Finding the Answers You Want in the Medical Literature

Russell Steves ATC, PT
Princeton University
Purpose

- Show how to make a search of the literature easier and more productive
Why would you do this?

- “Half of what you will be taught in medical school will in 10 years have been shown to be wrong. And the trouble is, none of your teachers knows which half.”

- Dr Sydney Burwell, Dean of Harvard Medical School
When can this be valuable?

- Unfamiliar situations
- Problems that are resistant to treatment or diagnosis
- Determining effectiveness of treatments or tests
You have questions and want answers
What do you need?

- Computer
- Access to the Internet
- Curiosity
Five Step Process

- Clinical question arises
- Formulate searchable question
- Search and acquire info
- Appraise the literature
- Make a clinical decision
Clinical Questions

- Arise all the time
- Which rise to the level of need-to-know
- Along with desire, you need the time to find answers
Formulating the Question

- Make it so the search yields a manageable number of results
Examples

- Which is better, ankle taping or bracing?
- Terms can yield too many results
  - “ankle sprains”
Ankle impingement: combined anterior and posterior impingement syndrome of the ankle.
P. Henderson, L. La Vallette D.  
Foot Ankle Int. 2004 Sep;25(9):632-6.  
PMID: 15603993 [PubMed - as process]

Ankle problems masquerading as sprains.
P. L. Leduc M.E.  
PMID: 15544834 [PubMed - as process]

Examination of Static and Dynamic Postural Stability in Individuals With Functionally Stable and Unstable Ankles.
P. J. S. Ross S.E.  
PMID: 15523324 [PubMed - as supplied by publisher]

Assessment of a topical NSAID in the treatment of pain and inflammation. The example of Flector Plaster, a local biodehesive plaster containing diclofenac epolamine.
S. Perren U.  
PMID: 15509942 [PubMed - as supplied for MEDLINE]

D. K. R. Wahl M. D.  
J. Dieter H. P. H.  
F.  
P.  
C. Steiger C.  
C.  
PMID: 15563385 [PubMed - as supplied by publisher]
Refine Terms

- “ankle bracing or taping”
1: Marshall SW, Loomis DP, Walker AR, Chalmers DJ, Bard YH, Quarrie KL, Feetham M.
Evaluation of protective equipment for prevention of injuries in rugby union.
PmID: 15561740 [PubMed - as supplied by publisher]

2: Goodman MJ, Masson IL, West JM, Barz KM, Vender Linden DW, McMillan ML.
Secondary gait compensations in individuals without neuromuscular involvement following a unilateral imposed equinus constraint.
PmID: 15331170 [PubMed - in process]

3: Uchino S, Nagoshi S, Yamashita H, Watanabe S.
Modified Radical Neck Dissection for Differentiated Thyroid Cancer: Operative Technique Supply department or division at
Nagasaki Thyroid Clinic and Hospital Foundation.
PmID: 15517410 [PubMed - as supplied by publisher]

4: Tseng LH, Wang AC, Lin YH, Li SJ, Ko YJ.
Randomized comparison of the suprapubic arc sling procedure vs tension-free vaginal taping for stress incontinent women.
PmID: 15517410 [PubMed - as supplied by publisher]

5: Jeon MY, Jeong HC, Jeong HS, Lee YJ, Kim JC, Lee ST, Lim NY.
[Effects of taping therapy on the deformed angle of the foot and pain in hallux valgus patients.]
Try new terms

- “recurrent ankle sprains”
Items 1 - 20 of 1383

1: Henderson L, La Valette D.
   Ankle impingement: combined anterior and posterior impingement syndrome of the ankle.
   Foot Ankle Int. 2004 Sep;25(9):632-8.
   PMID: 15363885 [PubMed - indexed for MEDLINE]

2: Laupland KJ.
   Ankle problems masquerading as sprains.
   PMID: 15544834 [PubMed - indexed for MEDLINE]

3: Ross SE, Gschwendtner KM.
   Examination of Static and Dynamic Postural Stability in Individuals With Functionally Stable and Unstable Ankles.
   PMID: 15528304 [PubMed - as supplied by publisher]

