

# Lloyd A. Hey, MD, MS

## Education & Training

---

- 1980-84      Massachusetts Institute of Technology (MIT). BS Electrical Engineering.
- 1984-88      Harvard Medical School, HST Program. MD Cum Laude.
- 1988-93      Resident, Harvard Combined Orthopaedic Surgery Program, Boston, MA.
- 1991-92      Harvard School of Public Health, MS Clinical Epidemiology.
- 1991-92      Pediatric Orthopaedic Fellowship, Children's Hospital Boston.
- 1994          Chief Resident, Orthopaedic Surgery, Children's Hospital Boston, Boston, MA. Advanced training in young adult and pediatric spinal deformity with Dr. John Hall, Dr. John Emans, Dr. Michael Millis and others.
- 1994-95      Combined Orthopaedic/Neurosurgical Adult Spine Fellowship, Duke University Medical Center. Advanced training in adult spinal deformity (scoliosis), treatment of adult degenerative spine conditions, tumors, and spinal trauma. Training with Dr. William Richardson, Dr. William Hardaker, Dr. Alan Friedman, Dr. Dennis Turner, and Dr. Robert Wilkins from Duke Orthopaedic and Neurosurgery Divisions.

## Professional Experience

---

- 1989-93      Information System Consulting, Clinical Information Systems. Boston, MA.
- 1995-2003    Assistant Professor, Division Orthopaedic Surgery, Department of Surgery, Duke...
- 1995-2003    Founder of MDeverywhere, Inc. Internet and Handheld...
- 1995-2004    Spine Surgeon, Duke University Medical Center  
Director, Duke Center for Clinical Effectiveness...
- 2004          Associate Professor, Division Orthopaedic Surgery, Department of Surgery, Duke...

## Awards and Honors

---

- 1984 Ernst A Guillemin Prize for best undergraduate thesis in the Department of Electrical Engineering and Computer Science, M.I.T.
- 1984 Tau Beta Pi Engineering Honor Society, MIT.
- 1984 Eta Kappa Nu Electrical Engineering Honor Society, President.
- 1986 CIBA-GEIGY Award for Contributions in Community Health, related to outcomes studies performed in statewide Massachusetts Emergency Shelter system for children.
- 1988 Rose Seegel Prize for the best thesis paper on the relation of the medical profession to the community: "Health Status and Health Care in Greater Boston Adolescent Emergency Shelters."
- 1988 Cum Laude Harvard Medical School.
- 1991 United Cerebral Palsy Foundation grant for pursuing advanced fellowship training.
- 1993 American Orthopaedic Association / Zimmer Resident Competition Award for "Arthrodesis of Subaxial Cervical Spine in Rheumatoid Arthritis"-San Diego, CA.
- 1993 Cervical Spine Research Society Research Award for "Predictors of Preoperative Neurologic Deficit and Postoperative Outcome in Patients with Rheumatoid Arthritis of the Subaxial Cervical Spine".
- 1997 Kilfoyle Award: New England Orthopaedic Society, for Pediatric Distal Radius Predictor paper with Roger Widmann MD, and Peter Waters MD.
- 1996 Volvo Award for best Clinical Research Paper presented at the 1996 International Society for the Study of the Lumbar Spine (ISSLS) International Meeting, Burlington Vt, for Perioperative Nutrition as Predictor for Postoperative Wound Infection Paper.
- 1998 American Orthopaedic Association (AOA) Zimmer Research Competition Award, for Metalloproteinase Paper.
- 2005 Physician of the Month, Duke Health Raleigh Hospital.

## **Committees/Boards**

---

### **Current Committees/Boards**

- Chair of the Adult Deformity Committee, Scoliosis Research Society
- Duke Health Raleigh Hospital Infection Control Committee

### **Former Committees/Boards**

- Duke Performance Improvement Coordinating Committee, (PICC) Duke Health System
- Duke Center for Healthcare Informatics (CHI), Duke Health System Surgery Representative
- Duke Health System Clinical Research Steering Committee
- Duke Pain Initiative Steering Committee
- Duke Patient Education Committee
- Chairman, ClinEffect Board of Directors
- Symbol Technologies Medical Advisory Board

## **Medical Societies and Professional Organizations**

---

- Fellow of the Scoliosis Research Society
- American Medical Association
- American Academy of Orthopaedic Surgeons
- Christian Medical and Dental Society
- North Carolina Medical Society
- North Carolina Orthopaedic Association
- Durham-Orange County Medical Society
- Piedmont Orthopaedic Society
- North American Spine Society
- North Carolina Spine Society
- Orthopaedic Research and Education Foundation Alfred R. Shands, Jr. Circle
- American Academy of Pediatrics

## **Publications**

---

Luo X, Pietrobon R, Curtis LH, Hey LA.

