Consensus on a Multidisciplinary Treatment Guideline for de Quervain Disease: Results From the European HANDGUIDE Study

Bionka M.A. Huisstede, J. Henk Coert, Jan Fridén, Peter Hoogvliet; for the European HANDGUIDE Group

Background. De Quervain disease is a common pathology resulting in pain caused by resisted gliding of the abductor pollicis longus and extensor pollicis brevis tendons in the fibro-osseous canal. In a situation of wavering assumptions and expanding medical knowledge, a treatment guideline is useful because it can aid in implementation of best practices, the education of health care professionals, and the identification of gaps in existing knowledge.

Objective. The aim of this study was to achieve consensus on a multidisciplinary treatment guideline for de Quervain disease.

Design. A Delphi consensus strategy was used.

Methods. A European Delphi consensus strategy was initiated. A systematic review reporting on the effectiveness of surgical and nonsurgical interventions was conducted and published and was used as an evidence-based starting point for this study. In total, 35 experts (hand therapists and hand surgeons selected by the national member associations of their European federations and physical medicine and rehabilitation physicians) participated in the Delphi consensus strategy. Each Delphi round consisted of a questionnaire, an analysis, and a feedback report.

Results. Consensus was achieved on the description, symptoms, and diagnosis of de Quervain disease. The experts agreed that patients with this disorder should always receive instructions and that these instructions should be combined with another form of treatment and should not be used as a sole treatment. Instructions combined with nonsteroidal anti-inflammatory drugs (NSAIDs), splinting, NSAIDs plus splinting, corticosteroid injection, corticosteroid injections plus splinting, or surgery were considered suitable treatment options. Details on the use of instructions, NSAIDs, splinting, corticosteroid injections, and surgery were described. Main factors for selecting one of these treatment options (ie, severity and duration of the disorder, previous treatments given) were identified. A relationship between the severity and duration of the disorder and the choice of therapy was indicated by the experts and reported in the guideline.

Limitations. One of the limitations of a Delphi method is its inability to forecast future developments. It investigated current opinions of the treatment of people with de Quervain disease.

Conclusions. This multidisciplinary treatment guideline may help in the treatment of and research on de Quervain disease.

B.M.A. Huisstede, PhD, Department of Rehabilitation Medicine and Physical Therapy, Erasmus MC-University Medical Center Rotterdam, and Department of Rehabilitation, Nursing Science & Sports, University Medical Center Utrecht, Building W01.121, PO Box 85500, 3508 GA Utrecht, the Netherlands. Address all correspondence to Dr Huisstede at: B.M.A.Huisstede@umcutrecht.nl.

J.H. Coert, MD, PhD, Department of Plastic & Reconstructive Surgery & Hand Surgery, Erasmus MC-University Medical Center Rotterdam.

J. Fridén, MD, PhD, Department of Hand Surgery, Sahlgrenska University Hospital, and Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden.

P. Hoogvliet, MD, PhD, Department of Rehabilitation Medicine and Physical Therapy, Erasmus MC-University Medical Center Rotterdam.

The participating organizations and members of the European HANDGUIDE Group are presented on page 1103.

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De Quervain disease was first described in 1895[1] and seems a relatively straightforward disease with a straightforward treatment. However, all is not as it seems, as there has been much confusion about its nature[2] and diagnosis.[3] Additional information about its anatomy[4] and treatment[5–8] was presented recently, although the exact mechanism of its occurrence has not been determined yet.[9]

De Quervain disease is a common pathology resulting in pain caused by resisted gliding of the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons in the fibro-osseous canal.[10] The incidence of de Quervain disease is 2.8 cases per 1,000 person-years for women and 0.6 cases per 1,000 person-years for men in a young, active population.[11] Its prevalence is 0.5% for men and 1.3% for women among adults of working age in the general population.[12] From those patients with de Quervain disease visiting a general practitioner, 40% are referred to a physical therapist.[13] Physical therapists diagnose about 1% of patients who visit them with complaints of the arm, neck, or shoulder as having de Quervain disease.[14]

The primary issue in de Quervain disease is a degenerative thickening of the extensor retinaculum covering the first extensor compartment, sometimes combined with secondary thinning of the tendon within the compartment and thickening of the tendon outside the compartment.[2] Patients with de Quervain disease display an impaired function of the wrist and hand[6] and decreased Disabilities of the Arm, Shoulder, and Hand (DASH) scores.[5]

In a situation of wavering assumptions and expanding medical knowledge, a guideline is useful because it can aid in the implementation of best practices, the education of health care professionals, the identification of gaps in existing knowledge, and the recognition of the presence or absence of the scientific basis of current therapies. Therefore, de Quervain disease was incorporated into the European HANDGUIDE study, which aimed to achieve consensus on multidisciplinary treatment guidelines for 5 hand disorders: 2 tendinopathies (trigger finger and de Quervain disease), 2 neuropathies (carpal tunnel syndrome and Guyon canal syndrome), and Dupuytren disease.

In order to establish an evidence-based starting point for this study, systematic reviews were published[8,15,16] on the evidence for the effectiveness of nonsurgical, surgical, and postsurgical interventions for the 5 above-mentioned hand disorders. Because the amount of evidence for all disorders was insufficient to create a guideline, Delphi consensus strategies were used to obtain the additional information. In these Delphi consensus strategies, a series of sequential questionnaires or rounds is presented to a panel of experts, interspersed with controlled feedback, with the aim of achieving consensus of opinion about the diagnosis and treatment of the above-mentioned disorders among these experts.[17] This article describes the agreement of the expert panel on the items included in the multidisciplinary treatment guideline for de Quervain disease.

Method

Steering Committee and Advisory Team

A steering committee to initiate and guide the HANDGUIDE study comprised a hand surgeon, a physical medicine and rehabilitation (PM&R) physician, and a physical therapist. All 3 members have PhD degrees as well as a clinical and a scientific or epidemiological background. They designed the questionnaires, analyzed the responses, and formulated the feedback reports. Furthermore, an advisory team (consisting of 2 professors of hand surgery, 1 professor of PM&R, and a PhD-trained hand therapist) was formed, which could be consulted at any time and could give their opinions and advice as they saw fit.

Preparation of the Study—Systematic Review

To provide an evidence-based overview of nonsurgical and surgical interventions for de Quervain disease, the Cochrane Library, PEDro, PubMed, EMBASE, and CINAHL up to February 2009 were searched to select potential relevant studies from the title and abstracts of the references retrieved by the literature search (Appendix 1). Relevant Cochrane reviews and randomized controlled trials (RCTs) were included. Two reviewers independently extracted the data and performed a methodological quality assessment. Because of heterogeneity of the data, a meta-analysis was not possible; therefore, a best-evidence synthesis was performed to summarize the results of the included trials (Appendix 2). We included 3 RCTs reporting on the effectiveness of physical therapy, and steroid injections were included: low-laser therapy versus placebo, triamcinolone versus triamcinolone plus oral nimesulide, and cortisone versus splinting in pregnant women or during breast-feeding were studied. The data extraction and methodological quality assessment of the included studies are described elsewhere.[8] Table 1 shows a summary of the evidence found for treatment of de Quervain disease. The results were used as an evidence-based starting point for the Delphi consensus strategy.