4: Jenson PA.
   [Assessment of a topical NSAID] in the treatment of pain and inflammation. The example of Flector Plaster, a local biadhesive plaster containing diclofenac epolamine.
   PMID: 15509942 [PubMed - indexed for MEDLINE]

Use History feature

- Combine terms
Bracing and rehabilitation--what's new.
PMID: 14962985 [PubMed - indexed for MEDLINE]

Gross MT, Lu HY.
The role of ankle bracing for prevention of ankle sprain injuries.
PMID: 14620736 [PubMed - indexed for MEDLINE]

Verragen EA, van Mechelen W, de Vente W.
The effect of preventive measures on the incidence of ankle sprains.
PMID: 11088797 [PubMed - indexed for MEDLINE]

Wright IC, Neptune RR, van den Bogert AJ, Nigg BM.
The influence of foot positioning on ankle sprains.
PMID: 10703771 [PubMed - indexed for MEDLINE]

Refrangere KM, Kilbreath SL, Raymond J.
The effect of recurrent ankle inversion sprain and taping on proprioception at the ankle.
PMID: 10647323 [PubMed - indexed for MEDLINE]
Formulate Searchable Question

- Terms that can yield manageable results
- PICO
  - Patient or problem
  - Intervention
  - Comparison
  - Outcome
Where to look?

- Bibliographic Databases
  - PubMed (MEDLINE)
  - SPORT Discus
  - CINAHL (Cumulative Index to Nursing and Allied Health Literature)
Where to look?

- Evidence-based medicine resources
  - Cochrane Library
  - SportsMed Update
  - PEDro
  - Hooked on Evidence
Cochrane Library

- www.cochrane.org
- List of topics in many medical fields
- Search and review already performed
- Access restricted to subscribers ($$)
Cochrane Review Examples

- Orthotic devices for treating PFS
- Deep transverse friction massage for treating tendinitis
- Interventions for preventing ankle ligament injuries
SportsMed Update

- www.sportsmedupdate.info
- Topics in sports medicine practice
- Search and review already performed
- Available to subscribers ($$)
PEDro

- **www.pedro.fhs.usyd.edu.au**
- Physiotherapy Evidence Database
- Topics already appraised relevant to physical therapy
- Free service
Hooked on Evidence

- www.apta.org/hookedonevidence/index.cfm
- Database run by the APTA
- Members review topics of interest and post them on the site
- Need to be an APTA member
CINAHL

- [www.cinahl.com/index.html](http://www.cinahl.com/index.html)
- Cumulative Index to Nursing and Allied Health Literature
- Database that doesn’t provide a review
- Available on subscription ($$)
SPORT Discus

- www.sportdiscus.com
- Database for sports, health, and sports medicine
- No reviews, just citations
- Subscription fee ($$)
PubMed (MEDLINE)

- www.pubmed.gov
- Largest database for all medical fields
- No reviews, just citations
- Free
Searching on PubMed

- Type in terms to be searched
PubMed, a service of the National Library of Medicine, includes over 15 million citations for biomedical articles back to the 1950s. These citations are from MEDLINE and additional life science journals. PubMed includes links to many sites providing full text articles and other related resources.

**Bookshelf Additions**

Molecular Biology of the Cell, 4th Ed., and The Genetic Landscape of Diabetes are now available for interactive searching on the Bookshelf.

**ATM Enhanced**

To augment PubMed retrieval with additional non-MEDLINE citations, the Automatic Term Mapping (ATM) translation has been enhanced for MeSH entry terms.

**New Global NCBI Search Engine**

NCBI’s growing number of Entrez databases can now be searched at once! Go
- Use All Fields pull-down menu to specify a field.
- Boolean operators AND, OR, NOT must be in upper case.
- If search fields tags are used enclose in square brackets, e.g., rubella [ti].
- Search limits may exclude in process and publisher supplied citations.

