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June 2017

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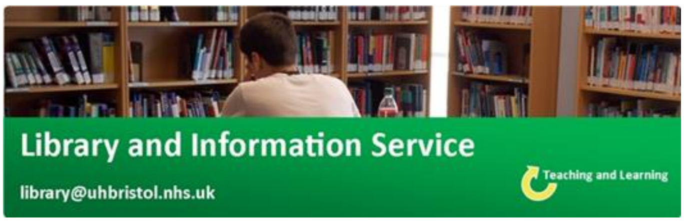

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July (13.00-14.00)

12th (Wed) Critical Appraisal

21st (Fri) Literature Searching

26th (Wed) Interpreting Statistics

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Stretch for the treatment and prevention of contractures

Lisa A Harvey , Owen M Katalinic , Robert D Herbert , Anne M Moseley , Natasha A Lannin and Karl Schurr

Online Publication Date: January 2017

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Contributor Disclosures

All topics are updated as new evidence becomes available and our peer review process is complete.
Literature review current through: Jun 2017. | **This topic last updated:** Jun 19, 2017.

INTRODUCTION — Primary care of hand fractures involves accurate diagnosis, pain control, reduction as indicated, immobilization of the fracture, appropriate referral to a hand surgeon, and appropriate rehabilitation once the fracture is healed.

This topic provides an overview of the initial evaluation, identification, and management of finger, hand, and wrist (carpal) fractures. Detailed discussions of specific injuries are found separately. (See "Scaphoid fractures" and "Distal radius fractures in adults" and "Lunate fractures and perilunate injuries" and "Overview of carpal fractures" and "First (thumb) metacarpal fractures" and "Overview of metacarpal fractures" and "Proximal phalanx fractures" and "Distal phalanx fractures" and "Middle phalanx fractures" and "Evaluation of the patient with thumb pain".)

INCIDENCE — Fractures of the phalanges and metacarpals are among the most common fractures of the skeletal system and account for 10 percent of all fractures [1]. Along with fractures of the carpal bones, they represent a substantial portion of upper extremity fractures [2]. The distal phalanx is the most commonly fractured bone in the hand, followed by the metacarpals [3]. The bones of the hand and wrist are shown in the figure (figure 1).

Metacarpal fractures are seen more often in adults, whereas phalangeal fractures are more common in children [2]. Approximately 20 percent of metacarpal and phalangeal fractures are intra-articular [3].

INITIAL EVALUATION — Before examining a hand fracture, a quick assessment to rule out any other associated injuries should be carried out. For patients without apparent life-threatening injuries who appear appropriate for office management, assessment begins with a focused history. Analgesia is sometimes needed before a history can be obtained.

A focused history should be obtained that includes:

- Hand dominance
- Occupation
- Mechanism of injury
- Time since injury
- Place of injury

Details of the mechanism of injury and an understanding of the injury patterns associated with particular mechanisms are important. Injuries sustained from trauma involving significant force are associated with greater displacement and a larger area of potential injury. Injury patterns guide the examination and choice of radiologic studies. Often, they help the clinician to consider less obvious associated injuries to bones, ligaments, or tendons. As an example, falling onto an outstretched hand is most often associated with a distal radius fracture, but may also cause an occult metacarpal or scaphoid fracture. (See "Distal radius fractures in adults" and "Scaphoid fractures" and "Distal forearm fractures in children: Diagnosis and assessment" and "Distal forearm fractures in children: Initial management".)

The time elapsed since injury is important to consider when assessing open fractures and fractures associated with vascular injuries, as this may determine the need for emergency surgery. The location where the injury occurred helps to determine the risk for contamination. As an example, an open fracture sustained in a farming accident is more likely to be contaminated and require early and thorough debridement before definitive fixation can be considered.