Prescription of nonsteroidal anti-inflammatory drugs and muscle relaxants for back pain in the United States.

Spine. 2004 Dec 1; 29(23): E531-7.

Luo X, Pietrobon R, Hey L.

Patterns and trends in opioid use among individuals with back pain in the United States.

Spine. 2004 Apr 15; 29(8): 884-90; discussion 891.

Luo X, Edwards CL, Richardson W, Hey L.

Relationships of clinical, psychologic, and individual factors with the functional status of neck pain patients.

Value Health. 2004 Jan-Feb; 7(1): 61-9.

Luo X, Pietrobon R, Sun SX, Liu GG, Hey L.

Estimates and patterns of direct health care expenditures among individuals with back pain in the United States.

Spine. 2004 Jan 1; 29(1): 79-86.

Luo X, Lynn George M, Kakouras I, Edwards CL, Pietrobon R, Richardson W, Hey L.

Reliability, validity and responsiveness of the short form 12-item survey (SF-12) in patients with back pain.

Spine. 2003 Aug 1; 28(15): 1739-45.

Luo X, Liu G, Frush K, Hey LA.

Children's health insurance status and emergency department utilization in the United States.

Pediatrics. 2003 Aug; 112(2): 314-9.

Speciale AC, Pietrobon R, Urban CW, Richardson WJ, Helms CA, Major N, Enterline D, Hey L, Haglund M, Turner DA.

Observer variability in assessing lumbar spinal stenosis severity on magnetic resonance imaging and its relation to cross-sectional spinal canal area.

Spine. 2002 May 15; 27(10): 1082-6.

Hey LA.

The wired orthopedist.

Orthopedic Technology Review. 2000 Dec 2; 11: 6&34-5.

Hey LA.

Championing a new technology in your practice.

Group Practice Journal. 2000 November/December; 49(10): 26-7.

Coles RE, Clements FM, Lardenoye JW, Wermeskerken GV, Hey LA, Nunley JA, Levin LS, Pearsall AW 4th.

Transesophageal echocardiography in quantification of emboli during femoral nailing: reamed versus unreamed techniques.

J South Orthop Assoc. 2000 Summer; 9(2): 98-104.

Goldstein LB, Hey LA, Laney R.

North Carolina stroke prevention and treatment facilities survey. Statewide availability of programs and services.

Stroke. 2000 Jan; 31(1): 66-70.

Hayward TZ 3rd, Hey LA, Newman LL, Duhaylongsod FG, Hayward KA, Lowe JE, Smith PK.

Endoscopic versus open saphenous vein harvest: the effect on postoperative outcomes.  
Ann Thorac Surg. 1999 Dec; 68(6): 2107-10;discussion 2110-1.

Goldner JL, Hey LA, Laney RB.  
Is the orthopedic generalist moving toward extinction?  
Am J Orthop. 1999 Jul; 28(7): 389-96.

Goldstein LB, Hey LA, Laney R.  
North Carolina stroke prevention and treatment facilities survey: rtPA therapy for acute stroke.  
Stroke. 1998 Oct; 29(10): 2069-72.

Otsuka NY, Hey L, Hall JE.  
Postlaminectomy and postirradiation kyphosis in children and adolescents.  
Clin Orthop Relat Res. 1998 Sep; (354): 189-94.

Coonrad RW, Murrell GA, Motley G, Lytle E, Hey LA.  
A logical coronal pattern classification of 2,000 consecutive idiopathic scoliosis cases based on the scoliosis research society-defined apical vertebra.  
Spine. 1998 Jun 15; 23(12): 1380-91.

Smith BG, Millis MB, Hey LA, Jaramillo D, Kasser JR.  
Postreduction computed tomography in developmental dislocation of the hip: part I: predictive value for outcome.  
J Pediatr Orthop. 1997 Sep-Oct; 17(5): 626-30.

Smith BG, Kasser JR, Hey LA, Jaramillo D, Millis MB.  
Postreduction computed tomography in developmental dislocation of the hip: part II: analysis of measurement reliability.  
J Pediatr Orthop. 1997 Sep-Oct; 17(5): 631-6.