**Limited to:**

- All Fields
- Publication Types
- Languages
- Publication Date From
- Subsets
- Human or Animal
- Gender
- Publication Date To

Use the format YYYY/MM/DD, month and day are optional.
Select from two filters to limit your retrieval. Choose either Clinical Queries or Systematic Reviews. Enter your search topic in the box below and click Go.

**Note**: If you want to retrieve everything on a subject area, go to the PubMed homepage. These filters are intended to limit retrieval to citations to articles conducted with specific methodologies including those that report applied clinical research.

### Clinical Queries using Research Methodology Filters

These search filters, based on the work of Hayes RR et al., are intended for clinicians. Four categories are provided, and the emphasis may be more sensitive (i.e., most relevant articles but probably some less relevant ones) or more specific (i.e., mostly relevant articles but probably omitting a few). See the filter table for details.

**Indicate the category and emphasis below:**

- Category: **therapy** 
  - **diagnosis** 
  - **etiology** 
  - **prognosis**
- Emphasis: **sensitive search** (broad) 
  - **specific search** (narrow)

### Systematic Reviews

This feature retrieves systematic reviews and meta-analysis studies for your search topic(s). For more information, see Help. Related sources are also provided.

Enter subject search:
Clinical Example

- High school football player
- Anterior shoulder dislocation
- Fastest way to return to play without reinjury?
Clinical Question

- Sling or not to sling?
- Where to find answers
  - My experience
  - Experiences of colleagues
  - Medical literature
Where to search?

- Time is important
- Access to databases
Clinical Question

- Population/problem: young adult male football player with first-time shoulder dislocation
- Intervention: early mobilization
- Comparison: sling
- Outcome: return to play or recurrent dislocation
Clinical Question

- “recovery rate for sling immobilization versus early mobilization in shoulder dislocations”
Reframe Question

- “sling immobilization for shoulder dislocations in athletes”
Reframe Question

- “sling immobilization for shoulder dislocations”
1. Kim SH, Ha KL, Jung MW, Lim MS, Kim YM, Park JH.
Accelerated rehabilitation after arthroscopic Bankart repair for selected cases: a prospective randomized clinical study.

Primary anterior dislocation of the shoulder in young patients: A ten-year prospective study.

3. Jozsa J, Dressler H, Steinbeck J, Lewejohann L.
Current concepts in treatment of the unstable shoulder. Results of a countrywide survey.

4. Mares CH, Angel KR, Schmerge BH, Wedge JR.
The fate of traumatic anterior dislocation of the shoulder in children.

5. Hawkine PB.
Arthroscopic staple repair for shoulder instability: a retrospective study of 50 cases.

Immobilization after primary dislocation of the shoulder.


Hovellius L, Augustini BG, Fredin H, Johansson O, Norin R, Thorling J.

Orthopedic Department, Gavle Hospital, S01 87 Gavle, Sweden.

Two hundred and forty-five patients who had had 247 primary anterior dislocations of the shoulder were followed for ten years in a multicenter study at twenty-seven Swedish hospitals. The ages of the patients at the time of the dislocation ranged from twelve to forty years. The patients were assigned to one of three treatment groups: immobilization with the arm tied with a bandage to the torso for three to four weeks after reduction of the dislocation, use of a ring, which was discontinued after the patient was comfortable, or immobilization for various durations. At the ten-year follow-up evaluation, no additional dislocation had occurred in 129 shoulders (52 per cent). Recurrent dislocation necessitating operative treatment had developed in fifty-eight shoulders (23 per cent): thirty-four (34 per cent) of the ninety-nine shoulders in patients who were twelve to twenty-two years old, sixteen (28 per cent) of the fifty-seven shoulders in patients who were twenty-three to twenty-nine years old, and eight (3 per cent) of the ninety-one shoulders in patients who were thirty to forty years old. Twenty-four (22 per cent) of the shoulders that had had at least two recurrences during the first two or five years seemed to have stabilized spontaneously without operative intervention at ten years. Dislocation of the contralateral shoulder occurred in association with sixteen (16 per cent) of the ninety-nine shoulders in patients who were twelve to twenty-two years old, twelve (21 per cent) of the fifty-seven shoulders in patients who were twenty-three to twenty-nine years old, and only three (3 per cent) of the ninety-one shoulders in patients who were thirty to forty years old. The type and duration of the initial treatment had no effect on the rate of recurrence. Radiographs, made for 185 shoulders at the time of the primary dislocation, demonstrated an avascular Hermodson (Hill-Sachs) lesion in ninety-nine shoulders (54 per cent); this finding was associated with a significantly worse prognosis with regard to recurrence than was no evident lesion (p = 0.04). Radiographs made for 208 shoulders at the ten-year follow-up examination were evaluated for post-dislocation arthropathy. Twenty-three shoulders (11 per cent) had mild arthropathy and eighteen (9 per cent) had moderate or severe arthropathy. Some of the shoulders that had arthropathy had had no recurrence.