Delphi Consensus Strategy

Selection of experts. The study was supported by the European Fed-

eration of Societies for Hand Therapy (EFSHT) and the Federation of European Societies for Surgery of the Hand (FESSH). The national member associations of these organizations selected the experts in their respective fields. Each national member association was invited to select a maximum of 3 representative experts per Delphi consensus strategy. In addition, some European PM&R physicians specializing in hand rehabilitation were invited to participate in this study. All participating experts fulfilled all of the criteria listed in Table 2.

Procedure. The web-based questionnaires of the Delphi rounds on de Quervain disease included questions on the description, symptoms, diagnosis, and interventions for this disease. Reminders for filling in the questionnaires were sent by e-mail, partly after fixed intervals and partly on an "as much as necessary" basis. The Delphi consensus strategy stopped if consensus was achieved or a maximum of 4 rounds were finished.

In this Delphi consensus strategy, only the physicians answered questions on medication and injections, and only the hand surgeons answered questions on surgery. All remaining questions were answered by all of the experts.

Structured questions were used with answer formats such as "yes/no/no opinion," after which the experts were invited to explain their individual choices. After each round, a feedback report was made to inform the experts about the answers and arguments of all experts, and on which items consensus was achieved. Based on the answers and arguments of the experts, the Steering Committee formulated the questions for the following questionnaire. Finally, conclusions were presented and explained in the feedback report.

Table 1.
Evidence for the Effectiveness of Interventions for de Quervain Disease[a]

Interventions	Evidence
Nonsurgical	
Physical therapy	Low-level laser therapy vs placebo Short-term: NC
Oral	ND
Injection	Triamcinolone vs triamcinolone plus oral nimesulide Short-term: NE Cortisone vs splinting in pregnant women or during breast-feeding Short-term: NC
Other	ND
Surgical	ND
Postsurgical	ND

[a] Searches in PubMed, EMBASE, CINAHL, and PEDro up to February 2009. NC=randomized controlled trial found, but no comparison between the intervention and control group was made, so no evidence was found; ND=no data; NE=no evidence found for effectiveness of the treatment (randomized controlled trials available, but no differences between intervention and control groups were found).

To avoid any imprecise definition for consensus, the experts were consulted about the cutoff point for consensus.[18] A cutoff point of 70% was proposed in the first round of the Delphi consensus strategy because it is often used in Delphi consensus strategies.[19,20] In case of consensus, this percentage also was calculated for each of the 3 participating professional groups. To reveal any discordant viewpoints among these groups, a remark was made in the report when fewer than 50% of the experts within a professional group answered in accordance with the achieved consensus.

Target population. All physicians and health care professionals who are involved in the treatment of patients with de Quervain disease can use this guideline.

Delphi Questionnaires

Description, symptoms, and diagnosis of de Quervain disease. The guideline will include short descriptions of de Quervain disease; the *International Statistical Classification of Diseases and Related Health Problems, 10th Revision*[21] (ICD-10) code; the symptoms; and its diagnostic process. In the first round, we included a description of each of these items and asked the experts if they agreed with this description. The questions of the subsequent rounds were formulated based on the results of the previous rounds.

Table 2.
Experts' Criteria for Participation in the Delphi Consensus Strategy

	Criteria
1	The expert[a] should be a medical or health care professional with considerable experience in treating patients with nontraumatic hand disorders (tendinopathies, Dupuytren disease or neuropathies, respectively)
2	The expert should be considered by his or her own professional specialty to be a key person in the field of nontraumatic hand disorders
3	The expert should have basic knowledge of evidence-based practice

[a] Participating hand surgeons and hand therapists participated as delegates for their respective professional association.

Interventions to treat de Quervain disease. In the first-round questionnaire, the nonsurgical interventions (ie, instructions for the patient, NSAIDs, splinting, and corticosteroid injection) and surgical interventions often reported in the literature to be used in treatment of de Quervain disease were listed. The evidence for the effectiveness of each type of intervention, including the "evidence table" and the full-text article of the review,[8] was incorporated in this questionnaire.

The above-mentioned interventions were then discussed. For each intervention, questions were included about the usefulness of the intervention and the main factors for starting and discontinuing the intervention. To identify useful combinations of treatments and a therapeutic hierarchy of interventions, the experts were asked if the interventions could be used as sole treatment or combined with another treatment, whether a specific intervention is the first choice in treatment, and to identify the treatment strategy in case the intervention was insufficient. Additional questions were included on the use of instructions for the patient, NSAIDs, splinting, corticosteroid injection, and surgery. In all situations where options were suggested by the Steering Committee, the experts were invited to provide additional options to avoid any limitations in the experts' choices.

The treatment options (and their combinations) mentioned by the experts were summarized. In the second round, the experts were asked to state (separately for each treatment option or combination of treatment options) whether this treatment option (or combination thereof) is applicable in the treatment of de Quervain disease.

Based on the answers given by the experts in the first round, a therapeutic hierarchy was formulated (ie, from the lightest [in the context of this article, the term "lightest" contains elements of invasiveness as well as effectiveness] form to the most severe form of treatment), and the experts were asked if they agree with this hierarchy. The experts also were asked what they considered the main factors for choosing a certain treatment option and in which way these factors influenced their choice. For questions relevant for each specific intervention for which no consensus was achieved in the first round, new questions were added in the second round.

In the third round, the main factors for choosing a treatment option for de Quervain disease were combined, and the summary of the consensus on the main factors was presented in one table. Any remaining questions on this table, and all other items for which no consensus was achieved in the second or third round, were added in the third and fourth rounds, respectively.

Data Analysis

A qualitative and quantitative analysis was made of the responses from the Delphi rounds. Quantitatively, for each question, we reported the number and percentages of experts who gave a certain answer. Qualitatively, the rationale for the answers given by each expert was reported.

Role of the Funding Source

The study was funded by Fonds NutsOhra, the Netherlands.

Results

Expert Panel

A total of 112 experts (52 hand surgeons, 47 hand therapists, and 13 PM&R physicians) from 17 European countries were selected to participate in 1 of the 3 Delphi consensus strategies of the HANDGUIDE study, which was performed between June 2009 and December 2012.