The hand and wrist are examined for swelling, deformity, open wounds, alignment of the fingers, neurovascular status, and local tenderness. Palpate the entire area around the fracture site to exclude adjacent injuries. This includes the entire bone in question, adjacent bones, and at least one joint above and below the injury site. The neurovascular examination includes palpating distal pulses and testing sensation, including two-point discrimination, distal to the fracture site. Avoid testing range of motion or moving the affected area or limb until the radiologic assessment is completed in order to prevent exacerbating fracture displacement, soft tissue damage, or neurovascular compromise. (See "General principles of acute fracture management", section on 'Initial clinical assessment' and "Initial management of trauma in adults", section on 'Secondary evaluation'.)

It is important to assess rotatory displacement clinically because this is difficult to determine on radiograph. Rotatory displacement of phalangeal and metacarpal fractures is assessed by asking the patient to flex their fingers and observing the resulting orientation. Normally, all fingers are directed toward the scaphoid and there is no overlap or rotation (picture 1A-B).

Occasionally, the patient may be unable to flex their fingers due to pain and swelling, making it difficult to assess rotational displacement. In such cases, one can look at the fingertips end-on to observe the orientation of the nails. Typically, the nails of the fingers lie in the same transverse axis. Any change in orientation of the nail of one finger relative to the adjacent fingers suggests rotational displacement. In uncooperative patients and small children, pressure on the forearm flexor muscles will result in flexion of the digits and any rotational malalignment will become apparent.

RADIOGRAPHIC EVALUATION — A radiograph of the injured part of the hand should be obtained. The type of radiograph depends on the clinical assessment and suspected injuries, based on the physical examination and mechanism of injury. Consultation with a radiologist is often helpful. (See "General principles of acute fracture management", section on 'Initial radiologic assessment'.)

- If a fracture of the phalanx is suspected, an anteroposterior (AP) and true lateral views of an individual digit are obtained.
- When the fracture involves or is close to the joint, an oblique view is useful.
- If the fracture cannot be delineated because of superimposed digits, such as the base of the proximal phalanx, a radiograph of the entire hand must be obtained. (See

"Proximal phalanx fractures".)

- ●All metacarpal fractures require AP, lateral, and oblique views. (See "Overview of metacarpal fractures".)
- ●A suspected scaphoid fracture should be evaluated with a "scaphoid series." (See "Scaphoid fractures".)
- ●Special views may be required for assessment of specific injuries.

FRACTURE DESCRIPTION — It is important to describe precisely the location and details of hand fractures in order to guide radiologic examination and management. (See "Finger and thumb anatomy" and "General principles of fracture management: Bone healing and fracture description".)

Hand fractures are described radiologically primarily by their location, geometry, and whether comminution is present.

- ●**Location** – The most precise method of describing a hand fracture is to name the broken bone and finger involved (eg, fracture middle phalanx of the ring finger), and then further anatomic details of the exact location of the fracture. Examples include:
  - •The anatomical sites for phalanges and metacarpals include head, neck, shaft, and base as shown in the figure (figure 2). Tuft fractures refer specifically to fractures involving the head of the distal phalanx.
  - •The anatomical sites of scaphoid fracture are the tubercle, waist, proximal pole, and distal pole (figure 3).
  - •Intra-articular fractures refer to fractures involving the joint.
- ●**Geometry** – Fracture geometry refers to the orientation of the fracture to the long axis of the bone. Fractures may be oriented in one or a combination of the following ways (figure 4):
  - •Transverse – perpendicular to long axis of bone
  - •Short long oblique – tangential to long axis of bone
  - •Spiral – tangential and spiraling around the shaft
  - •Longitudinal – parallel to long axis of bone
- ●**Comminution** – A simple fracture has two fractured fragments, whereas a comminuted fracture has more than two fragments. Often a fracture has more fragments than those clearly visible on the radiograph.

