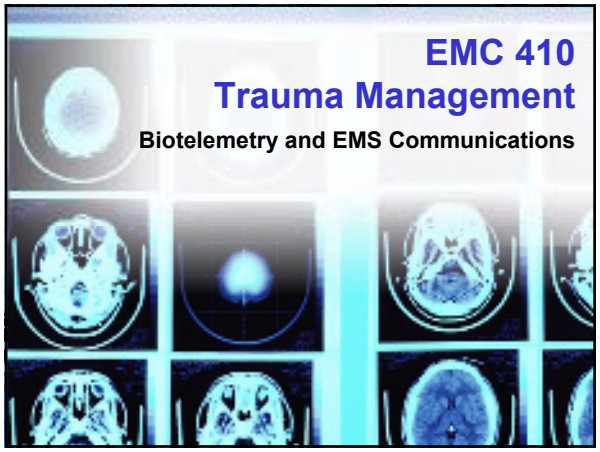


EMC 410
Trauma Management

Biotelemetry and EMS Communications

Unit Objectives

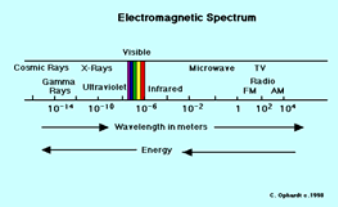
- **Upon completion of this chapter, you should be able to:**
  - Describe the role of the Federal Communications Commission in EMS communications
  - Define the relevant terminology of EMS communications.
  - Describe the various bands and channels used for EMS Communications.
  - Describe a radio repeater system.
  - Describe simplex, duplex, and multiplex systems.
  - Describe the various types of radio hardware.
  - Compare and contrast call screening, priority dispatching, and medical priority dispatching.
  - Provide a concise radio encode to the hospital.

Federal Communications Commission (FCC)

- **The agency that controls all nongovernmental communications in the United States.**
- **Licenses and allocates radio frequencies.**
- **Establishes technical standards.**
- **Monitors frequencies to assure appropriate usage.**
- **Spot checks base stations and dispatch centers for appropriate licenses and records**

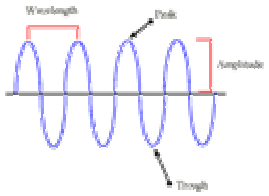
Radio Terminology

- **Electromagnetic Radiation Spectrum**



Radio Terminology continued

- **Radio Band—a range of radio frequencies.**
- **Radio Frequencies—the number of times per minute a radio wave oscillates. Measured in Hertz (Hz).**



Radio Terminology continued

- **Effective Radiated Power (ERP)**
  - Transmitter output measured in “watts”
- **Telemetry –**
  - Transmission of data by radio, such as EKG signal
- **Very High Frequency (VHF)**
  - VHF Low Band – 30 MHz to 54 MHz
  - VHF High Band – 138 MHz to 174 MHz
- **Ultrahigh Frequency (UHF)**
  - 406 to 470 MHz
  - 806 MHz to 866 MHz (known as “800 MHz)

Frequency Characteristics

- **VHF**
  - Low band
    - Up to 2000 mile range
    - Susceptible to "skip" interference where radio signals bounce off the ionosphere and return to earth a considerable distance away.
    - Better penetration in rural areas with dense foliage
  - High band
    - Mostly skip free
    - Shorter range
- **UHF**
    - Entirely skip free
    - Minimal signal distortion
    - Clear signal most suitable for EKG transmission.
    - Better penetration in urban areas
    - Shorter range
    - Signals absorbed by foliage

Common EMS Frequencies

- **Coordination and Control**
  - Local VHF channels
  - 155.280 MHz (required on all ambulances in NC for disaster communications)
  - 155.220 MHz
  - UHF Channels
    - Med channels 8-10
- **Medical Control**
  - 155.340
  - UHF Med channels (1-7)