For the Delphi consensus strategy on de Quervain disease, 38 experts (16 hand surgeons, 16 hand therapists, and 6 PM&R physicians) were selected. Three of the experts (2 hand surgeons and 1 PM&R physician) did not complete any of the questionnaires. Response rates of the remaining 35 experts for rounds 1 to 4 were 97%, 94%, 91%, and 91%, respectively.

Table 3 lists the participating countries, the total number of experts of the HANDGUIDE study, the number of experts participating in the Delphi consensus strategy on de Quervain disease, and years of experience with this topic.

Delphi Consensus Strategy on de Quervain Disease

Consensus. In the first round, consensus was achieved to use a cutoff point of 70% for consensus for all rounds of this Delphi consensus strategy. Within the Delphi rounds, there were no discordant viewpoints between a professional group and the general consensus (ie, when <50% agreed with the consensus). Four rounds were needed before consensus on the treatment guideline for de Quervain disease was achieved. The guideline is reported in Appendix 3.

Description, symptoms, and diagnosis of de Quervain disease. In the first round, consensus was achieved on the short description of de Quervain disease and its ICD-10 code. In the second round, the experts agreed on the symptoms and diagnosis of the disorder. The initial diagnosis of de Quervain disease is usually made on the basis of clinical symptoms, in combination with physical examination. The test used most often for treatment of de Quervain disease is the Finkelstein test. The experts agreed to include the following text on the Finkelstein test in the guideline: "In his original

Table 3.
Experts and Participating Countries in the HANDGUIDE Study[a]

Profession (European Federation)	Participating Countries	Total No. of Experts in the HANDGUIDE Study	Experts in de Quervain Disease	
			No. of Experts	Years of Experience $\bar{X}$ (Range)
Hand surgeons (FESSH)	Belgium, Denmark, Estonia, Finland, France, Germany, Italy, Norway, the Netherlands, Spain, Sweden, Switzerland, Turkey, United Kingdom	52	14	15.2 (8–30)
Hand therapists (EFSHT)[b]	Belgium, Denmark, Finland, France, Italy, Norway, the Netherlands, Slovenia, Sweden, Switzerland, Turkey, United Kingdom	47	16	17.5 (6–33)
PM&R physicians	Austria, the Netherlands, Portugal, Slovenia, Switzerland, Turkey	13	5	16.0 (10–20)
Total		112	35	16.5 (6–33)

[a] FESSH=Federation of European Societies for Surgery of the Hand, EFSHT=European Federation of Societies for Hand Therapy, PM&R=physical medicine and rehabilitation.
[b] Physical therapists and occupational therapists specializing in the treatment of hand disorders.

paper, Finkelstein described grasping the patient's thumb and quickly abducting the hand ulnarward, which elicits an excruciating pain over the styloid tip.[22] A disadvantage of this method is that the test is somewhat crude and can elicit pain in healthy individuals. In practice, less crudely performed variants of this test are often used, sometimes in comparison with the healthy hand." Furthermore, the presence of osteoarthritis of the first carpometacarpal joint (CMC-1), a problem with the superficial radial nerve (cheiralgia paresthetica or Wartenberg syndrome), and intersection syndrome should be considered.

Interventions to treat de Quervain disease. Experts did not add interventions that should be included as "most commonly used interventions" to the list of nonsurgical and surgical interventions (as described in the "Method" section). Consensus was achieved that the lightest form of treatment consists of NSAIDs, followed by splinting or corticosteroids and, finally, surgery for the most serious forms of de Quervain disease.

In the first round, the experts agreed that patients with de Quervain disease should always receive instructions and that these instructions should always be combined with another treatment. Consensus was achieved that instructions combined with NSAIDs, splinting, NSAIDs plus splinting, corticosteroid injection, corticosteroid injections plus splinting, and surgery are applicable treatments for de Quervain disease. No consensus was achieved that instructions plus corticosteroid injections, NSAIDs, and splinting is applicable to treat de Quervain disease. Consensus was achieved on a therapeutic hierarchy (Tab. 4).

For instructions, NSAIDs, splinting, corticosteroid injections, and surgery, consensus was achieved on the aim of the treatment. For the latter 4 treatments, consensus also was achieved on when the treatment should be adjusted or stopped. Other items for each specific treatment are discussed below.

From the remarks provided by the experts in the first round, it was concluded that instructions to the patient can be given on 3 levels: (1) level 1—activities, (2) level 2—function (force, range of motion, repetitive movements), and (3) level 3—pain. In the second round, the experts agreed that, in general, instructions given on all 3 levels will be most effective. The instructions are described in Table 5.

Consensus was achieved that treatment with NSAIDs should always be combined with another treatment.

Table 4.
Therapeutic Hierarchy of Suitable Treatments for de Quervain Disease[a]

Therapeutic Hierarchy:	
1	IN (Instructions plus NSAIDs)
2	IS (Instructions plus splinting)
3	INS (Instructions combined with NSAIDs and splinting)
4	IC (Instructions plus a corticosteroid injection)
5	ICS (Instructions combined with a corticosteroid injection and splinting)
6	IO (Instructions plus operative treatment/surgery)

[a] A therapeutic hierarchy does not mean that all steps should always be performed for each patient. NSAIDs=nonsteroidal anti-inflammatory drugs.

Table 5.
Three Levels of Instructions to the Patient With de Quervain Disease

Level of Instruction	Goal	Description of the Instruction
Level 1: activity	To provide specific information on certain activities that can aggravate the complaints for this specific patient	The individual situation of the patient (eg, a young mother holding her baby in her arms, a laborer handling a pneumatic drill) should be taken into account if instructions are given related to activities
Level 2: function (force, range of motion, repetitive movements)	To instruct on specific loading types that should be avoided	Specific instructions on functional aspects can include: • Avoid repetitive thumb movements as much as possible • Avoid repetitive wrist movements as much as possible • Avoid static exercises • Avoid thumb flexion as much as possible • Avoid ulnar deviation as much as possible • Avoid forceful manual movements as much as possible
Level 3: pain	Can act as a sort of "emergency brake"	Painful movements with the hand should be avoided as much as possible. Instructions on this level should be adapted to the coping strategies of the individual patient.