GENERAL APPROACH — Basic assessment of a hand fracture includes determining the following features:

- ●Open or closed

- Displaced or nondisplaced
- Reducible, with reduction maintained by a simple splint, or irreducible

Open fracture — An open fracture is a fracture that communicates with the outside environment via an overlying wound, whereas a closed fracture does not. An overlying wound may not in fact communicate with the fracture, but it is better to treat all such fractures as open fractures and let the treating hand surgeon make the final decisions about management.

The presence of a communicating wound implies that the fracture is contaminated. In order to prevent bacterial colonization of the fractured bone and subsequent infection, it is advisable to immediately remove any gross contaminants, gently irrigate the wound with isotonic saline solution, place clean moist gauze on the wound and cover it with an impermeable dressing, and administer prophylactic antibiotics as indicated [4]. (See "Treatment and prevention of osteomyelitis following trauma in adults", section on 'Initial fracture management'.)

Patients with open fractures should be referred to a hand surgeon immediately and should receive treatment within four to six hours. Prophylactic antibiotics should be administered parenterally within six hours after open trauma to reduce the risk of soft tissue infection or osteomyelitis. Initial empiric parenteral antibiotic therapy should be directed against gram-positive and gram-negative organisms. For patients at risk for methicillin-resistant *Staphylococcus aureus* (MRSA), prophylactic antibiotics should include an agent with activity against MRSA (table 1). Prophylactic antibiotics should be administered for 48 to 72 hours total or for 24 hours after wound closure. Antibiotic selection is described in detail separately. (See "General principles of fracture management: Early and late complications", section on 'Open fractures' and "Treatment and prevention of osteomyelitis following trauma in adults", section on 'Antibiotic therapy' and "Methicillin-resistant Staphylococcus aureus (MRSA) in adults: Epidemiology", section on 'Risk factors'.)

Nondisplaced fracture — A fracture may be nondisplaced (fracture fragments held in anatomic position by the periosteum or surrounding soft tissues) or displaced. In general, nondisplaced fractures can be managed conservatively with appropriate splinting to immobilize the involved bone(s) until healing occurs. A simple splint typically restricts motion one joint above and one joint below the fractured bone(s) [5]. Patients who have a closed nondisplaced fracture should have the fracture placed in a splint and be scheduled for follow-up with a hand surgeon in approximately 7 to 10 days (table 2). Often, minor degrees of displacement can be managed nonoperatively, but evaluation by a hand surgeon is needed within 7 to 10 days.

Displaced fracture — Displacement of fracture fragments can cause shortening, angulation, translation and rotation of the involved bone(s). The degree of displacement depends upon the force of the initial injury and the quality of the bone (osteoporotic), and determines the need for intervention. All closed fractures with clinically significant displacement require preliminary reduction and splinting to stabilize the fracture prior to any operative repair. In general, any degree of rotational displacement is unacceptable. (See 'Fracture reduction' below.)

Fracture reduction — A reduction under appropriate anesthesia (local or regional) should be attempted upon diagnosis for most closed displaced hand fractures. If the fracture is reduced, a splint is applied and radiographs obtained to determine if the reduction has been maintained. If the fracture cannot be reduced (due to soft tissue interposition, ligamentous avulsion, or severe comminution) or the reduction cannot be maintained, the patient requires early surgical consultation (ie, within two to three days). (See "General principles of acute fracture management", section on 'Immobilization'.)

Stability — A fracture is considered clinically stable if it is nondisplaced or if the displacement can be reduced and the reduction maintained with a simple splint. Typically, stable fractures allow at least 50 percent of active range of motion at the adjacent joints without pain or displacement of the fracture. A displaced fracture that cannot be reduced or whose reduction cannot be maintained with a simple splint is termed an unstable fracture [6].