Publication Types:
- Clinical Trial
- Multicenter Study
- Randomized Controlled Trial

PMID: 8934481 [PubMed - indexed for MEDLINE]
The fate of traumatic anterior dislocation of the shoulder in children.

Marans HJ, Angel KR, Schemitsch EH, Wedge JH.

Department of Orthopaedic Surgery, Adelaide Childrens Hospital, South Australia.

The cases of twenty-one patients who had open physes and were treated for radiographic evidence of traumatic anterior dislocation of the shoulder at either the Adelaide Childrens Hospital or The Hospital for Sick Children, Toronto, during a fifteen-year period, were reviewed. All twenty-one patients had one or more recurrent dislocations. Treatment, which included immobilization in a sling and swathe for as long as six weeks, had no effect on the rate of recurrence.

PMID 1400553 [PubMed - indexed for MEDLINE]

Immobilization after primary dislocation of the shoulder.

Kiviluoto O, Pasila M, Jaroma H, Sundholm A.

A total of 226 patients with primary shoulder dislocation were followed up for 1 year, the primary object being to observe the effect...
Immobilization after primary dislocation of the shoulder.

Kiviluoto O, Pasila M, Jaroma H, Sundholm A.

A total of 226 patients with primary shoulder dislocation were followed up for 1 year, the primary object being to observe the effect of immobilization on the incidence of redislocation. The shoulders were immobilized in a matella for 1 week in all the 127 patients older than 50 years of age, and in 53 of the patients under 50 years of age. The shoulders of the remaining 46 patients (under 50 years) were completely immobilized with a stockinette-Gibbs bandage for a period of 3 weeks. Thirteen per cent (30/226) suffered from one to four redislocations each during the follow-up period. Because most recurrences occurred in the patients under 30 years of age, these patients were compared with the older ones in the analysis. The frequency of redislocation was higher in the group of 53 patients under 30 years than in the older subgroup (P less than 0.001). Twenty-six of these 53 patients (under 30 years), who had been immobilized for 1 week, presented a higher frequency of redislocation than the remaining 27 patients subjected to 3 weeks' immobilization (P less than 0.05). Manual labourers experienced more numerous redislocations than office workers (P less than 0.01). The greater the initial trauma to the shoulder, the lower was the incidence of recurrence. There were only two among the 57 patients with early complications of the primary shoulder dislocation who had a redislocation (P less than 0.001). Residual stiffness was encountered more often in the patients over 30 years than in the younger ones (P less than 0.001). Following primary shoulder dislocation, 1 week's immobilization in a sling is sufficient in patients over 30 years, while in the case of most of the younger patients 3 weeks' complete immobilization of the shoulder is recommended.

PMID: 7211296 [PubMed - indexed for MEDLINE]
Primary anterior dislocation of the shoulder in young patients. A ten-year prospective study.

Hovelius I., Augustini RG, Fredin H, Johansson O, Norlin R, Thorling J.

Orthopedic Department, Gavle Hospital, 801 87 Gavle, Sweden.

