

Clinical Practice Guideline

# Nonspecific Neck Pain

Ahmad El-Allawy, Nils Hecht, Kerstin Luedtke, Philipp Schleicher,  
Norbert Weidner, Thomas Kötter

University Medical Center  
Schleswig-Holstein, Cam-  
pus Lübeck, Institute of  
Family Medicine, Lübeck,  
Germany: Dr. med. Ahmad  
El-Allawy, Prof. Dr. med.  
Thomas Kötter

Department of Neurosur-  
gery, Charité – Universitäts-  
medizin Berlin, Campus  
Benjamin Franklin, Berlin,  
Germany: PD Dr. med. Nils  
Hecht

University of Lübeck, Insti-  
tute of Health Sciences,  
Lübeck, Germany: Prof. Dr.  
Kerstin Luedtke

BG Trauma Center  
Frankfurt am Main, Center  
for Spinal Surgery and  
Neurotraumatology, Frank-  
furt am Main, Germany: Dr.  
med. Philipp Schleicher

Heidelberg University  
Hospital, Clinic for Para-  
plegiology—Paraplegia  
Center, Heidelberg,  
Germany: Prof. Dr. med.  
Norbert Weidner

Further guideline  
collaborators are listed in  
the eBox.

## Summary

**Background:** Nearly half of the adults in Germany have neck pain at least once a year. Neck pain is distressing to those who suffer from it and costly to society at large. Its treatment requires a coordinated approach with the participation of general practitioners, physician specialists, and other health care professionals, such as physical therapists. The German Society for General Medicine and Family Medicine has now issued an upgraded (S1 to S3 level) set of recommendations for rational diagnosis and treatment.

**Methods:** The new recommendations were developed in an interdisciplinary and interprofessional collaboration as specified by the rules of the Association of the Scientific Medical Societies in Germany (AWMF). Systematic searches for scientific evidence were conducted in Medline (latest update, 11/2024), and the recommendations were formulated in a structured consensus process. The guideline was practically tested in physiotherapeutic and general medical practice settings.

**Results:** The diagnostic evaluation begins with meticulous medical history-taking and physical examination. In cases of acute neck pain (0–3 weeks) without any evidence of a structural cause (e.g.,

motor deficit, night pain, precipitating trauma), diagnostic imaging should generally not be performed. Activating therapeutic measures with a focus on self-management have shown high effect sizes (up to  $d > 1.0$ ). The success of such measures may depend on patient education (moderate effect size,  $d = 0.73$ ). For chronic neck pain (longer than 12 weeks), exercise therapy is recommended as well. Analgesic drugs may yield short-term relief (low effect size).

**Conclusion:** In patients with neck pain for which the medical history and physical examination do not point to a structural cause, activation is recommended as the central element of treatment.