In general, it is possible to predict fracture stability based on three main factors:

- Deforming forces acting on the fracture site
- Fracture location, geometry, and comminution
- Condition of the surrounding soft-tissue envelope

Certain fracture patterns are intrinsically unstable and it is generally not worthwhile attempting reduction of these fractures in the emergency department or clinic, assuming the distal extremity is neurovascularly intact. Patients with unstable fractures should be evaluated by a hand surgeon within two to three days of injury, whereas patients with closed stable fractures can be evaluated within approximately 7 to 10 days. In the intervening period, the hand is splinted and appropriate analgesics are prescribed. For any fracture, the patient is advised to keep the limb elevated above heart level if possible to reduce swelling and pain.

Splinting — Splinting plays a major role in the management of musculoskeletal injuries, particularly those involving extremity fractures and joint dislocations. Immobilization of the extremity through splinting decreases pain and bleeding and prevents further soft tissue, vascular, or neurologic compromise.

In contrast to casts, splints accommodate some degree of swelling and may prevent neurovascular compromise. Considerations in splinting hand injuries include the joints to be immobilized, position of limb for splinting, splint location, and duration of splinting. (See "Basic techniques for splinting of musculoskeletal injuries", section on 'Basic techniques'.)

Splint placement and position — It is important to place the splint on the appropriate side of the hand (palmar or dorsal) to counteract deforming forces and maintain reduction. As an example, a fracture with an apex dorsal angulation deformity should have the splint placed on the dorsal side, whereas a fracture with an apex volar angulation deformity should have the splint placed on the palmar side. If the fracture involves a translational deformity, the splint should be placed on the palmar aspect to counteract the pull of the stronger flexor muscles. Hand and wrist anatomy is revealed in greater detail separately. (See "Finger and thumb anatomy" and "Anatomy and basic biomechanics of the wrist".)

The joints proximal and distal to the fracture should be immobilized. As an example, the metacarpophalangeal (MCP) joint and distal interphalangeal (DIP) joint should be immobilized for a proximal phalanx fracture. The adjacent digit should also be immobilized in such a case in order to passively correct any rotational deformity and reduce the pull of the flexor digitorum profundus (FDP) (table 3).

The vast majority of hand fractures can be immobilized in the same "safe" position (picture 2), which involves the following:

- **Wrist** – The wrist is splinted in 10 to 20 degrees of extension. This is done to avoid contracture and maintain maximum hand strength. The volar radiocarpal ligaments are stronger, shorter, and more prone to contracture compared to the dorsal radiocarpal ligaments.
- **Metacarpophalangeal (MCP) joint** – The MCP joint is splinted in 50 to 60 degrees of flexion. The metacarpal head is an eccentrically shaped ellipse. This makes the collateral ligaments taut in flexion and lax in extension (the cam effect). Thus, it is preferable to maintain the MCP joint in flexion to keep the ligaments taut.
- **Proximal interphalangeal (PIP) joint** – The collateral ligaments of the PIP joint are the same length in flexion and extension. The thick volar plate of the PIP joint is able to accommodate flexion and extension because its proximal end is relatively free and anchored only at the side by the check-rein ligaments (figure 5). The check-rein ligaments are flexible and allow the volar plate to slide proximally.

  The PIP joint is splinted in full extension, which keeps the check-rein ligaments extended to their full length, whereas maintaining them in flexion can cause contracture. In addition, maintaining the PIP joint in flexion for a long period stresses the extensor expansion and central slip, which may lead to a boutonniere deformity (figure 6).

●**Distal interphalangeal (DIP) joint** – The DIP joint is splinted in full extension to avoid stressing the terminal tendon and prevent contracture of the oblique retinacular ligament.

Duration of splinting — The joints of the hand, especially the PIP joint, are prone to stiffness and should not be completely immobilized (even in the safe position) for more than three weeks.

●Most nondisplaced fractures will permit gentle range of motion exercises that can be started early (typically 7 to 10 days after injury). Patients are given a splint for protection, advised to keep moving the joints intermittently, and started on strengthening exercises and loading the joint after four weeks.

●Displaced fractures that have been reduced should be splinted and immobilized for three weeks. This period will allow the fracture fragments to consolidate and prevent re-displacement once the splint is removed. After three weeks, the joints can be taken through gentle range of motion exercises.