Table 6.
Kinds of Splints Presented in The First-Round Questionnaire

	Kind of Splints Used in Clinical Practice for de Quervain Disease:
1	Short hand-based (wrist free) splint including the interphalangeal (IP) joint of the thumb (S-IPin)
2	Short hand-based splint excluding the IP joint of the thumb (S-IPex)
3	Long lower arm-based (wrist immobilized) splint including the IP joint of the thumb (L-IPin)
4	Long lower arm based splint excluding the IP joint of the thumb (L-IPex)

In the first round, the experts showed a clear preference for the use of diclofenac (Voltaren, Novartis Consumer Health Inc, Parsippany, New Jersey), a cyclo-oxygenase-1 (COX-1) inhibitor, for 2 weeks. Only one expert reported combining diclofenac with a gastrointestinal protectant (omeprazole). It was proposed to include the following remark for NSAIDs in the guideline: "Preferably in the form of a COX-1 inhibitor without additional gastrointestinal protection. More specifically, diclofenac or Voltaren for 2 weeks." However, no consensus on this item could be achieved; therefore, in the guideline, no preference for a specific type of NSAIDs was added.

In the first-round questionnaire, 4 types of splints regularly used in clinical practice to treat de Quervain disease were presented to the experts (Tab. 6). The experts considered no additional splints sufficiently applicable. Consensus was achieved for the use of a long-based splint (ie, incorporating the wrist) when treating patients with de Quervain disease. To decrease the amount of mechanical friction of the APL and EPB tendons, the joints that are being crossed by these tendons have to be immobilized (ie, only the wrist and the metacarpophangeal joint). A long lower arm–based (wrist immobilized) splint including the interphalangeal (IP) joint of the thumb (L-IPin) or a long lower arm-based splint excluding the IP joint of the thumb (L-IPex) is preferred. Although immobilization of the IP joint does not affect movement of the APL and EPB tendons, it was considered to decrease the functionality and, therefore, the activity of the hand and the APL and EPB tendons as wrist and thumb stabilizers. The experts agreed that the splint should be worn for 3 to 8 weeks, 24 hours a day, excluding grooming and except for brief periods of pain-free range of movement.

The experts agreed that intermediate-acting corticosteroid injections, such as methylprednisolone or triamcinolone, should be used in the treatment of de Quervain disease and that a local anesthetic should be added. The maximum number of injections is 1 to 3. Consensus also was achieved on the advice that should be given to the patient after this treatment. This advice should focus on 2 items: (1) possible adverse effects as a result of the corticosteroid injection, including pain should not be present for longer than 2 days and, in case of the presence of diabetes, the patient should monitor his or her blood glucose level, and (2) the patient should rest the hand for 1 to 7 days and avoid strain on the structures involved in de Quervain disease.

Consensus was achieved on the use of open surgery (in preference to percutaneous or other surgical techniques), using a transversal or longitudinal incision (in preference to Brunner-type, Lazy S, and other [oblique] incisions), and the use of nonresorbable sutures under local anesthetic.

The experts also agreed on the recommendations that should be given to the patient for treatment during

the primary postoperative period (ie, up to 10–14 days after surgery), until the sutures are removed. Moreover, consensus was achieved on the main goal of postsurgical treatment that can be given after this period. Postsurgical treatment should include instructions to the patient on how to use the hand to prevent further problems. A statement on what to do in case surgery is not successful is included in the guideline.

Next to instructions, NSAIDs, splinting, corticosteroid injections, and surgery or a combination of these interventions, the experts mentioned several other additional therapeutic modalities, including ultrasound, exercise therapy, and kinesiotaping. To indicate that the guideline concentrates on the most commonly used interventions but that additional therapeutic modalities can be added, consensus was achieved to include the following note in the guideline: "Depending on the patient's situation and personal preferences, additional therapeutic modalities can be added."

In the first Delphi round, the experts suggested that the main factors for choosing a treatment option are: (1) the severity of the disease, (2) the duration of the disease, and (3) previous treatments given. The latter factor also was incorporated into the therapeutic hierarchy. The relationship between severity and duration of the disease and the choice of therapy was further explored in the consecutive Delphi rounds. On the basis of the terminology used by the experts for severity and duration, 5 levels were created for both variables. In the first Delphi round, the experts described the severity of de Quervain disease in terms of the amount of pain or severity of symptoms (mild, severe, and so on). The duration of de Quervain disease was expressed in terms of "acute, subacute, and chronic" or by mentioning the exact durations in terms of number of weeks or months. Combining these expressions for severity and duration resulted in the identification of 5 subgroups for both severity and duration (Tab. 7).

Table 7.
Subgroups Related to the Severity and Duration of de Quervain Disease

5 Subgroups for Severity		5 Subgroups for Duration
Symptoms	**Pain**	**Duration (Stage)**
1: very mild	Very mild pain/other symptoms	1: ≤1 mo (acute)
2: mild	↓	2: 1≤2 mo (subacute)
3: moderate	↓	3: 2≤3 mo (subacute)
4: severe	↓	4: 3≤6 mo (chronic)
5: very severe	Unbearable pain/other symptoms	5: ≥6 mo (chronic)

In the second round, the experts were asked which treatment options (listed in Tab. 4) were suitable for the different subgroups of severity of symptoms. Subsequently, the Steering Committee calculated for each level of severity for which treatment (or combination of treatments) the cutoff point of 70% for consensus was reached or exceeded. The same process took place for the duration of the complaints.

The results for severity and duration were combined and reported in a table that finally was included in the guideline. In this table, each cell represents a subgroup of patients with a certain severity and duration of de Quervain disease and the corresponding treatment options. After the second Delphi round, some cells in the table remained empty. Only after the fourth Delphi round did all cells contain one or more treatment options (see the Table in the guideline [Appendix 3]).

Discussion

The purpose of this study was to achieve multidisciplinary consensus on the treatment for de Quervain disease. Because the systematic review initially conducted for this purpose was insufficient, a Delphi consensus strategy was applied to gain additional data for a multidisciplinary consensus.

It is clear that proportionally few European PM&R physicians participated in this study. The main reason for this finding is that, in contrast to hand surgery and hand therapy, hand rehabilitation is not an established specialty. Furthermore, because a PM&R physician is seldom involved with a patient with an uncomplicated hand condition, PM&R physicians specializing in hand rehabilitation are generally found only in clinics treating a considerable number of patients with complicated hand conditions.

This study also was characterized by a surprising absence of discordant viewpoints among the 3 participating professional groups. During our preparatory discussions, it was anticipated that the largest of these groups might exert too much influence on the final outcome; this proved to be an unwarranted assumption. A possible explanation for this finding is that, because the groups of experts often work in close collaboration, any major differences have already been discussed and transformed into mutually accepted viewpoints.

Some remarks are warranted about the diagnosis of de Quervain disease. Finkelstein's test, in his article described as "On grasping the patient's thumb and quickly abduct-

ing the hand ulnarward, the pain over the styloid tip is excruciating,"[22] should be distinguished from the method conceived by Eichoff whereby ulnar deviation of the wrist with the thumb gripped in the palm by the other fingers causes severe discomfort in patients with de Quervain disease. A disadvantage of both methods is that they are somewhat crude and can elicit pain in healthy individuals. In daily practice, more controlled variants of these tests are often used, retaining the possibility to compare the injured side with the healthy side. The experts of this Delphi consensus strategy concluded that instructions for the patient, NSAIDs, splinting, corticosteroid injections, and surgery are suitable treatments for de Quervain disease.

