Rockwell Laser Industries Laser Incident Database

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Why have a Laser Incident Database ?

- **The Rockwell Laser Incident Database recurring message is that:**
  - "The case studies of typical laser exposure incidents reveal that the type of incidents are often repeated and the events are often predictable"
- **We may analyze incidents to understand why and under what conditions such accidents occur and how they can be prevented**
- **This will lead us to improve laser safety policies and procedures**

What the Database Contains

- **Over 2,500 Laser Incidents Currently Entered**
  - Accident reports
  - Laser manufacturers
  - Industry/government/university contacts
  - Scientific literature
  - Newspaper/TV reports
  - Medical reports
  - FAA, FDA, Air Force, Army
  - Workman's compensation records
  - Other reports and research / Laser Safety Experts

FAA Database

- ~4800 incidents – as of 7/16/2010
- Covers 2004-present
- Includes all aircraft laser encounters
  - ~3600 Laser sightings and aircraft illuminations
  - ~1200 Cockpit illuminations (Incidents)

FAA Database

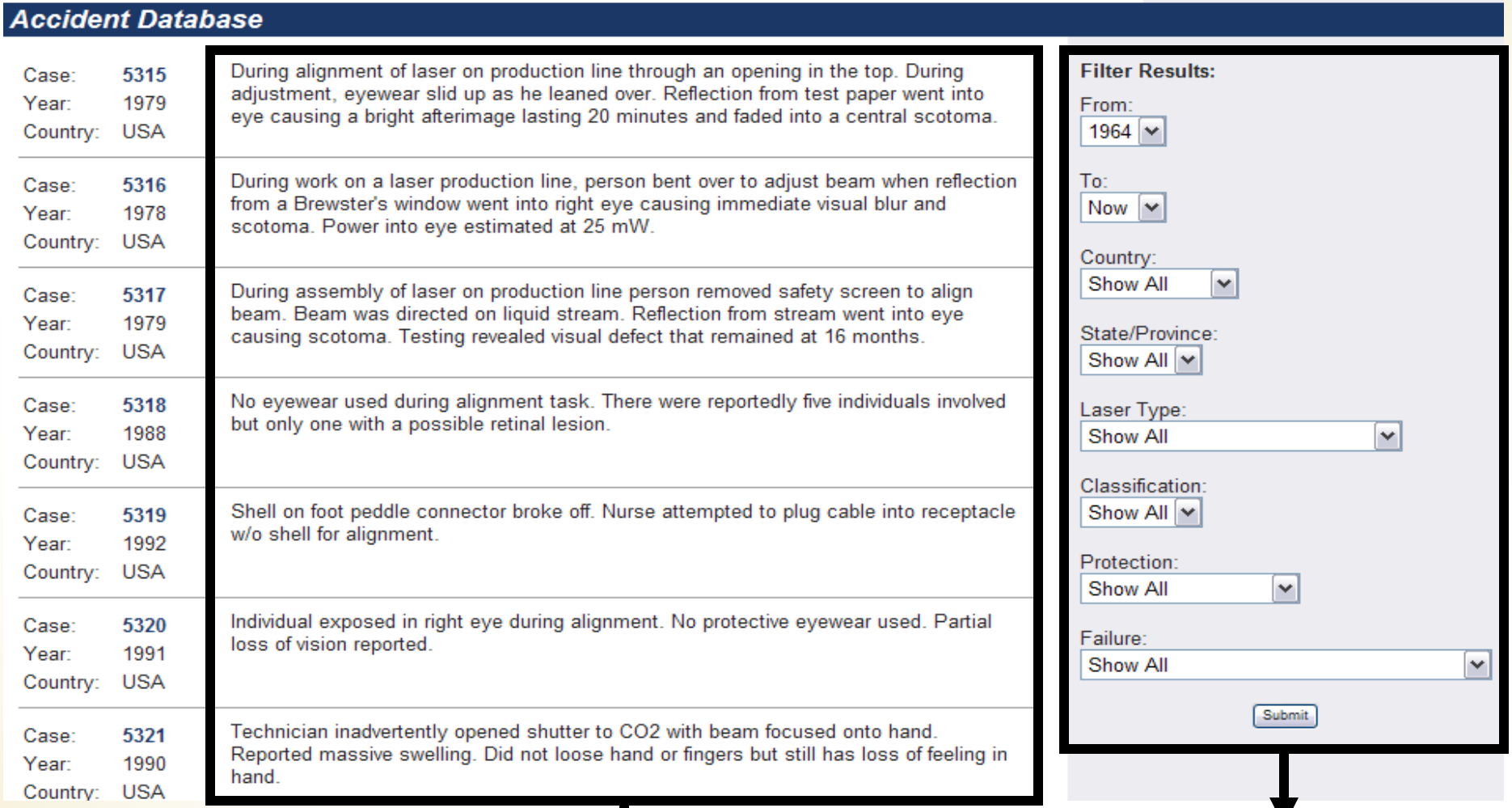
Of the 1200+ cockpit illuminations

- ~270 intentional illuminations
  (ie. multiple exposures or aircraft tracked)
- ~60 reported injuries (mostly eye injuries)

What's New?

- Database entries increased from 2,000+ in 2009 to 2,500+ in 2010
- New cases submitted from FAA, DOD & Industry, but not FDA
- New Form has more fields for more information
- More recent entries to see current trends in laser accidents and incidents
- Updated webpage more user friendly, with improved searching and reviewing options

New Web Page



Case Summaries for Simplified Browsing

New Search Options

New Incident Form

Accident Detail	
Case Nbr	6651
Accident Year	2005
Location	University
Country	USA
State	CO
City	Golden
Laser Type	YAG
WaveLength	750
Class	4
Divergence	
Exposure Time	
Output	.0000002 W
Pulse Rate	
Beam Diameter	
Subject	Other
Age	Unknown
Sex	M
Application	Research and Development
Protection	Available, Not Used
Eye Damage	Internal
Cause	Negligence
Description	Government contractor at NREL but working at Colorado School of Mines exposed a sample to laser radiation and was struck in the eye while tring to remove the sample. The worker was not wearing available eye protection. Worker reported seeing floaters and a yellowish-orange spot in field of view. He received steroid injections to reduce inflammation and swelling. Follow-up exam showed showed a 500 um burn spot in top retinal layer and a 200 um burn area in second retinal layer. Worker returned to work with "no-laser" restriction. Vision is still 20-20 after recovery.

