



Experiential Practice Rotations

- Last year of the PharmD curriculum
- Elective (35/37, 95%)
 - Required in 3 schools
- Length (n=36)
 - 4 weeks (53%)
 - 5 weeks (25%)
 - 6 weeks (19%)



n = 59

Pharmacy

Postgraduate Education

- Residencies
 - 7 available (4 CT, 2 CT/EM, 1 EM)
 - Not accredited
- Training in a poison center
- American Board of Applied Toxicology
 - Doctoral trained pharmacists
 - Clinical toxicology residency, or
 - Sustained involvement
 - Credentialing process
 - Board certified by examination

Nursing

Undergraduate Education

- Not well developed
- No specific courses in nursing curriculum
 - Typically in pharmacology
- Limited experiential time in a poison center
 - 4 to 8 hours
 - Familiarize with poison center services

Nursing

Postgraduate Education

- No formal training programs
- Extensive training programs in poison control centers
 - Specialists in Poison Information
- AAPCC Regional Certification Guidelines
 - Requires completion of a training program approved by their medical director
- AAPCC training resources
 - Orientation Manual
 - Staff Development Tool
 - Toxicology References Resource Guide

Continuing Education

- Multidisciplinary
- Locally by individual poison centers servicing their catchment areas
- Nationally by AACT, ACMT and AAPCC, through the NACCT
- Other conferences (SCCM, ACMT, ASHP, ACCP)