Instructions to the Patient

The experts agree that patients with this disorder should always be instructed. It was concluded that instructions should generally be given on 3 levels: (1) activities, (2) functions, and (3) pain. This combination of levels is interesting because, to some extent, they are complementary. Instruction on the level of specific activities has the advantage that it is highly specific because it addresses a particular activity. A disadvantage is that the number of instructions necessary for general activity modification is relatively large and the nature of the instructions may vary per person. In contrast, instructions on the level of function are less specific and address more fundamental aspects of movements. An advantage of instructions on this level is that their number is very limited and they are (at least theoretically) widely applicable. A disadvantage is that these instructions are less practical because it is difficult for the patient to translate them into restrictions on the activity level. Giving instructions on both levels combines their advantages and compensates for the disadvantages. Giving instructions on the level of pain has the combined advantages of the other 2 levels of instruction. It is a single instruction that is both highly specific and generally applicable. However, its major disadvantage is that, when the patient experiences pain, friction between the roof and the APL and EPB tendons of the first extensor compartment apparently becomes too high. Instructions on the level of pain can serve a sort of "emergency brake" function that informs the patient that "whatever you do, be sure that it does not cause pain."

NSAIDs

Nonsteroidal anti-inflammatory drugs are the lightest form of intervention. In the first round, the experts showed a clear preference for the use of diclofenac or Voltaren (COX-1) for 2 weeks. The use of a conventional NSAID (in preference to COX-2 inhibitors) is understandable in view of the limited period in which the drug is prescribed. However, no consensus was achieved on the preferred type of NSAIDs. Moreover, because the options of the experts differed, in the guideline, no preference for a specific type of NSAIDs for de Quervain disease is mentioned.

Splinting

In the Delphi consensus strategy, it was discussed whether the IP joint also should be immobilized, although the APL and EPB tendons do not cross this joint. Consensus was achieved that the IP joint could be included in the splint. Some additional considerations on this topic should be taken into account when deciding which splint to use. The concept of protecting a tendon and its integuments by immobilizing the joints it crosses is mechanistic and clear. The concept of providing additional protection by making a limb less functional is less straightforward. When additional joints are immobilized, the risk of joint stiffness or the development of increased compensatory movements increases when the patient tries to squeeze any function left out of the affected hand. This could result in an increase of existing (or new) symptoms in the affected or the contralateral hand.

Corticosteroid Injections

Although the experts agreed on the application of a limited number of injections with corticosteroids into the first extensor tendon compartment, there is uncertainty about the nature of its therapeutic effect. Initially, these injections were given based on the paradigm that inflammation of the tendons exists within the first extensor compartment. However, studies on the histology of de Quervain disease showed no signs of tendon inflammation but rather a noninflammatory thickening of the extensor retinaculum that covers the first dorsal compartment of the wrist.[23] An alternative explanation could be that the corticosteroids may soften the roof of the first extensor compartment or its contents. This deformation could create an increase in the volume and a decrease of the friction or pressure within the first extensor compartment. More research on this topic is needed.

Surgery

Surgery is reserved for individuals with the most serious form of de Quervain disease. When surgery does not result in a decrease of the symptoms, the first thing to be questioned is the initial diagnosis. Apart from the obvious differential diagnosis, such as osteoarthritis of the CMC-1 joint and compression of the superficial radial nerve (Wartenberg syndrome), several experts suggested that an intersection syndrome should be considered. In an intersection syndrome, the complaints are located on the top of the forearm,

where the APL and EPB tendons cross over with the extensor carpi radialis longus and extensor carpi radialis brevis tendons (4–8 cm proximal to the radial styloid).[24]

Hierarchy of the Treatment Options

Treatment options are described in terms of a hierarchy to guide the involved therapists and physicians with respect to the sequence in which various therapies are logically prescribed. However, not all patients have to receive all treatments in the hierarchy. For example, when the responsible health care professional anticipates (eg, due to the presence of certain comorbidity or earlier complications) that some treatments will not alleviate the symptoms or give rise to new ones, one or more treatments in the hierarchy can be skipped. This approach provides therapeutic guidance but retains the flexibility to adapt to altered medical situations.

Delphi Consensus Strategy

One of the limitations of a Delphi method is its inability to forecast future developments. Although this limitation does not apply to the present study, which investigated current opinions on the treatment of de Quervain disease, it stresses the temporality of its compilations. New scientific developments can alter the paradigm regarding the exact nature of de Quervain disease and, concomitantly, related opinions.

A main advantage of the Delphi consensus strategy is its ability to guide group opinion toward a final decision. This advantage is especially true in a highly specialized field such as hand surgery, with its limited evidence-based framework to guide clinical decisions.

Use of the Guideline in Clinical Practice

The guideline of de Quervain disease, in our opinion, can improve quality of treatments because it reports how—according to the experts—patients could be treated. All professionals, including those who have to deal with this disorder on an irregular basis, can use the guideline. They can learn from the experts' view as reported in the guideline. Moreover, this report can contribute to the discussion on how to improve treatment, and it can help to give direction to future research.

The implications of the guideline for physical therapists and occupational therapists depend on their local situation. When a local guideline is available, the current one can be used for comparison and to aid in the discussion about future improvements of the existing one. When no local guideline is available, the current one can be used as such or as a basis for the development of a new local guideline. Another important implication of this type of guideline is that it aids in the clarification of the responsibilities of the therapists as well as the physicians in the treatment of patients with de Quervain disease. This subsequently strengthens the therapists' professional identity and autonomy and demarcates responsibilities as well as accountability.

Implementations of the Guideline and Future Research

In the Delphi consensus strategy, hand surgeons, hand therapists, and PM&R physicians were included from 17 European countries, considered to be the key people on this topic within their own countries by their own national associations. In this way, we created a number of "ambassadors" who may facilitate the implementation of the guideline of de Quervain disease in daily practice. However, despite this result of the study, more time and specific implementation activities, also initiated by the FESSH and the EFSHT, are needed to facilitate the guideline's acceptance.

In our opinion, future research on this topic should concentrate on standardization of the assessment of de Quervain disease and the effectiveness of the different interventions, as mentioned in the guideline, in high-quality controlled studies. Because of the low prevalence of patients with this disease, we suggest that multicenter studies be initiated. Furthermore, when the evidence for the effectiveness of interventions increases or new treatment options are developed, the guideline should be re-evaluated and adjusted in view of these new insights.