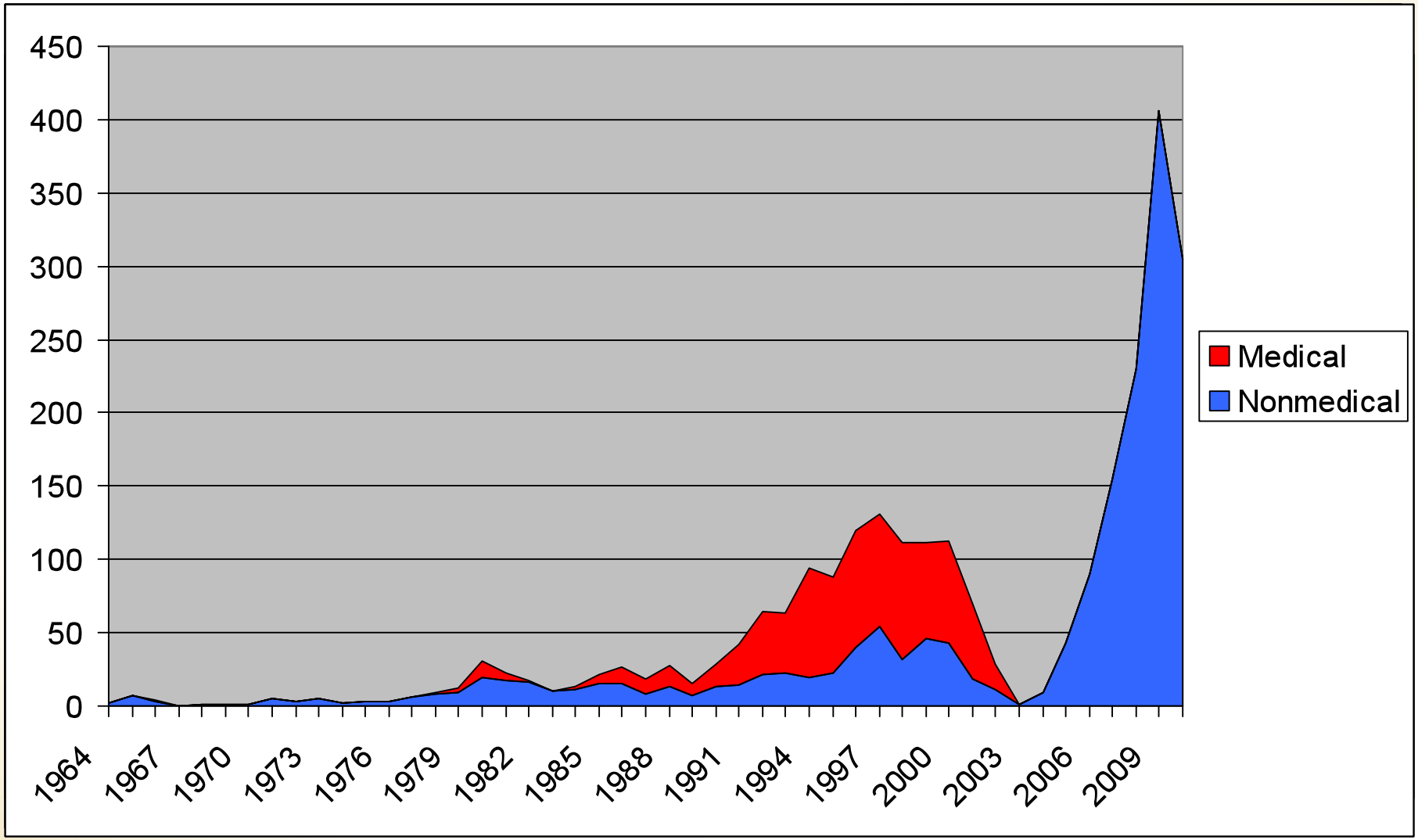
Goals of New Database

1. **Use the collected data to improve laser safety practices and decrease the number of laser related accidents and incidents**
2. **Create a standardized form and fields for reporting laser incidents so that information can be used by anyone**
   - Every database uses different fields
   - There are many discrepancies in coding between various databases
   - There needs to be a standard set so that information can be more easily shared and used
3. **Go Global …still in process**

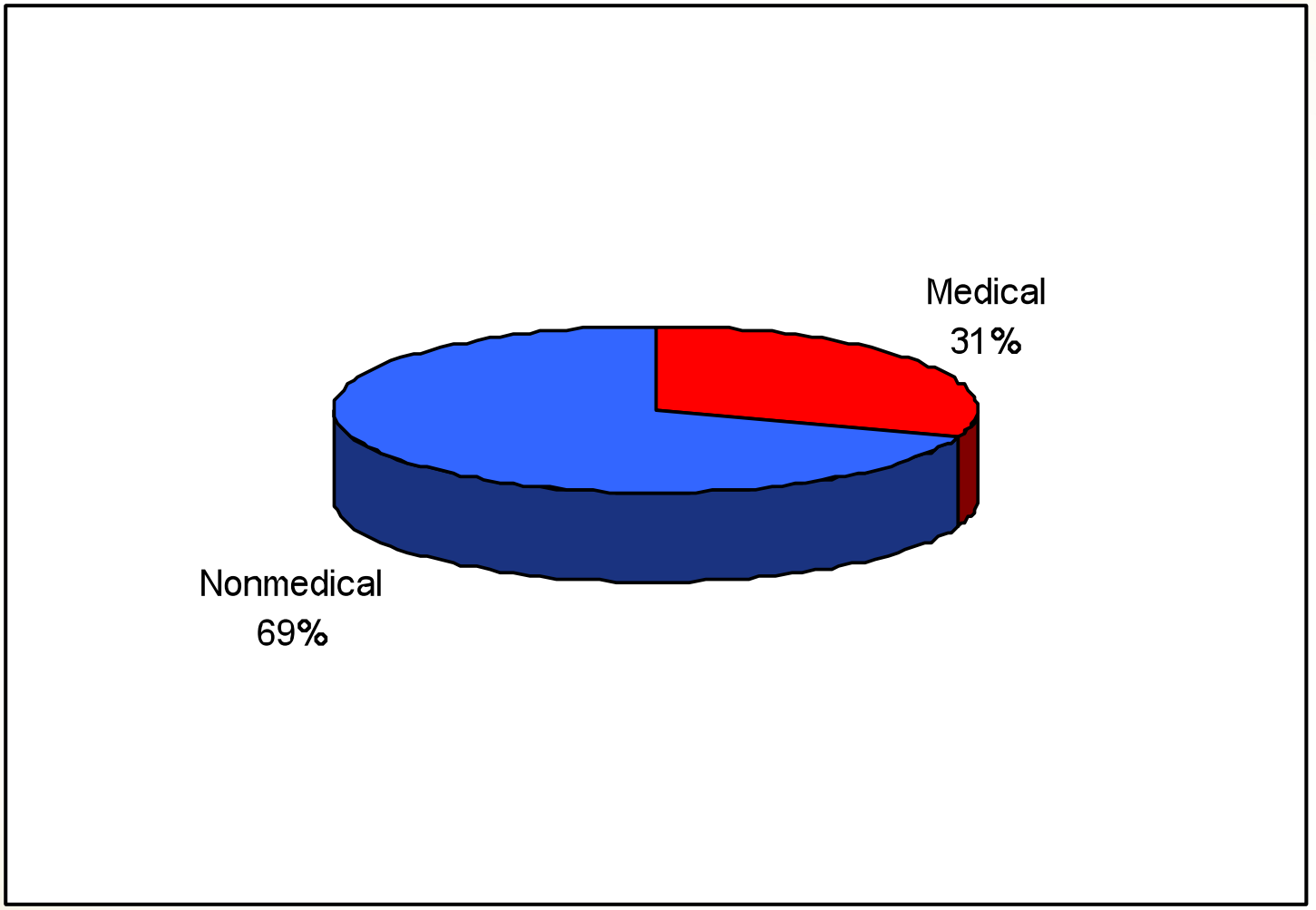
Analysis of the Current Data

Medical vs. Nonmedical Incidents
&
Incidents from the First 25 vs. the Last 25 Years of the Laser