Berend KR, Toth AP, Harrelson JM, Layfield LJ, Hey LA, Scully SP.  
Association between ratio of matrix metalloproteinase-1 to tissue inhibitor of metalloproteinase-1 and local recurrence, metastasis, and survival in human chondrosarcoma.  
J Bone Joint Surg Am. 1998 Jan; 80(1): 11-7.

Villavicencio AT, Hey LA, Patel D, Bressler P.  
Acute cardiac and pulmonary arrest after infusion of vancomycin with subsequent desensitization.  
J Allergy Clin Immunol. 1997 Dec; 100(6,1): 853-4.

Allen DM, Hey LA, Heinz TR, Golal R, Levin LS.  
Development and implementation of an extremity free-tissue-transfer database.  
J Reconstr Microsurg. 1997 Oct; 13(7): 475-7.

Klein JD, Hey LA, Yu CS, Klein BB, Coufal FJ, Young EP, Marshall LF, Garfin SR.  
Perioperative nutrition and postoperative complications in patients undergoing spinal surgery.

Spine. 1996 Nov 15; 21(22): 2676-82.

Schwend RM, Waters PM, Hey LA, Hall JE, Emans JB.

Treatment of severe spondylolisthesis in children by reduction and L4-S4 posterior segmental hyperextension fixation.

J Pediatr Orthop. 1992 Nov-Dec; 12(6): 703-11.

## **Non-Refereed Publications**

---

Grigorian M, Lynch JA, Guermazi A, Fierlinger AL, Fan B, MacLean DB, Hey LA, Maclean A, Genant HK.

Quantitative and Qualitative Assessment of Closed Fracture Healing using Multimodality Imaging.

Submitted to Journal of Bone and Joint Surgery, November 2002.

Luo X, Kakouras I, Laney R, Wenzel L, Edwards CL, Richardson W, Hey LA.

Mental health status in patients with neck or back-related work disabilities.

To be submitted.

## **Abstracts**

---

Hayward, HZ, Hey LA, Duhaylongsod FG, Lowe JE, Smith PK.

Endoscopic Verses Open Saphenous Vein Harvest: The Effect on Wound Complications, Incisional Pain, and Hospital Length of Stay.

Southern Thoracic Surgical Association in Orlando, FL on November 12th-14th, 1998.

Hey LA, Kasser J, Rosenthal R, Ramsing N, Katz J.

Feasibility and discriminant validity of the Pediatric Evaluation of Disability Inventory (PEDI). Developmental Medicine and Child Neurology 1992 34 (9): 19-20 (Abstracts from the AACPD Annual Meeting, 1992).

Poster presentation for AACPD meeting, October 1992.

Schwend R, Hey L, Waters P, Hall J, Emans J. Slip progression in severe spondylolisthesis.

Sources of error. Submitted to Journal of Pediatric Orthopaedics, 1994. (presented AAOS 1993, San Francisco paper 172).

Harmon J, Hey LA, Stowell C. Postoperative Infusion of Blood Drainage after Internal Fixation of Large Bone Fractures. Orthopaedic Trauma Association 1994 Abstract.

Millis M, Diminic M, Hey LA, Hall J. Long-term follow-up of patients with short segment anterior instrumentation in the treatment of adolescent idiopathic thoracolumbar scoliosis. Abstract AAOS 1993.

Grodzinsky AJ, Hey LA. Skeletal tissue electromechanics and electrical stimulation of growth and remodeling. *Engineering in Medicine and Biology*, Dec. 1983.

## **Grants**

---

CoInvestigator: "System for Interactive Electronic Guidelines with Feedback and Resources for Instructional and Educational Development (SIEGFRIED). R01 HS09436-01, sponsored by the Agency for Health Care Policy and Research (AHCPR). Principal Investigator: Lobach DL. My principle role has been to determine outcome measures, assist with implementation including integration of the Web Guideline tool into the clinical process.

Principal Investigator "Effectiveness of Endosurgical Harvesting of Sapenous Vein: a Randomized Control Trial. 1995-1996. Research Sponsor: Ethicon. CoInvestigators: Hayward T, Smith PK, Lowe J.

Principal Investigator. "Practical Spinal Surgical Outcomes Assessment Using Scannable Form Technology" 1994. Funding Source: Piedmont Society.

## **Recent Presentations**

---

May 3<sup>rd</sup>, 2013. Duke Piedmont Orthopedic Society Annual Meeting: "Scoliosis and Spine Surgery – Stewardship and Possible Benefits of Screening, Adult Follow-up, and Earlier Intervention".