In conclusion, this European Delphi consensus strategy was successful in achieving consensus on the treatment of de Quervain disease. The consensus is reported in the treatment guideline. It can help physical therapists, physicians, and other health care professionals in their clinical practice and aid scientific researchers in targeting future research on this subject.

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Appendix 1.

Search Strings Used in the Systemic Review[a]

1. Search strategy for disorders

de Quervain Disease	
PubMed	(tendinopathy(mh:noexp) OR tenovaginitis OR tendovaginitis OR tendinit* OR tendonitis OR tenosynovitis OR tendinos* OR bursitis[mh:noexp]) OR Quervain* OR DeQuervain* OR "De Quervain Disease"[mh] OR ((abductor AND pollicis) AND (long OR longus)) OR (extensor AND pollicis AND brevis)
EMBASE	tendinopathy OR tenovaginitis OR tendovaginitis/ OR tendinit* OR tendonitis OR tendinitis/ OR tenosynovitis/ OR tendinos* OR bursitis/ OR 'De Quervain tenosynovitis'/ OR Quervain* OR DeQuervain* OR ((abductor AND pollicis) AND (long OR longus)) OR (extensor AND pollicis AND brevis)
CINAHL	Quervain* or DeQuervain* or ((abductor and pollicis) and (long or longus)) or (extensor and pollicis and brevis)
PEDro	De Quervain disease

2. Search strategy for therapy

Therapy	
PubMed	(randomized controlled trial[Publication Type] OR (randomized[Title/Abstract] AND controlled[Title/Abstract] AND trial[Title/Abstract]))
EMBASE	'randomized controlled trial':it OR (randomized:ti,ab AND controlled:ti,ab AND trial:ti,ab)
CINAHL	
PEDro	

3. Search strategy for systematic reviews

Systematic Reviews	
PubMed	((meta-analysis [pt] OR meta-analysis [tw] OR metanalysis [tw]) OR ((review [pt] OR guideline [pt] OR consensus [ti] OR guideline* [ti] OR literature [ti] OR overview [ti] OR review [ti]) AND ((Cochrane [tw] OR Medline [tw] OR CINAHL [tw] OR (National [tw] AND LIbrary [tw])) OR (handsearch* [tw] OR search* [tw] OR searching [tw]) AND (hand [tw] OR manual [tw] OR electronic [tw] OR bibliographi* [tw] OR database* OR (Cochrane [tw] OR Medline [tw] OR CINAHL [tw] OR (National [tw] AND Library [tw])))))) OR ((synthesis [ti] OR overview [ti] OR review [ti] OR survey [ti]) AND (systematic [ti] OR critical [ti] OR methodologic [ti] OR quantitative [ti] OR qualitative [ti] OR literature [ti] OR evidence [ti] OR evidence-based [ti]))) BUTNOT (case* [ti] OR report [ti] OR editorial [pt] OR comment [pt] OR letter [pt])
EMBASE	('review'/exp AND (medline:ti,ab OR medlars:ti,ab OR embase:ti,ab OR pubmed:ti,ab) OR scisearch:ti,ab OR psychlit:ti,ab OR psyclit:ti,ab OR psycinfo:ti,ab OR psychinfo:ti,ab OR cinahl:ti,ab OR 'hand search': ti,ab OR 'manual search':ti,ab OR 'electric database':ti,ab OR 'bibliographic database':ti,ab OR 'pooled analysis':ti,ab OR 'pooled analyses':ti,ab OR pooling:ti,ab OR peto:ti,ab OR dersimonian:ti,ab OR 'fixed effect':ti,ab OR 'mantel haenszel':ti,ab OR 'retracted article':ti,ab) OR ('meta analysis'/exp OR 'meta analysis' OR 'meta-analysis' OR 'meta-analyses':ti,ab OR 'meta analyses':ti,ab OR 'systematic review': ti,ab OR 'systematic overview':ti,ab OR 'quantitative review':ti,ab OR 'quantitativ overview':ti,ab OR 'methodologic review':ti,ab OR 'methodologic overview':ti,ab OR 'integrative research review':ti,ab OR 'research integration':ti,ab OR 'quantitative synthesis':ti,ab)
CINAHL	(MH "Systematic Review")
PEDro	

(Continued)

Appendix 1.
Continued

4. Search strategy for RCTs

	RCT
PubMed	(randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized controlled trials [mh] OR random allocation [mh] OR double-blind method [mh] OR single-blind method [mh] OR clinical trial [pt] OR clinical trials [mh] OR ("clinical trial" [tw]) OR ((singl* [tw] OR doubl* [tw] OR tripl* [tw]) AND (mask* [tw] OR blind* [tw])) OR ("latin square" [tw]) OR placebos [mh] OR placebo* [tw] OR random* [tw] OR research design [mh:noexp] OR comparative study [pt] OR evaluation studies [pt] OR follow-up studies [mh] OR prospective studies [mh] OR cross-over studies [mh] OR control[tw] OR controls [tw] OR controlled[tw] OR controled[tw] OR control*[tw] OR prospectiv* [tw] OR volunteer* [tw]) NOT (animals [mh] NOT humans [mh])
EMBASE	('controlled clinical trial'/exp OR 'randomized controlled trial':ti OR 'controlled clinical trial':it OR 'randomization'/OR 'double blind procedure'/OR 'single blind procedure'/ OR 'crossover procedure'/ OR 'clinical trial':it OR (('clinical trial' OR (singl* OR doubl* OR tripl*)) AND (mask* OR blind*)) OR ('Latin square design'/ OR 'latin square' OR 'latin-square') OR 'placebo'/ OR placebo* OR 'random sample'/ OR 'comparative study':it OR 'evaluation study':it OR evaluation/exp OR 'follow up'/exp OR 'prospective study'/ OR control* OR prospectiv* OR volunteer*) NOT (animals/exp NOT humans/exp)
CINAHL	(MH "Clinical Trials+")
PEDro	

[a] For the review search, strategies 1, 2, and 3 were combined. For the randomized controlled trial (RCT) search, strategies 1, 2, and 4 were combined.

Appendix 2.
Levels of Evidence for Effectiveness Used in the Systematic Review

1. Strong evidence for effectiveness: consistent,[a] positive (significant) findings within multiple higher-quality randomized controlled trials (RCTs).

2. Moderate evidence for effectiveness: consistent, positive (significant) findings within multiple lower-quality RCTs or one high-quality RCT

3. Limited evidence for effectiveness: positive (significant) findings within one low-quality RCT

4. Conflicting evidence for effectiveness: provided by conflicting (significant) findings in the RCTs (<75% of the studies reported consistent findings)

5. No evidence found for effectiveness of the inventions: RCTs available, but no (significant) differences between intervention and control groups were reported

6. No systematic review or RCT found

[a] ≥75% of the trials reported the same findings.