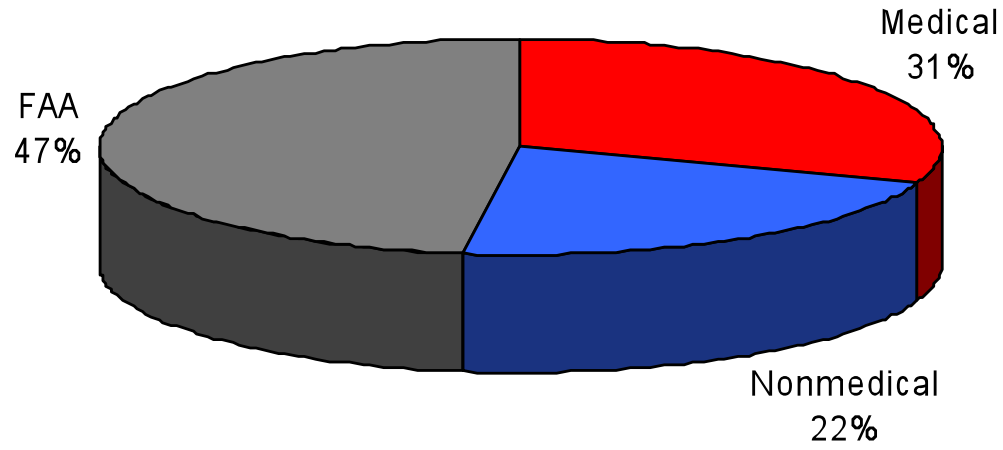
Number of Incidents by Year
Medical vs. Nonmedical



Medical vs. Nonmedical Breakdown



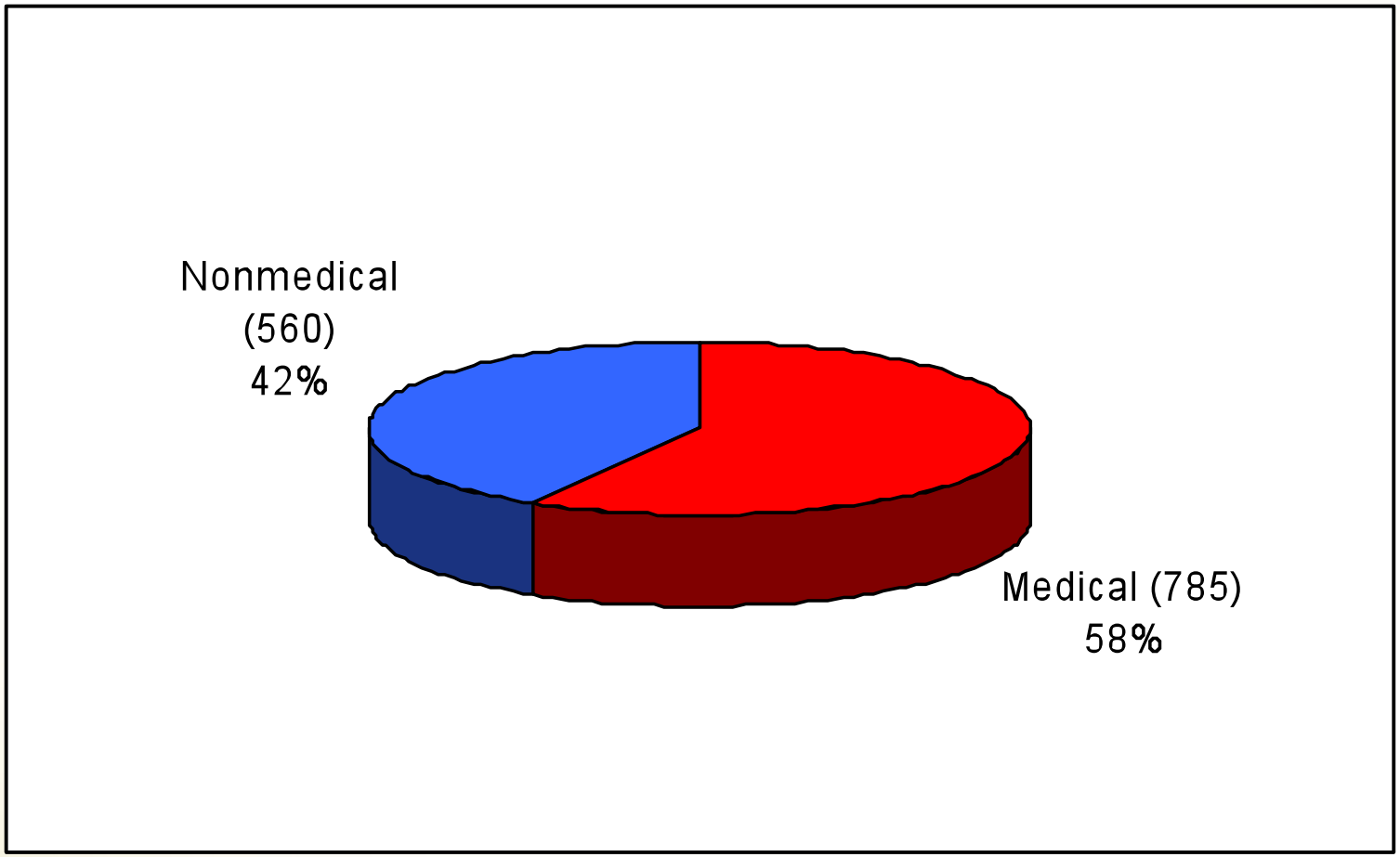
Medical vs. Nonmedical vs. FAA Incidents