May 11<sup>th</sup>, 2012. Duke Piedmont Orthopedic Society Annual Meeting: "Adult Spinal Deformity: What signs to look for When Trouble May Be Brewing".

April 11<sup>th</sup>, 2012. Duke Raleigh Hospital Orthopaedic Grand Rounds: "Scoliosis and Kyphosis Screening for Children, Adolescents and Adults."

May 13<sup>th</sup>, 2011. Duke Piedmont Orthopedic Society Annual Meeting: "Effect of Implantation Type on Instrumentation Fracture Rate in Adult Spinal Deformity Surgery".

August 27<sup>th</sup>, 2011. North Carolina Spine Society Annual Meeting. " "Baby Steps" to Improve Quality, Efficiency and Cost Effectiveness while Decreasing Risk in Your Spine Practice".

October 21<sup>st</sup>, 2011. Eastern Orthopaedic Association Annual Meeting. "Effect of Implantation Type on Instrumentation Fracture Rate in Adult Spinal Deformity Surgery".

August 15, 2007. WakeMed Pediatric Grand Rounds: "Sports Spine Injuries" For Wake County Pediatric Society.

April 11, 2007. DHRH Ortho Grand Rounds: "Five Healthy Spine Habits".

March 28, 2007. Rex Pediatric Grand Rounds, "Evaluation and Management of Adolescent Scoliosis".

March 28, 2007. North Raleigh Rotary Club, "Five Healthy Spine Habits".

December 13, 2006. DHRH Hospitalists Meeting: "Quality Improvement for the Spine".

October 25, 2006. DHRH Grand Rounds: "The Evaluation and Management of Adolescent and Adult Spine Problems".

September 9, 2006. "The Evolution of Spinal Deformity Treatment: A Quick Update and Dialogue" Presentation at the Annual North Carolina Spine Society Meeting. Highpoint, North Carolina.

August 24, 2006. "Scoliosis Training." Duke Pediatric Residents. Durham, North Carolina.

July 2006. "Five Pediatric and Young Adult Spine Diagnoses You Don't Want to Miss." Duke Pediatrics Medical Lecture. Durham, North Carolina.

April 6, 2006. "Five Pediatric and Young Adult Spine Diagnoses You Don't Want to Miss." Medical Lecture. Raleigh, North Carolina.

March 31, 2005. "Adolescent Scoliosis Screening." Medical Lecture. Raleigh, North Carolina

February 8, 2000. "Enabling the Mobile Healers: Orthopaedic Surgeons on the Go". Key note address. EHealthConnections.com Conference for eHealth Strategies for Health Systems, and Physician Groups. Scottsdale, Arizona.

January 20, 2000. "Lessons Learned from the 'Trench' of Entrepreneurial Reality." Fuqua School of Business Entrepreneur Class.

January 10, 2000. MDeverywhere.com. Private Company Presentation at 18th Annual Chase Hambrecht and Quist (H+Q) Healthcare Conference. San Francisco, CA.

December 1, 1999. Duke/UNC/Wake Forest Medical Informatics Seminar. "Use of Mobile Devices for Patient Care".

October 28, 1999. Strategic Issues Panel: Getting Physicians to Change Their Behavior and Embrace the Internet. Technology Partner's Healthcare Outlook Conference. Panel Participants: Moderator: Sam Colella, Partner, Institutional Venture Partners. Panel Participants: Lloyd Hey, MD MS, Founder ClinEffect Systems, Inc., Dr. Robert I. Kramer, Director, Life Sciences, Technologic Partners, Dr. Mark K. Leavitt, CEO, MedicaLogic, Dr. Rick Peters, President & CEO, iTrust.

September 22, 1999. "Acute and Chronic Pain Management for the Primary Care Provider: A



practical approach". Durham Regional Hospital Grand Rounds Presentation.

September 11, 1999. "Defining and Achieving Success". Roxboro Christian Youth Rally.

June 29, 1999. "Evaluation and Treatment of the Degenerative Spine". Duke Geriatrics Grand Rounds.

April 1999: "Physician Charge capture via handheld devices and the Internet: giving doctors control of their data". American College of Surgeons (ACS) New York/ LI Chapter meeting.

January 1999. "Enabling the Mobile Healers: Appliance use by physicians that they will truly use", Gartner Group Healthcare Conference.

## **Current Research Affiliations**

---

North Carolina State University, Department of Medical Engineering: "Development of Improved 3-Dimensional Spinal Deformity Reconstructions Using Computer Modeling, and Mechanical Testing".