Appendix 3.

Guideline for de Quervain Disease

The European HANDGUIDE study

The aim of the European HANDGUIDE study was to achieve consensus on multidisciplinary treatment guidelines for the following five non-traumatic hand disorders: trigger finger, De Quervain's disease, Dupuytren's disease, carpal tunnel syndrome, and Guyon's canal syndrome.

To establish an evidence-based starting point for the HANDGUIDE study, systematic reviews were written reporting on the evidence for effectiveness of non-surgical, surgical as well as post-surgical interventions for these five hand disorders.
Supplementary to the available evidence-based information, a Delphi consensus strategy was used to achieve consensus on each treatment guideline. In a Delphi consensus strategy a series of sequential questionnaires or rounds is presented to a panel of experts, interspersed by controlled feedback, with the aim to achieve consensus of opinions within this group of experts.
A total of 112 experts – hand surgeons, hand therapists, and PM&R physicians – from 17 countries were selected by their national member associations of the Federation of European Societies for Surgery of the Hand (FESSH) and the European Federation of Societies for Hand Therapy (EFSHT) to participate in the HANDGUIDE study. Also, a number of Physical Medicine and Rehabilitation (PM&R) physicians specialized in hand rehabilitation were added to the expert group. The HANDGUIDE study was performed between June 2009 and December 2012.

Treatment guideline for De Quervain's disease

This guideline concerns the treatment of De Quervain's disease. A total of 35 experts (14 hand surgeons, 16 hand therapists and 5 PM&R physicians) cooperated in the Delphi consensus strategy to achieve consensus on this treatment guideline.

For whom?

All physicians and allied healthcare professionals who are involved in the treatment of patients with De Quervain's disease can use this guideline.

MULTIDISCIPLINARY TREATMENT

GUIDELINE FOR DE QUERVAIN'S DISEASE

Description of De Quervain's disease
De Quervain's disease is primarily a non-inflammatory thickening of the ligamentous structure overlying the tendons in the first dorsal compartment of the wrist. This impairs gliding of the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons and thumb function, and causes pain on the radial (thumb) side of the wrist.

ICD-10 (2010)

Soft tissue disorders (M60-M79)
- Disorders of synovium and tendon (M65-M68)
  - M65 Synovitis and tenosynovitis,
    - M65.4 Radial styloid tenosynovitis [de Quervain]

Symptoms of patients
Patients suffering from De Quervain's disease experience pain at the base of the thumb area near the first extensor compartment. Movement of the thumb and/or the wrist can provoke the pain. The pain may appear suddenly or may increase over time. Often, there is also swelling over the first extensor compartment.

Diagnosis
History: The initial diagnosis of De Quervain's disease is usually made on the basis of clinical symptoms, in combination with physical examination.

Physical examination:
- Tests in which a movement with the thumb and/or wrist is made can provoke the pain, or when pressure is applied on the first extensor compartment.
- The test used most often for De Quervain's diseases is the Finkelstein test. In his original paper Finkelstein described grasping the patient's thumb and quickly abducting the hand ulnarward, which elicits an excruciating pain over the styloid tip. A disadvantage of this method is that the test is somewhat crude and can also elicit pain in healthy subjects. In practice, less crudely performed variants of this test are often used, sometimes in comparison with the healthy hand.
- To exclude the presence of CMC-1 osteoarthrisis, the grind test movement of the joint under axial compression is performed. To exclude a problem with the superficial radial nerve (cheiralgia paraesthetica or Wartenberg's syndrome) the presence of a Hoffman-Tinel sign over this nerve, and the sensation over the radiodorsal area of the hand, is examined.
- Check whether the complaints are located at the top of the forearm, where the APL/EPB cross over the extensor carpi radialis longus/brevis (ECRL/ECRB) tendons (4-8 cm proximal to the radial styloid), which could suggest intersection syndrome.

Appendix 3.
Continued

I NON-SURGICAL TREATMENT

1 Instructions for the patient

Aim of instructions: To avoid activities that cause mechanical friction of the affected tendons in order to decrease the pain and swelling.

Patients with De Quervain's disease should **always** receive instructions. Instructions for the patients should be combined with an additional treatment.

What advice should be given to the patient?
Instructions can be given on three levels. Level 1: Activities, Level 2: Function (force, range of motion, repetitive movements) and Level 3: Pain.

In general, instructions given on all three levels will be the most effective.

Instruction on level 1 (activities) gives specific information about certain activities that can aggravate the complaints for this specific patient; instructions on level 2 (function) focus on specific loading types that should be avoided; and instruction on level 3 (pain) can act as a sort of 'emergency brake'.

Instruction on Level 1: **Activity**
The individual situation of the patient should be taken into account if instructions are given related to activities. For example, a young mother holding the baby in her arms, a labourer handling a pneumatic drill.

Instruction on Level 2: **Function** (force, range of motion, repetitive movements)
Specific instructions on functional aspects can include:
- Avoid repetitive thumb movements as much as possible,
- Avoid repetitive wrist movements as much as possible,
- Avoid static exercises,
- Avoid thumb flexion as much as possible,
- Avoid ulnar deviation as much as possible,
- Avoid forceful manual movements as much as possible.

Instruction on Level 3: **Pain**
Movements with the hand that cause pain should be avoided as much as possible. Instructions on this level should be adapted to the coping strategies of the individual patient.

2 NSAIDs

Aim of NSAIDs: To reduce pain and swelling.

When should treatment with NSAIDs be stopped? This treatment should be stopped if the patient is free of symptoms, if there are complications related to NSAIDs (such as gastritis or skin reaction), or if NSAIDs have insufficient or no effect.

Type of NSAIDs: No preference.

3 Splinting

Aim of splinting: To decrease the amount of mechanical friction of the painful tendons, i.e. abductor pollicis longus (APL) and extensor pollicis brevis (EPB) by immobilizing the thumb and wrist, to keep them straight in order to reduce the symptoms of De Quervain's disease.

Kind of splint: Long lower-arm based splint, i.e. incorporating the wrist.
To decrease the amount of mechanical friction of the tendons (APL and EPB), the joints that are crossed by these tendons have to be immobilized, i.e. only the wrist and the MCP, an L-IPin (long lowerarm based (wrist immobilized) splint including the IP joint of the thumb) or an L-IPex (long lower-arm based splint excluding the IP joint of the thumb) are preferable. Although immobilization of the IP joint does not affect movement of the APL and EPB, it is considered to decrease the functionality and therefore the activity of the hand and the APL/EPB as wrist and thumb stabilisers.

Duration of wearing the splint: 3 to 8 weeks for 24 hours a day, excluding grooming and except for some brief periods of pain-free range of movements exercises.