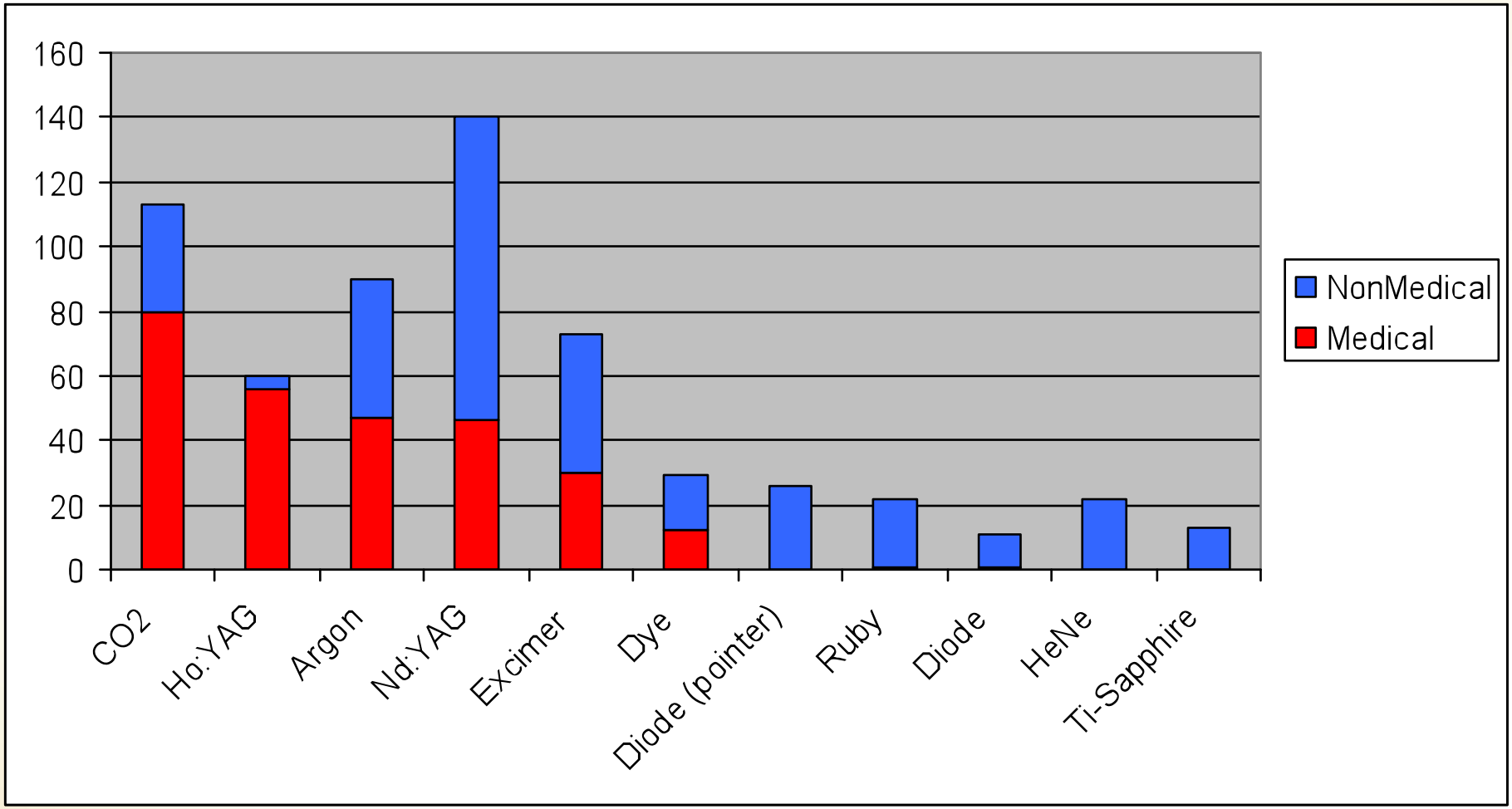
Note: FAA Data is omitted in the following slides