Two hundred and forty-five patients who had had 247 primary anterior dislocations of the shoulder were followed for ten years in a multicenter study at twenty-seven Swedish hospitals. The ages of the patients at the time of the dislocation ranged from twelve to forty years. The patients were assigned to one of three treatment groups: immobilization with the arm tied with a bandage to the torso for three to four weeks after reduction of the dislocation, use of a sling, which was discontinued after the patient was comfortable; or immobilization for various durations. At the ten-year follow-up evaluation, no additional dislocation had occurred in 129 shoulders (52 per cent). Recurrent dislocation necessitating operative treatment had developed in fifty-eight shoulders (23 per cent); thirty-four (34 per cent) of the recurrent dislocations in patients who were twelve to twenty-two years old, sixteen (28 per cent) of the fifty-seven shoulders in patients who were twenty-three to twenty-nine years old, and eight (9 per cent) of the ninety-one shoulders in patients who were thirty to forty years old. Twenty-four (22 per cent) of the shoulders that had had at least two recurrences during the first two or five years seemed to have stabilized spontaneously without operative intervention at ten years. Dislocation of the contralateral shoulder occurred in association with nineteen (15 per cent) of the ninety-one shoulders in patients who were twelve to twenty-two years old, twelve (21 per cent) of the fifty-seven shoulders in patients who were twenty-three to twenty-nine years old, and only three (3 per cent) of the ninety-one shoulders in patients who were thirty to forty years old. The type and duration of the initial treatment had no effect on the rate of recurrence. Radiographs, made for 185 shoulders at the time of the primary dislocation, demonstrated an evident Hill-Sachs (Hill-Sachs) lesion in ninety-nine shoulders (54 per cent); this finding was associated with a significantly worse prognosis with regard to recurrence than was no evident lesion (p < 0.04). Radiographs made for 208 shoulders at the ten-year follow-up examination were evaluated for post-dislocation arthropathy. Twenty-three shoulders (11 per cent) had mild arthropathy and eighteen (9 per cent) had moderate or severe arthropathy. Some of the shoulders that had arthropathy had had no recurrence.
Obtaining Article

- Link to full-text version
- Document delivery
  - PubMed
  - Nearest library
- Colleague with back issues of JBJS
- Go to library and photocopy
Literature Appraisal

- Most time consuming
  - Reading the study
  - Applying judgment
- Most important step
  - Not all studies are to be weighted the same
  - Should you accept these results
Hierarchy of Evidence

1-Systematic Reviews (SRs) of Randomized Controlled Clinical Trials (RCTs)
2-Individual RCTs
3-SRs of cohort studies
4-Individual cohorts and low-quality RCTs
Hierarchy of Evidence

5-SRs of case-control studies
6-Case-control studies
7-Case series
8-Expert opinion
   - articles in non-refereed publications
   - presentations

Clinical Study Appraisal

- Appraisal differs by study type
  - Therapy
  - Diagnosis/Screening
  - Prognosis
  - Harm
Appraising Therapy Studies

- Random assignment to treatment groups?
- Long and complete follow-up?
- All patients analyzed in assigned groups?

Therapy Studies

- Patients and clinicians blind to treatment?
- Groups treated equally, except for tx?
- Similar groups at the start of trial?

Hovelius et al Study

- 257 shoulders in Swedish males/females
- Ages 12-40 yrs
- First-time (primary) dislocations
- Follow-up 10 years later

Hovelius L et al. JBJS 1996;78A:1677-84
Hovelius Study

- Two treatment groups
  - Sling immobilization 3-4 weeks
  - Immobilization to tolerance
- Recurrence rate of dislocations

Hovelius L et al. JBJS 1996;78A:1677-84
Hovelius Study

- Randomly assigned, not blinded
- No bias to sex, age, or injury type

Hovelius L et al. JBJS 1996;78A:1677-84
Hovelius Study - Problems

- Immobilization to tolerance may result in 3-4 wks anyway
- Athletes not identified
- Sweden doesn’t have football
- Need to exercise clinical judgment
Results