●A protective splint should be maintained until bony healing is complete (usually four to six weeks). Clinically, bony healing is evidenced by absence of tenderness over the fracture site; this may precede radiographic evidence of bony healing by up to four weeks. Midshaft proximal phalangeal fractures need 6 to 10 weeks and midshaft middle phalangeal fractures need 10 to 14 weeks for complete bony healing. Harder cortical bone requires protective splinting for a longer period (figure 7).

PHALANGEAL FRACTURES — Fractures of the distal phalanx and middle/proximal phalanx require differing approaches depending on the location and characteristics of the injury (table 3). The presentation, diagnosis, and management of these fractures is discussed separately. (See "Distal phalanx fractures" and "Middle phalanx fractures" and "Proximal phalanx fractures".)

Distal phalanx fractures — Distal phalanx fractures are common, accounting for over half of all hand fractures. They are often caused by a direct blow or a crush injury, which can produce significant soft tissue damage and nail bed injuries. Patients with a distal phalanx fracture usually complain of tenderness and swelling at the end of the finger following trauma. Distal phalanx fractures include tuft fractures, shaft fractures, and intra-articular fractures (figure 8). Distal phalanx fractures may be associated with nail bed injuries and associated subungual hematomas that may require drainage of the hematoma and/or repair of the nail bed. (See "Distal phalanx fractures" and "Subungual hematoma".)

Notable distal phalanx injuries include extensor tendon injury of the distal interphalangeal (DIP) joint (commonly called a mallet finger) and flexor digitorum profundus (FDP) avulsion injuries (commonly called a Jersey finger). Mallet finger injury is caused by sudden forced flexion of an extended DIP joint, resulting in avulsion of the attachment of the extensor tendon (image 1). Examination is most notable for a fixed flexed posture of the DIP joint, loss of active extension, and tenderness over the dorsal aspect of the joint.

Jersey finger is caused by sudden forced extension of a flexed DIP joint, resulting in avulsion of the attachment of the FDP, and is commonly seen in rugby or American football players. The patient may present with bruising and swelling at the location of the proximal stump with inability to actively flex the DIP joint. The diagnosis is often missed initially.

The presentation, diagnosis, and management of mallet finger and Jersey finger are discussed separately. (See "Extensor tendon injury of the distal interphalangeal joint (mallet finger)" and "Flexor tendon injury of the distal interphalangeal joint (jersey finger)".)

Middle and proximal phalanx fractures — Middle and proximal phalangeal fractures can be categorized as extra-articular or intra-articular. Many of these fractures are displaced or angulated due to their complex tendon and ligament attachments. All such fractures are discussed in detail separately. (See "Middle phalanx fractures" and "Proximal phalanx fractures".)

METACARPAL FRACTURES — Metacarpal fractures can be classified into head, neck, shaft, and base depending on the anatomic location of the fracture. In addition, the thumb metacarpal has two special types of fractures; the Bennett and the Rolando fracture. Metacarpal fractures are reviewed in detail separately. (See "Overview of metacarpal fractures" and "First (thumb) metacarpal fractures" and "Metacarpal shaft fractures" and "Metacarpal base fractures" and "Metacarpal head fractures" and "Metacarpal neck fractures".)

Notable metacarpal fractures include the following:

- Metacarpal head fractures may be sustained from a punch thrown during a fight and associated with lacerations, in which case they are at higher risk of complications such as septic arthritis. The patient may not be forthcoming about such an injury. (See "Metacarpal head fractures".)
- Metacarpal neck fractures may occur with any metacarpal but usually involve the small or ring finger metacarpal. Fractures of the neck of the small or ring finger metacarpal are often referred to as a "boxer's fracture," but in fact these injuries

rarely occur in professional boxers. Most often, they occur in young men who punch a wall in anger. Such fractures may be unstable. (See "Metacarpal neck fractures".)