Medical vs. Nonmedical Breakdown

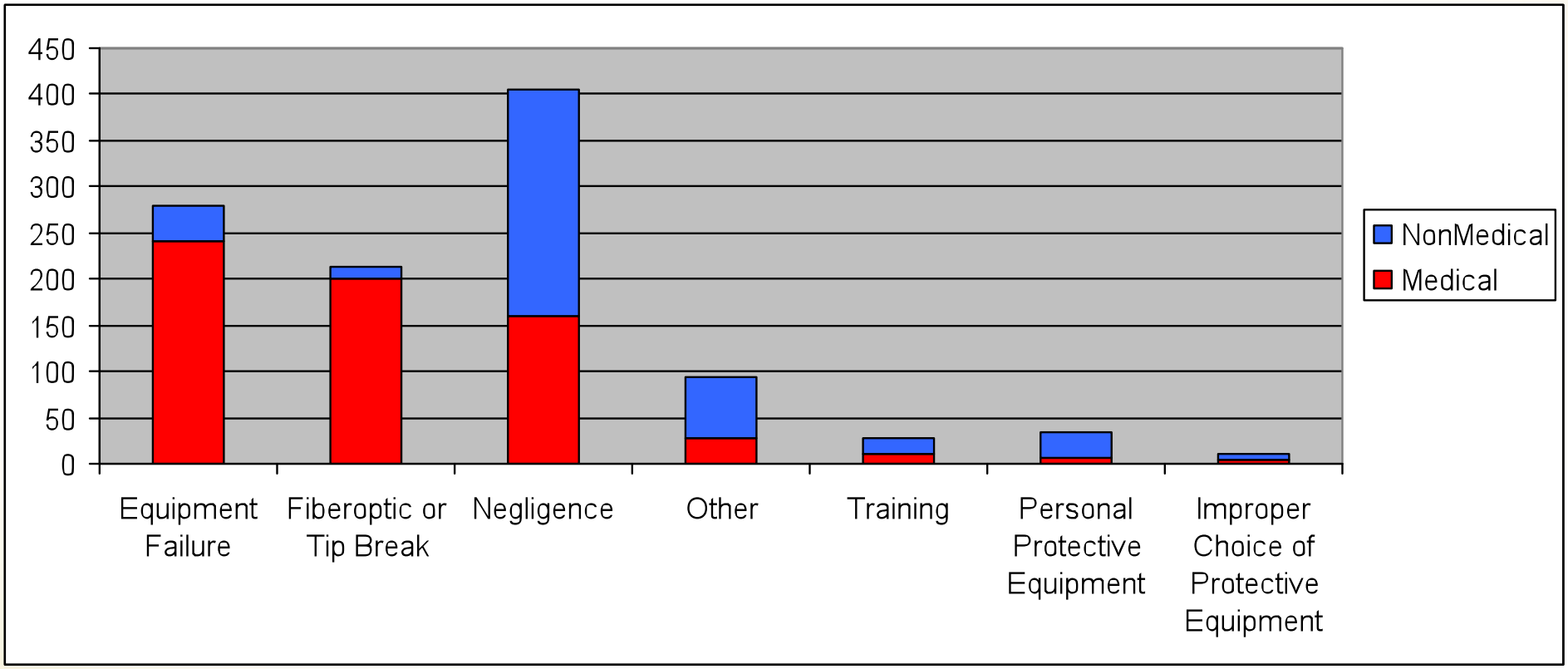
- 1345 Total Incidents



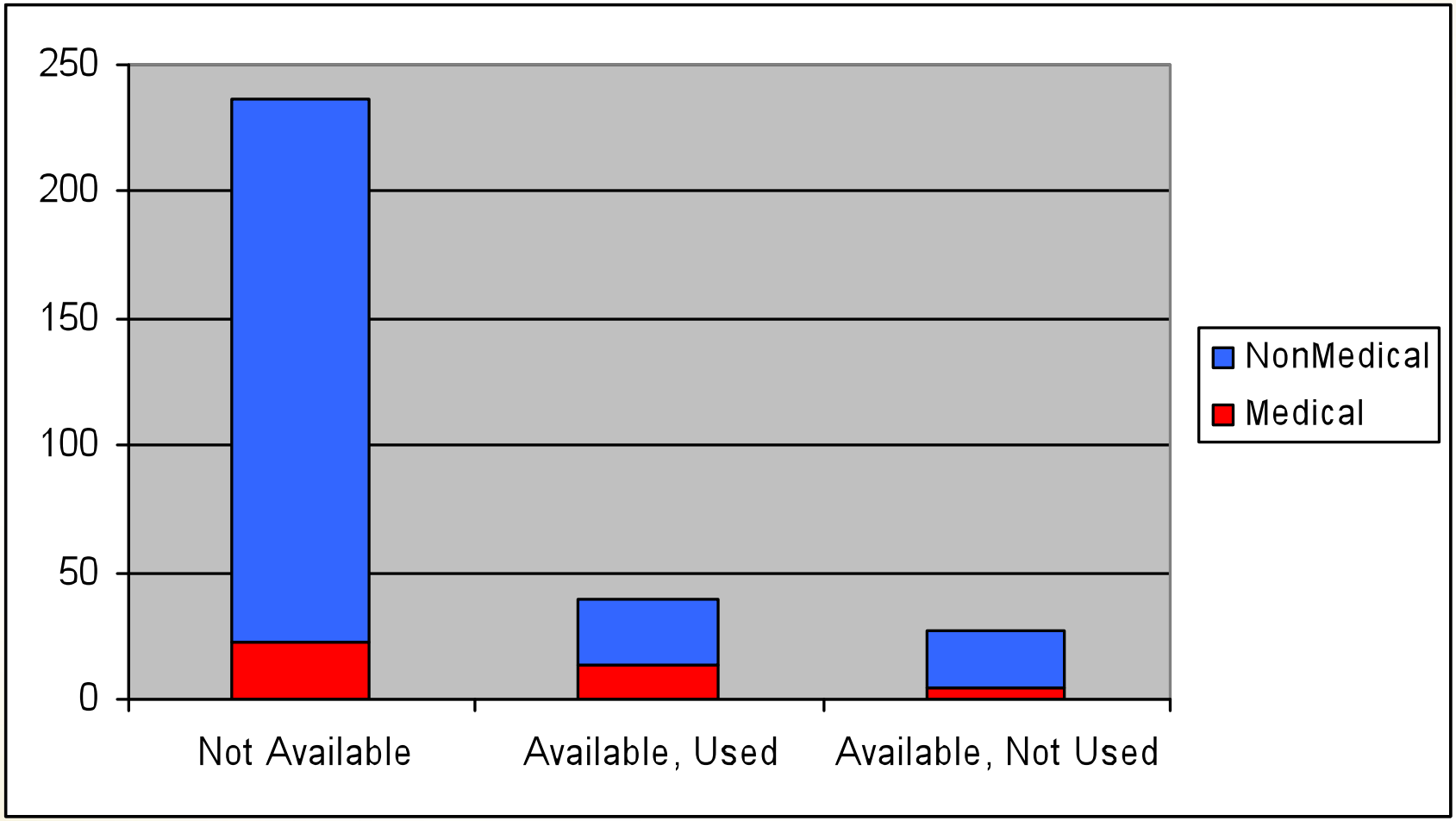
Number of Incidents by Laser Type Medical vs. Nonmedical



Number of Incidents by Cause Medical vs. Nonmedical



Number of Incidents by Eye Protection Medical vs. Nonmedical



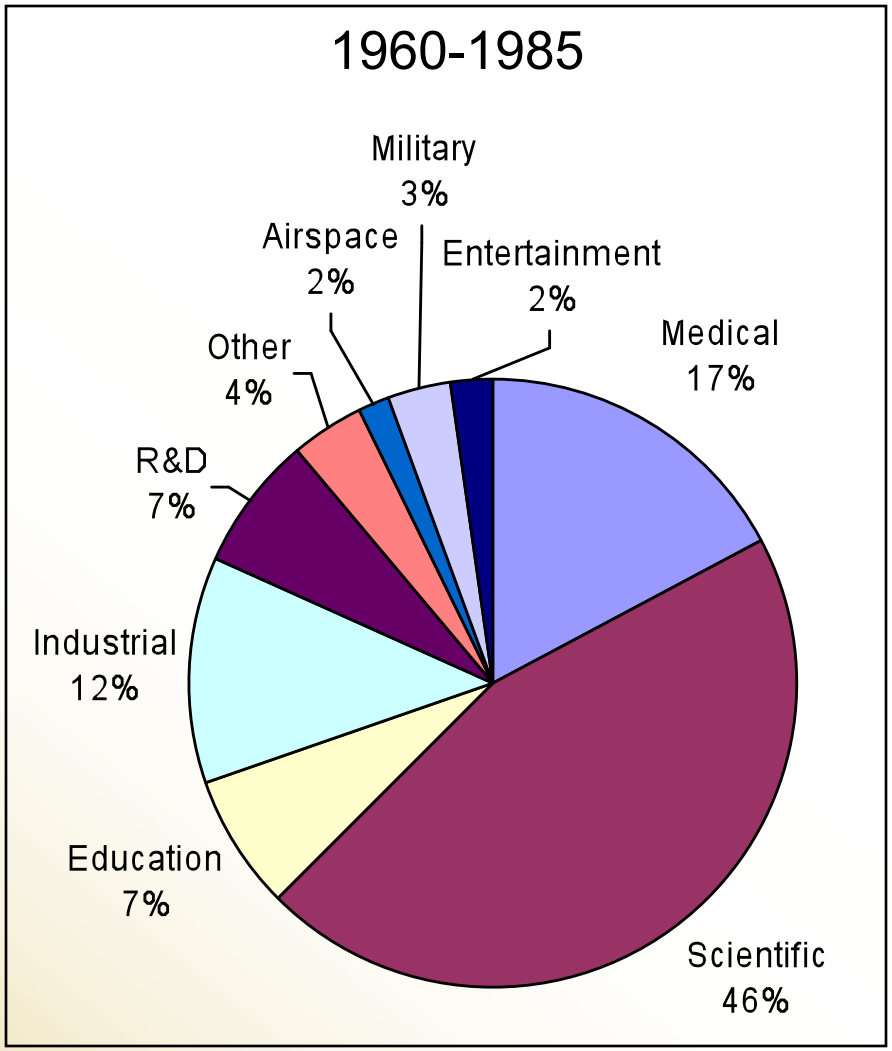
Laser Eyewear Available and Used

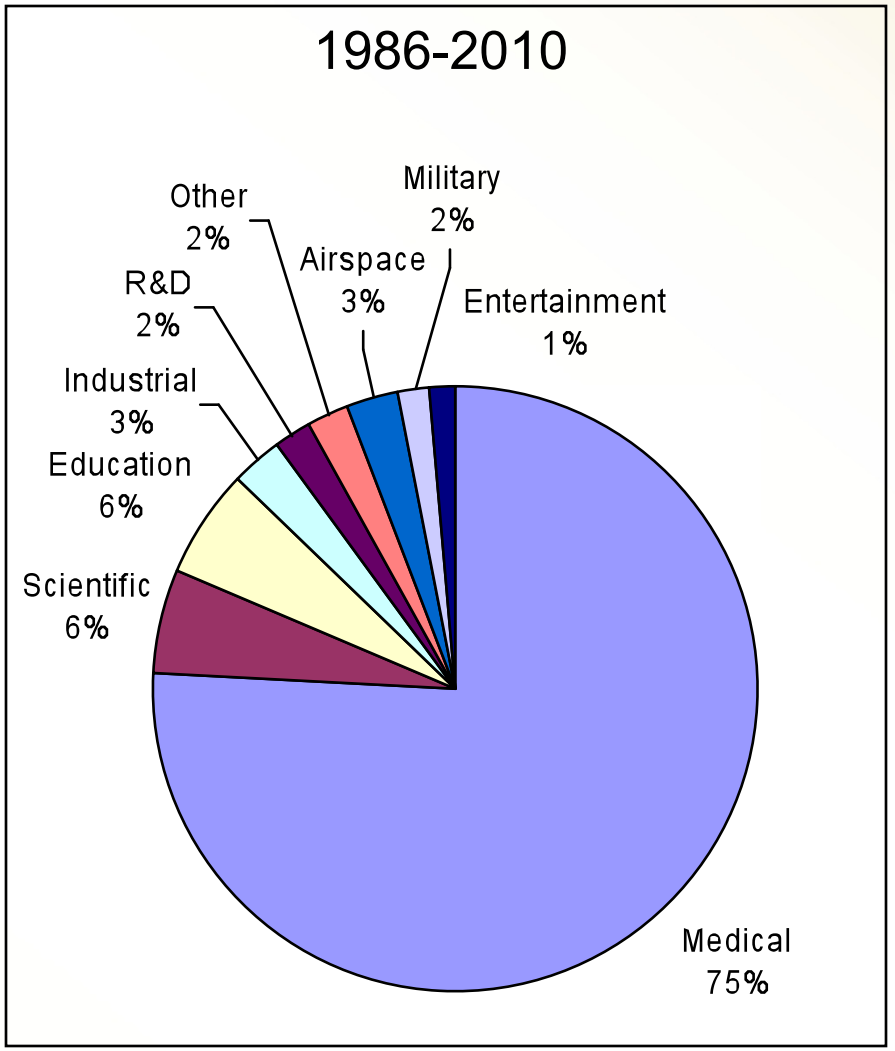
- **Case 5327**
  - Technician received ocular exposure in right eye while repairing & aligning laser. Reportedly safety eyewear had gap between bridge of nose & goggles. No pain involved. Recovery after 6 months. Small blind spot and "floaters" remained.
- **Case 5596**
  - Swim goggles lined with electrical tape were provided patient for eye protection. During procedure, each pulse produced excruciating eye pain.
- **Case 6099**
  - Student was wearing eyewear for 1064nm wavelength, but used a Nd:YAG laser with doubling crystal (532nm). Student was looking down, trying to determine the polarity of the beam - beam passed through escape windows and was deflected toward his eyes.