- Groups by age
  - I- 12-22 yrs
  - II- 23-29 yrs
  - III- 30-40 yrs
- Control group (sling)
- Experimental group (immob to tolerance)
- Main effect (recurrence rate)

Hovellius L et al. JBJS 1996;78A:1677-84
Results

- 247 total primary shoulder dislocations
  - 10 lost to follow-up
- 118 recurrent dislocations
- 129 no recurrence

Hovelius L et al. JBJS 1996;78A:1677-84
## Results

<table>
<thead>
<tr>
<th>Age</th>
<th>Rate of Recurrence</th>
<th>Control</th>
<th>Exp</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-22 yrs</td>
<td>32/46 (70%)</td>
<td>24/38 (63%)</td>
<td></td>
</tr>
<tr>
<td>23-29 yrs</td>
<td>12/19 (63%)</td>
<td>16/30 (53%)</td>
<td></td>
</tr>
<tr>
<td>30-40 yrs</td>
<td>10/47 (21%)</td>
<td>9/31 (29%)</td>
<td></td>
</tr>
</tbody>
</table>

Hovelius L et al. JBJS 1996;78A:1677-84
Results

- Authors reported no statistically significant difference between Experimental and Control groups.
- Does that mean no clinically significant difference?
Clinically Useful Measures

- Control Event Rate (CER)
- Experimental Event Rate (EER)
Clinically Useful Measures

- When experimental tx reduces probability of a bad outcome (recurrent dislocations)
  - Relative Risk Reduction (RRR)
  - Absolute Risk Reduction (ARR)
  - Number Needed to Treat (NNT)
Clinically Useful Measures

- When experimental tx increases the probability of a bad outcome
  - Relative Risk Increase (RRI)
  - Absolute Risk Increase (ARI)
  - Number Needed to Harm (NNH)
Clinically Useful Measures

- When experimental tx increases the probability of a good outcome
  - Relative Benefit Increase (RBI)
  - Absolute Benefit Increase (ABI)
  - Number Needed to Treat (NNT)
Assessing Treatment Effects

- For Age group I (12-22 yrs)
  - CER = 70%
  - EER = 63%

- RRR = (CER – EER)/CER
  = (70% - 63%)/ 70%
  = 7%/ 70%
  = 10%
Assessing Treatment Effects

- **ARR** = EER – CER
  - = 63% - 70%
  - = 7%

- **NNT** = 1/ARR
  - = 1/.07
  - = 14.3
Assessing Treatment Effects

- We would need to treat 14 patients over 10 years to prevent one additional person (12-22 yrs old) from having a recurrent dislocation.
**Number Needed to Treat**

- Little or no differences btw groups i.e., treatment not helpful = high NNT
  - CER 70%, EER 69.9%
  - ARR 0.1%
  - NNT = 1/.001 = 1000
Number Needed to Treat

- Big differences btw groups, i.e., treatment makes a difference, low NNT
  - CER 70%, EER 10%
  - ARR 60%
  - NNT = 1/.6 = 1.67
Final Analysis

- Clinician’s judgment if NNT of 14 is high or low
- It doesn’t feel like there’s much difference between groups
Final Analysis

- Wearing sling to tolerance doesn’t lead to more recurrent dislocations than wearing sling for 3-4 weeks
- Recurrence rate is very high (63-70%); decreasing as the subjects got older
Final Analysis - Problems

- Subject numbers don’t add up
  - 20 subjects into Group III
  - 247 - 20 = 227
  - Add up the results table = 211

- What if they all were from the same treatment group?
**Bottomline**

- Are these results convincing?
- Is the study’s population similar to my situation?
- Do I have enough experience/equipment to make this work?
- What are the preferences of my athlete and his parents?
Bottomline

- Discuss potential benefits and risks with athlete and family
- Use best clinical judgment
- Act
Final Review

- As a result of this process, will my clinical behavior change?
- After the fact, did it help my athlete and was it worth the effort?
Conclusions

- Learning is a lifelong endeavor
- It takes practice to become proficient
- Use the evidence to enhance clinical judgments
Further Information


Thank You