- Metacarpal shaft fractures are common and if displaced, particularly if they are oblique, spiral, or comminuted, require surgical fixation. (See "Metacarpal shaft fractures".)

CARPAL FRACTURES — Carpal fractures are classified primarily based on the anatomic location of the fracture. Fractures of the bones of the proximal carpal row (ie, scaphoid, lunate, triquetrum, and pisiform) are more common than fractures of the distal carpal row (ie, trapezium, trapezoid, capitate, and hamate). The location of pain and mechanism (often involving a fall onto the hand) provide clues to the site of injury (image 2). (See "Overview of carpal fractures".)

INFORMATION FOR PATIENTS — UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topics (see "Patient education: Fractures (The Basics)" and "Patient education: Common wrist injuries (The Basics)" and "Patient education: Finger fracture (The Basics)" and "Patient education: Boxer's fracture (The Basics)")

SUMMARY AND RECOMMENDATIONS

- Primary care of finger, hand, and wrist fractures involves accurate diagnosis, pain control, reduction and splinting of the fracture, and timely appropriate referral to a hand surgeon.
- The initial evaluation of hand fractures includes a focused history and examination for swelling, deformity, open wounds, alignment of the fingers, neurovascular status, and local tenderness. Details of the mechanism of injury and an understanding of common injury patterns associated with particular mechanisms help to guide the examination and choice of radiologic studies. (See 'Initial evaluation' above.)
- Plain radiographs of the injured part of the finger and/or hand should be obtained.

The radiographs obtained depend on the injuries suspected, as determined by the physical examination and mechanism of injury. (See 'Radiographic evaluation' above.)

●A precise description of the location and details of any hand fracture helps in guiding the proper radiologic examination and management, and helps when obtaining hand surgery consultation. (See 'Fracture description' above.)

●An open wound may not necessarily communicate with the underlying fracture, but it is better to treat all such fractures as open fractures. An open fracture implies that the fracture is contaminated. Patients with open fractures require immediate removal of any gross contaminants, gentle irrigation of the wound with isotonic saline, placement of an appropriate dressing, and prophylactic antibiotics. They should be referred to a hand surgeon as soon as possible. (See 'Open fracture' above.)

●Patients with open fractures should immediately be given a dose of a broad spectrum antibiotic to reduce the risk of soft tissue infection and osteomyelitis. For patients at risk for methicillin-resistant *Staphylococcus aureus* (MRSA), prophylactic antibiotics should include an agent with activity against MRSA. (See 'Open fracture' above.)

●Distinguishing between stable and unstable fracture patterns helps to determine the urgency of referral to the hand surgeon. Patients with closed unstable fractures should be evaluated by the surgeon within two to three days of injury, whereas patients with closed stable fractures can be evaluated in approximately 7 to 10 days. In the intervening period, the hand is splinted, appropriate analgesics are prescribed, and the patient is advised to keep the limb elevated to reduce swelling and pain. (See 'Stability' above.)

●Splinting plays an important role in the management of musculoskeletal injuries, particularly those involving extremity fractures and joint dislocation. Immobilization of the extremity by splinting decreases pain and bleeding and prevents further soft tissue, vascular, and neurologic compromise. (See 'Splinting' above.)

●Fractures of the distal phalanx and the middle and proximal phalanges require differing approaches depending on the characteristics of the injury. (See 'Phalangeal fractures' above.)

●Metacarpal fractures are classified by location, and include head, neck, shaft, and base fractures. (See 'Metacarpal fractures' above.)

●Carpal fractures are classified primarily by their location. (See "Overview of carpal fractures".)