In Honor of the 50th Anniversary of the Laser

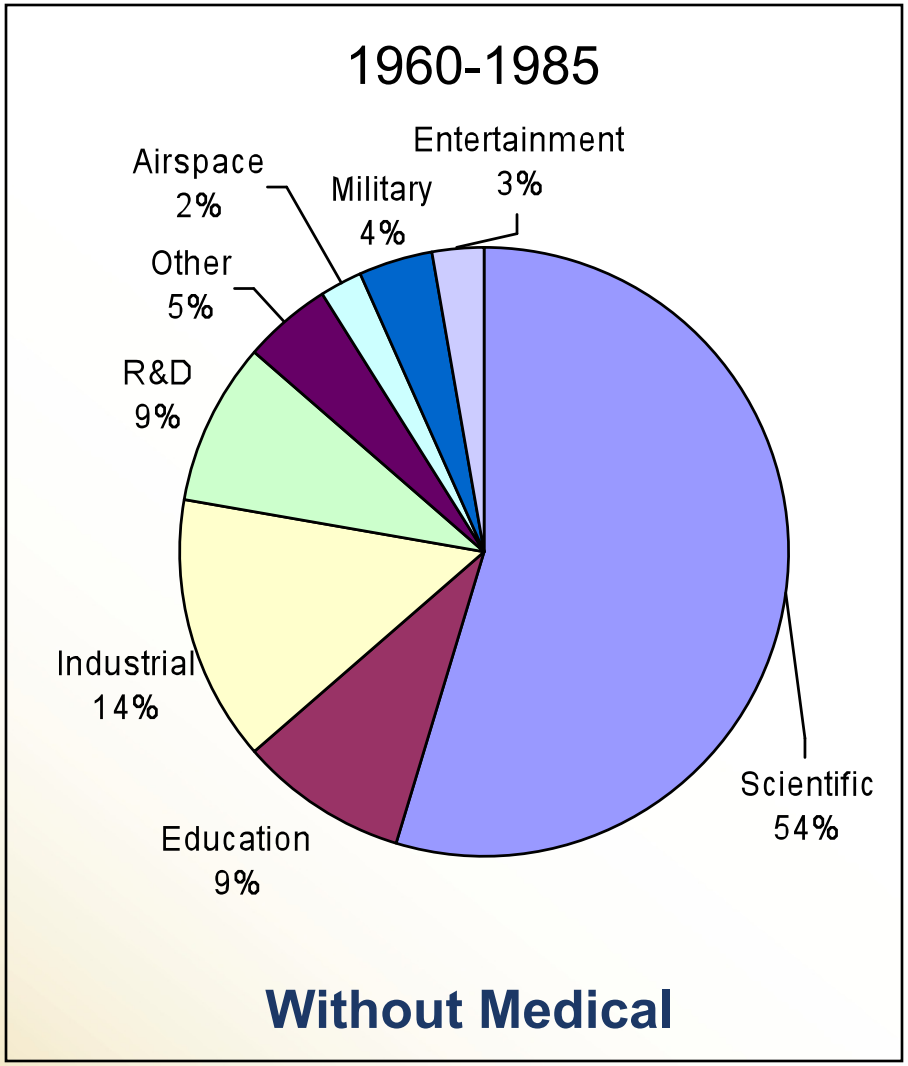
Incidents from the First 25 vs. the Last 25 Years of the Laser

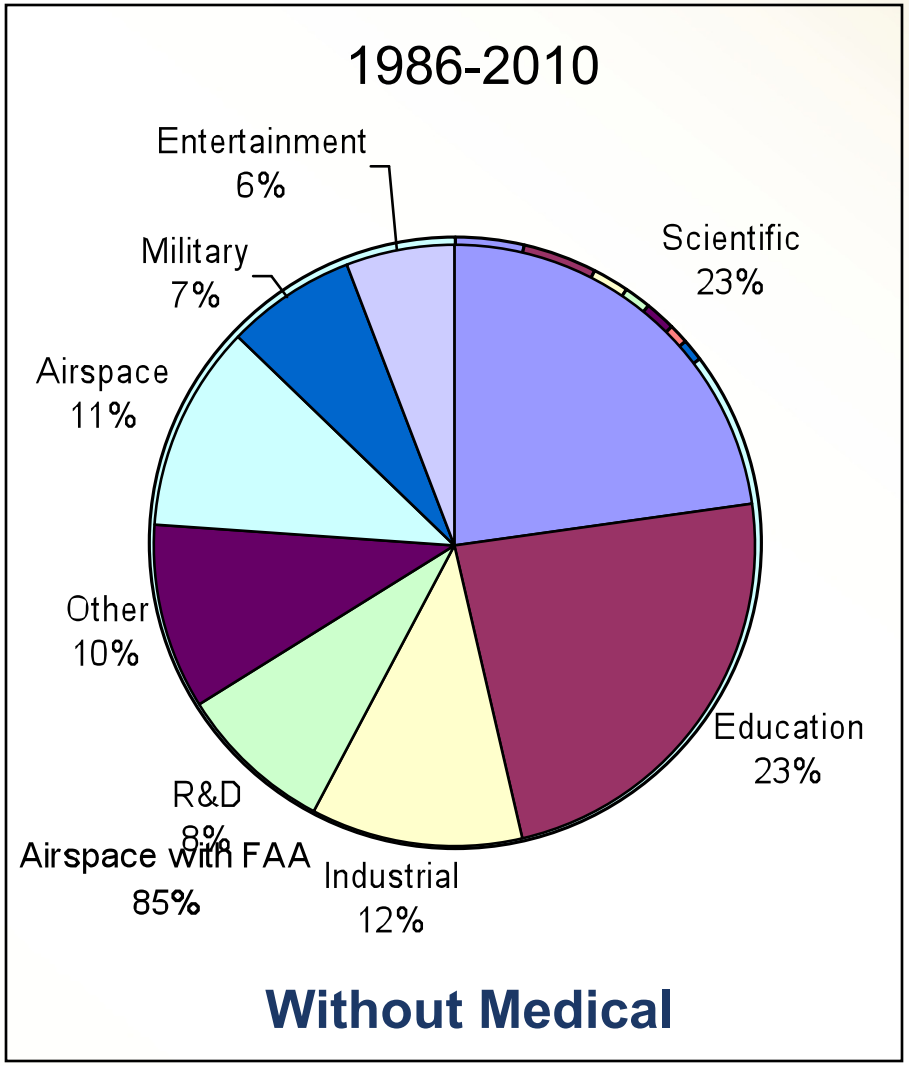
Number of Incidents by Environment
First 25 Years vs. Last 25 Years