When should a splint be adjusted or stopped?
If the patient is free of symptoms, or splinting has insufficient or no effect after a certain period of splinting, or when complications (such as skin problems) occur, the treatment should be adjusted or stopped.

Appendix 3.
Continued

I NON-SURGICAL TREATMENT

4 Corticosteroid injection

Aim of a corticosteroid injection: To reduce the symptoms of De Quervain's disease. The mechanism behind this reduction still needs to be elucidated.[1]

Kind of corticosteroid injection: Intermediate-acting corticosteroid injections, such as methylprednisolone or triamcinolone, should be used in the treatment of De Quervain's disease; a corticosteroid injection should be used together with a local anaesthetic.

Maximum number of injections: 1-3

Advice after treatment with corticosteroid injections should focus on 2 items:
1 Possible adverse effects as a result of the corticosteroid injection:
- Pain: The patients can have pain for 1 or 2 days. If the pain persists for a longer period, a physician should be contacted,
- In case of diabetes: The patient should be advised to watch their sugar level.

2 Corticosteroid injection after-care
- Rest the hand for 1-7 days after treatment with a corticosteroid injection,
- Strain on the structures involved in De Quervain's disease should be avoided by using a splint, giving specific instructions to the patients, etc.

When should treatment with corticosteroid injections be stopped? When the patient is free of symptoms, if the maximum number of steroid injections (1-3) has been given, or if there are complications such as allergy, increased pain or nerve injury.

Treatment combinations for De Quervain's disease

The following treatments options are applicable in the treatment of De Quervain's disease:
- Instruction plus NSAIDs (IN),
- Instruction plus splinting (IS),
- Instruction combined with NSAIDs and splinting (INS),
- Instruction plus a corticosteroid injection (IC),
- Instruction combined with corticosteroid injection and splinting (ICS),
- Instruction plus operative treatment/ surgery (IO).

Therapeutic hierarchy [2, 3, 4]
1 IN
2 IS
3 INS
4 IC
5 ICS
6 IO

II SURGICAL TREATMENT

Surgery

Aim of surgery: To reduce the mechanical friction between the roof of the first compartment and the APL and the EPB as they travel over the radial styloid by surgically opening the compartment to make more room for the (irritated) tendons, in order to reduce the symptoms of De Quervain's disease.

Preferable technique:
- Anaesthesia technique: Local anaesthesia,
- Incision: Although the more cosmetic transverse incision is preferred in surgery to treat De Quervain's disease, the longitudinal incision was also appreciated in order to minimise the risk of damage of the superficial radial nerve. Surgeons should take care not to cut the superficial radial nerve when using a transverse incision,
- Open surgery,
- Suture: Non-resorbable.

What to do if surgery is not successful?
The first three options are: reconsidering the diagnosis, check the surgical procedure, and consider the possibility of a complication.
If none of these are applicable, all kinds of conservative treatments (except corticosteroid injections) can be (re-)considered.

Post-surgical treatment

Primary post-operative advice: During this primary post-operative period - i.e. up to 10-14 days after surgery when the sutures are removed - advice for the patient consists of:
1 Elevation of the hand, i.e. hand above heart level to prevent swelling,
2 Move the fingers to prevent scar adhesions,
3 No heavy lifting or forceful activities until 2-6 weeks post-surgery,
4 Rest the hand, avoid thumb activity; for this a splint can be used.

Post-surgical treatment can be prescribed if necessary.

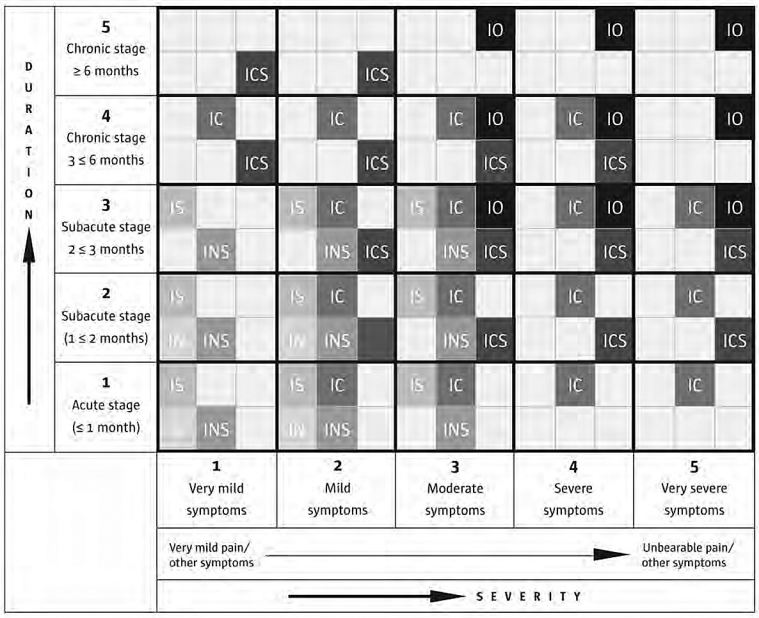
Main goal of post-surgical therapy, is (if necessary) to return the patient to full function by increasing range of motion and muscle strength and preventing scar adhesions. In addition, instructions should be given to the patient about the best way to use the hand to prevent further problems.

[1] Originally, the aim of corticosteroid use was to decrease the amount of inflammation. However, because tissue changes in De Quervain's disease, appear to be more degenerative than inflammatory in nature, the exact mode of action of corticosteroids is unclear although hypotheses exist.

[2] Namely, from the lightest to the most severe form of treatment options.
[3] Please note that a therapeutic hierarchy does not indicate that all steps should be performed for each patient.
[4] Depending on a patient's situation and personal preferences, additional therapeutic modalities can be added.

Appendix 3.
Continued

Table Severity and duration of De Quervain's disease and suitable treatment options
Severity and duration of De Quervain's disease are the main factors when deciding on the type of treatment. Both severity and duration were divided into five subgroups. For each subgroup of patients the suitable treatment options are indicated below:



IN: Instruction plus NSAIDs; **IS:** instruction plus splinting; **INS:** Instruction combined with NSAIDs and splinting; **IC:** Instruction plus a corticosteroid injection; **ICS:** Instruction combined with corticosteroid injection and splinting; **IO:** Instruction plus operative treatment/surgery.

Advisory team:
Jan Fridén, MD, PhD (hand surgeon),
Steven E.R. Hovius, MD, PhD (hand surgeon),
Ton Schreuders, PhD (hand therapist),
and Henk Stam, MD, PhD (PM&R physician)

Contact person:
If you have questions, please contact the project coordinator, Bionka M.A. Huisstede, PhD, e-mail: BMA.Huisstede@gmail.com

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