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Journal of Hand Surgery (America)

June 2017, Volume 42, Issue 6

Journal of Hand Therapy

January-March 2017, Volume 30, Issue 1 (Quarterly)

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Database Articles

Below are a selection of articles related to **wrist and finger fractures** that were recently added to the healthcare databases. If you would like any of the following articles in full text, or if you would like a more focused search on your own topic, then get in touch: library@uhbristol.nhs.uk

1. Biologic Approaches to Problems of the Hand and Wrist.

Author(s): Steiner, Murphy M; Calandruccio, James H

Source: The Orthopedic clinics of North America; Jul 2017; vol. 48 (no. 3); p. 343-349

Publication Date: Jul 2017

Publication Type(s): Journal Article Review

PubMedID: 28577783

2. Volar Radioscapholunate Arthrodesis and Distal Scaphoidectomy After Malunited Distal Radius Fractures.

Author(s): Quadlbauer, Stefan; Leixnering, Martin; Jurkowitsch, Josef; Hausner, Thomas; Pezzei, Christoph

Source: The Journal of hand surgery; Jul 2017

Publication Date: Jul 2017

Publication Type(s): Journal Article

PubMedID: 28676150

3. A combined randomised and observational study of surgery for fractures in the distal radius in the elderly (CROSSFIRE)-a study protocol.

Author(s): Harris, Ian A; Naylor, Justine M; Lawson, Andrew; Buchbinder, Rachelle; Ivers, Rebecca; Balogh, Zsolt; Smith, Paul; Mittal, Rajat; Xuan, Wei; Howard, Kirsten; Vafa, Arezoo; Yates, Piers; Rieger, Bertram; Smith, Geoff; Elkinson, Ilia; Kim, Woosung; Chehade, Mellick; Sungaran, Jai; Latendresse, Kim; Wong, James; Viswanathan, Sameer; Richardson, Martin; Shrestha, Kush; Drobetz, Herwig; Tran, Phong; Loveridge, Jeremy; Page, Richard; Hau, Raphael; Bingham, Roger; Mulford, Jonathan; Incoll, Ian

Source: BMJ open; Jun 2017; vol. 7 (no. 6); p. e016100

Publication Date: Jun 2017

Publication Type(s): Journal Article

PubMedID: 28645976

Available in full text at BMJ Open - from ProQuest

4. Does socioeconomic status influence the epidemiology and outcome of distal radial fractures in adults?

Author(s): Clement, N D; Duckworth, A D; Wickramasinghe, N R; Court-Brown, C M; McQueen, M M

Source: European journal of orthopaedic surgery & traumatology : orthopedie traumatologie; Jun 2017

Publication Date: Jun 2017

Publication Type(s): Journal Article

PubMedID: 28638948

5. Pain and fracture-related limitations persist 6 months after a fragility fracture.

Author(s): Sale, Joanna E M; Frankel, Lucy; Thielke, Stephen; Funnell, Larry

Source: Rheumatology international; Jun 2017

Publication Date: Jun 2017

Publication Type(s): Journal Article

PubMedID: 28634634

6. Which immobilization is better for distal radius fracture? A prospective randomized trial.

Author(s): Gamba, Carlo; Fernandez, Felipe Andrés Mingo; Llavall, Marta Cuenca; Diez, Xavier Lizano; Perez, Fernando Santana

Source: International orthopaedics; Jun 2017

Publication Date: Jun 2017

Publication Type(s): Journal Article

PubMedID: 28578470

Database: Medline

7. Examination of the Applicability of the Disabilities of the Arm, Shoulder and Hand (DASH) Questionnaire to Patients with Hand Injuries and Diseases Using Rasch Analysis.