Number of Incidents by Environment
First 25 Years vs. Last 25 Years

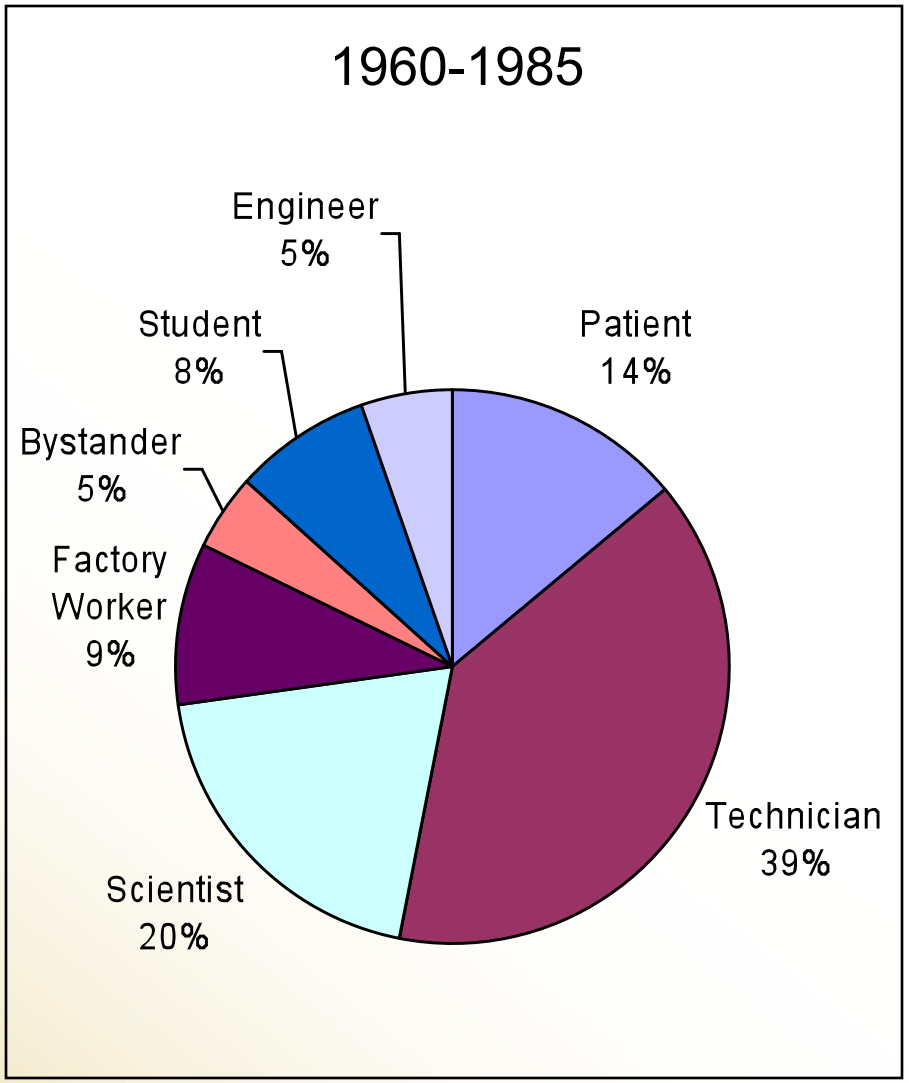


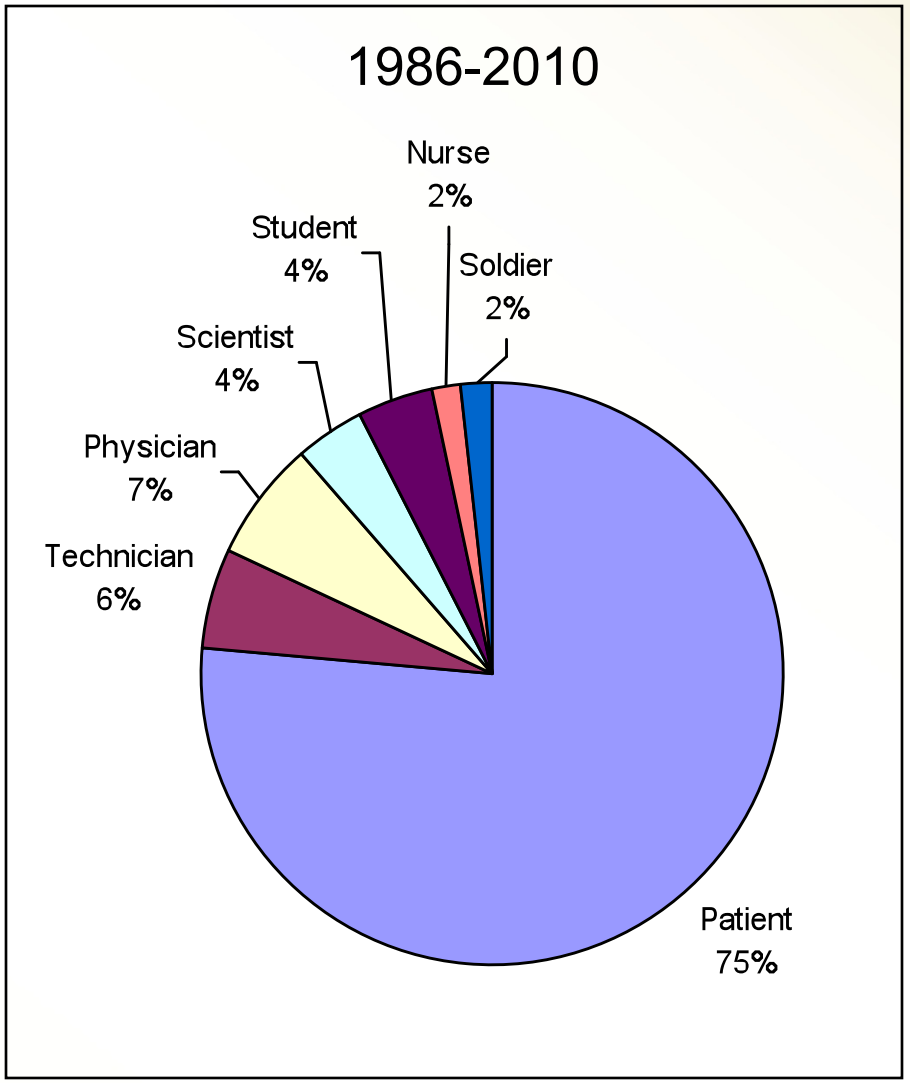


Educational Research Incidents

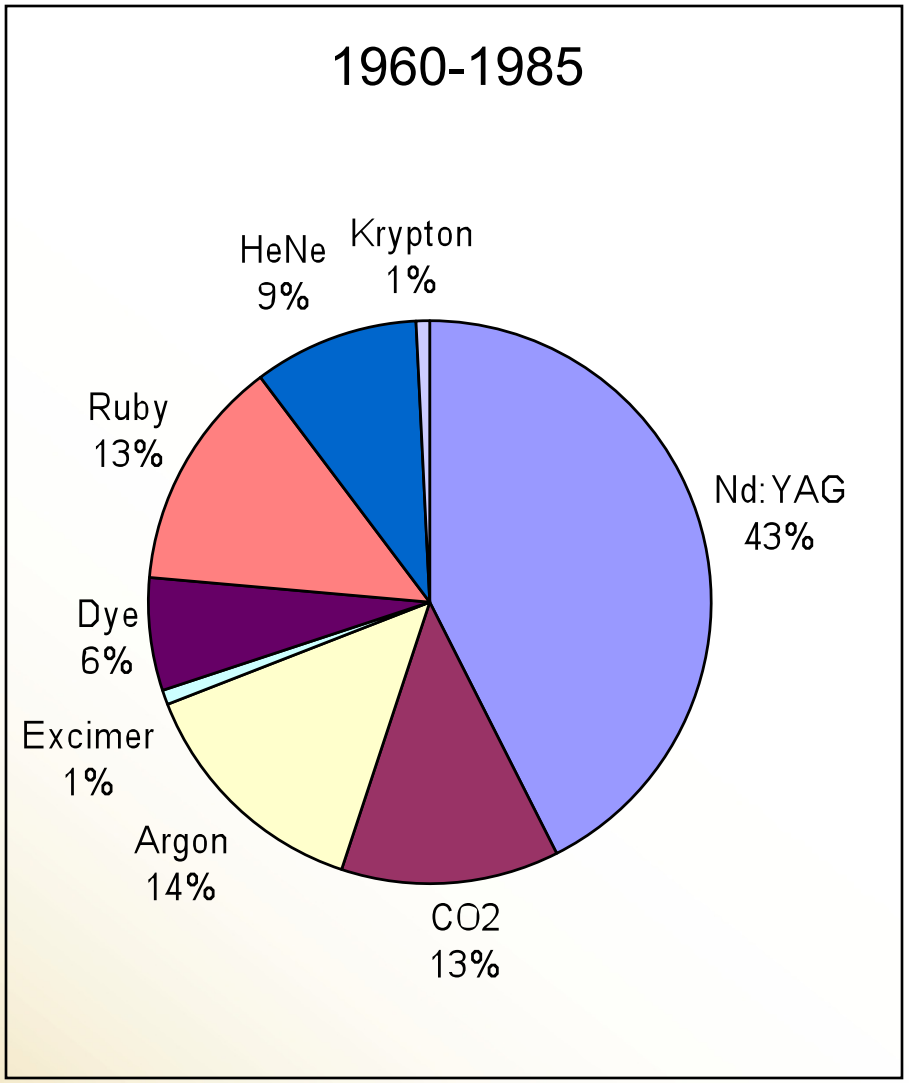
- **Case 5678**
  - New grad student received ocular exposure. Was given "splash" goggles by "experienced" grad student while that student had proper eyewear. Procedure called for sighting beam off the target. Exposure caused 50% vision loss.
- **Case 5892**
  - While doing experiment that called for sighting the beam, the student did not wear available laser eyewear. Exposure caused permanent loss of vision in right eye.

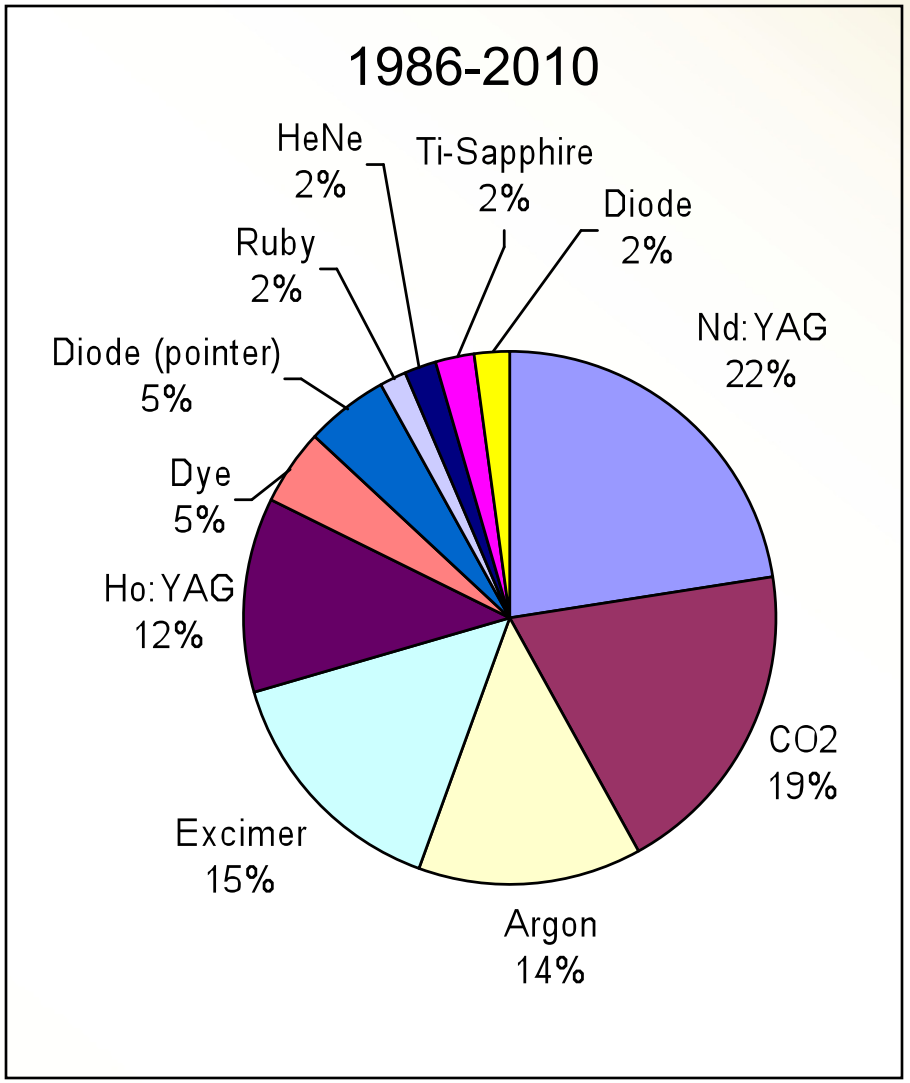
Number of Incidents by Top 7 Subjects First 25 Years vs. Last 25 Years





Number of Incidents by Laser Type
First 25 Years vs. Last 25 Years





Parting Thoughts…

- Some things never change
- Indifference, lack of training and unauthorized personnel in the enviornment are three of Safety's biggest obstacles
- Failure to follow SOP and to use available PPE is often sited

Reporting Incidents

- We are continuously working to collect as much information from as many sources as possible to get the best representation of laser accidents and incidents
- We appreciate any information on laser incidents
- We welcome you to analyze the data
- www.rli.com or accidents@rli.com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Laser Incident Database