Tone Coding

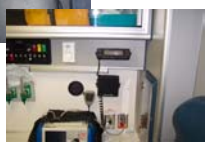
- **Squelch (silencing the "big bang")**
- **CTCSS (continuous tone-coded squelch system)**
  - Also known as "Private Line, PL, Channel Guard, and Quiet Channel"
- **DTMF (dual tone multi-frequency)**
  - Base station access
- **Digital Dial**
  - Encoder
  - Decoder

Radio Hardware

- Transmitter + receiver = transceiver
- Base station

Radio Hardware continued

- Mobile unit

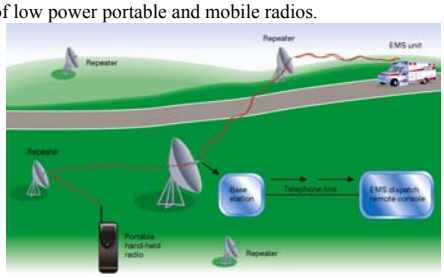


Radio Hardware continued

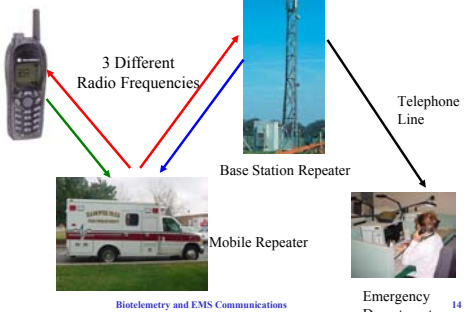
- Portable unit

Example of an EMS System Using Repeaters

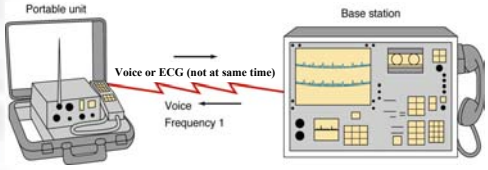
Repeater systems increase the effective transmission range of low power portable and mobile radios.



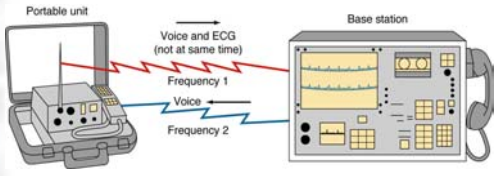
Repeater System continued



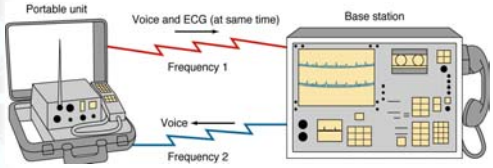
A Basic Communications System Using Simplex Transmissions (push-to-talk)



Duplex transmissions allow simultaneous two-way communications similar to telephone.



Multiplex systems can transmit voice and data at the same time.



Detection & Citizen Response

- Pre-911
- 911
- E-911

Call-taking & Emergency Response

- Call Screening
- Priority Dispatching
- Medical Priority Dispatching
- System Status Management

Call Coordination

- Voice dispatch
- Cell Phones
- Mobile Data Terminals
- Real-time Vehicle Tracking
  - Uses Automatic Vehicle Locator (AVL), GPS system, and vehicle radio.

Cellular Phone

- E-911
- Dispatch
- Coordination
- Hospital Communications

Encoding (Reporting) Procedures

- **One of your most important skills will be gathering essential patient information, organizing it, and relaying it to the medical direction physician.**

Encoding Procedures continued

- North Carolina Dial Code Book

Encoding Procedures continued

- Identification of unit, provider, and location
- Description of scene
- Patient's age, sex, and approximate weight (if relevant)
- Patient's chief complaint
- Brief pertinent history (OPQRST)
- Relevant past medical history (SAMPLE)
- Pertinent physical exam findings
- Treatment given so far/request for orders
- Estimated time of arrival to the hospital
- Other pertinent information

Tips for Encoding

- Routine encodes typically are 30 seconds or less
- Encodes in which medical orders are requested are 60 seconds are less
- Think of what you intend to say before keying the microphone
- Being concise, descriptive, thorough, and non-emotive are hallmarks of a professional.