Author(s): Braitmayer, Kathrin; Dereskewitz, Caroline; Oberhauser, Cornelia; Rudolf, Klaus-Dieter; Coenen, Michaela

Source: The patient; Jun 2017; vol. 10 (no. 3); p. 367-376

Publication Date: Jun 2017

Publication Type(s): Journal Article

PubMedID: 28005235

8. Early active motion after rigid internal fixation of unstable extra-articular fractures of the proximal phalanx.

Author(s): Ataker, Y; Uludag, S; Ece, S C; Gudemez, E

Source: The Journal of hand surgery, European volume; Jun 2017 ; p. 1753193417709949

Publication Date: Jun 2017

Publication Type(s): Journal Article

PubMedID: 28589776

9. A Protocol for Evaluation and Rehabilitation of Distal Radius Fractures Using Sensorimotor Input: A Case Series.

Author(s): Wollstein, Ronit; Michael, Dafna; Harel, Hani

Source: The journal of hand surgery Asian-Pacific volume; Jun 2017; vol. 22 (no. 2); p. 150-155

Publication Date: Jun 2017

Publication Type(s): Journal Article

PubMedID: 28506171

10. Novel Signs and Their Clinical Utility in Diagnosing Complex Regional Pain Syndrome (CRPS): A Prospective Observational Cohort Study.

Author(s): Kuttikat, Anoop; Shaikh, Maliha; Oomatia, Amin; Parker, Richard; Shenker, Nicholas

Source: The Clinical journal of pain; Jun 2017; vol. 33 (no. 6); p. 496-502

Publication Date: Jun 2017

Publication Type(s): Journal Article

PubMedID: 27662180

Exercise: Relative Risk

The relative risk is the ratio of probability of an event (a specified outcome) occurring in one group (i.e. those exposed to a particular intervention) compared to those in another group (i.e. those not exposed – a control group).

The relative risk can be interpreted using the following chart. First, you must determine whether the event (the outcome measure) is adverse or beneficial.

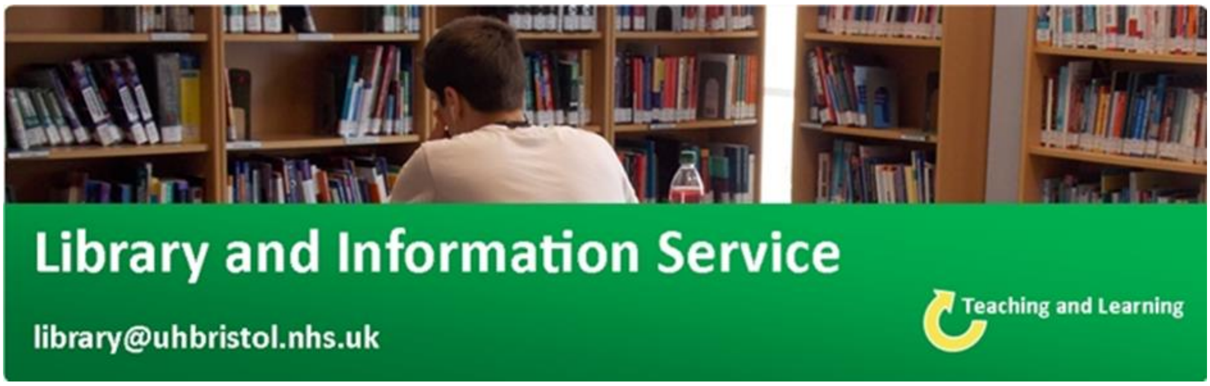
Relative Risk	**Adverse outcome (e.g. death)**	**Beneficial outcome (e.g. recovery of limb function)**
<1	Intervention better than control	Intervention worse than control
1	Intervention no better or worse than control	Intervention no better or worse than control
>1	Intervention worse than control	Intervention better than control

Have a go at interpreting the relative risks for these three studies using the chart above. Is the intervention better or worse than the control?

	Intervention	**Population**	**Outcome measure (think: adverse or beneficial?)**	**Relative Risk**
Study 1	Drug X	Adults at risk of a heart attack	Heart attack	1.2
Study 2	Therapy programme Y	Smokers	Smoking cessation	0.8
Study 3	Probiotic Z	Children on antibiotics	Diarrhoea	0.3

*Find out more about relative risk in one of our **Statistics** training sessions.*
For more details, email library@uhbristol.nhs.uk.

Answers: Study 1: worse; Study 2: worse; Study 3: better



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