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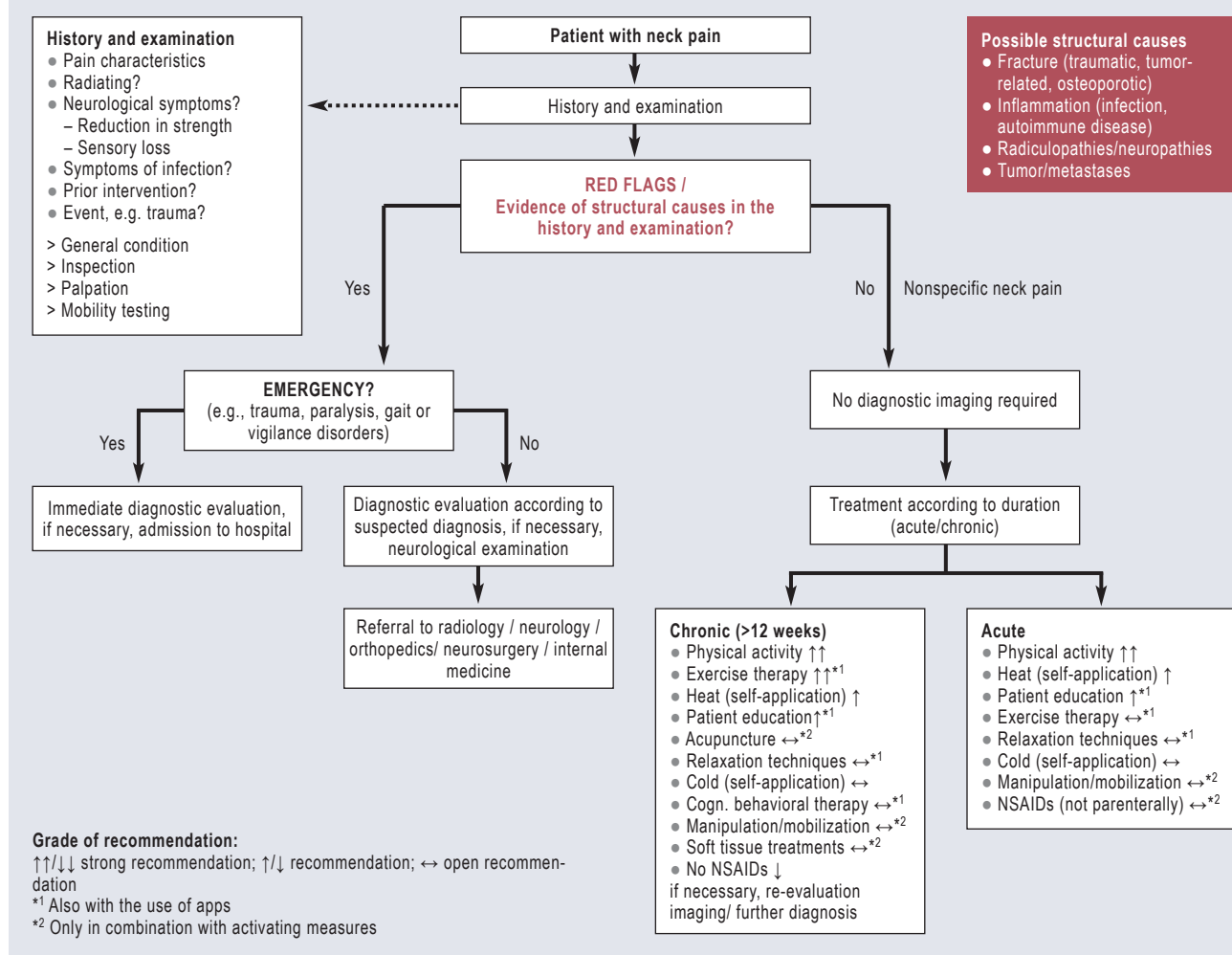
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Neck pain is defined as pain perceived in the area bounded superiorly by the superior nuchal line, inferiorly by the first thoracic vertebra and laterally by the insertions of the trapezius muscle close to the shoulder joint (1). The classification of neck pain by its duration into acute (0–3 weeks), subacute (4–12 weeks) and chronic (longer than 12 weeks) neck pain is commonly encountered in the literature (2). However, a classification based on these rigid criteria is difficult and of limited practical use, as it is not clearly defined whether the duration of neck pain is calculated starting from the initial consultation or from the onset of pain. Thus, a clear distinction between acute and chronic neck pain cannot always be made (3).

In most cases, the cause of neck pain remains obscure. If it is not possible to identify a cause that requires specific treatment or further diagnostic workup, the condition is referred to as nonspecific neck pain. In less than 1% of cases, neck pain is caused by a potentially dangerous underlying condition (e.g., malignancy, infection, bleed-  
ing, vascular injury).

Neck pain is a common health problem. In the BURDEN study, a representative cross-sectional telephone survey, 46% of the adult German population ( $N = 5009$ ) reported to have at least once experienced neck pain in the past twelve months (4). The point prevalence of neck pain has remained constant at approximately 5% for years (5). Neck pain is the third most common reason for general practitioner consultations in Germany (6). In 2018, diseases of the musculoskeletal system accounted for 42% of all outpatient and inpatient rehabilitation measures, reflecting a consistent trend observed since 2008 (7). In 2020, musculoskeletal disorders accounted for 13% of reduced earning capacity pensions, ranking third behind mental illness and neoplasms (8). In addition, musculoskeletal disorders significantly contribute to incapacity for work. In 2019, diseases of the musculoskeletal system ranked second behind

Figure



# Clinical algorithm

cogn., cognitive; NSAIDs, non-steroidal anti-inflammatory drugs

respiratory diseases with regard to cases of incapacity for work and sick days per 100 insurance years (9). Based on the findings of the BURDEN study, showing that many affected individuals complained of back pain and neck pain at the same time, a significant proportion of sick days, retirement due to reduced earning capacity, and rehabilitation measures are likely to be attributable to neck pain (4).

The available data show that neck pain is a common condition, requiring an effective coordinated approach with the participation of general practitioners, physician specialists, and other health care professionals, in particular physical therapists. This collaboration also helps to reduce unnecessary imaging studies and the use of ineffective treatment modalities as well as to identify potentially dangerous conditions underlying neck pain which is usually harmless. For this guideline, the S1-level neck pain recommendations of the German Society of

General Practice and Family Medicine (DEGAM, *Deutsche Gesellschaft für Allgemein- und Familienmedizin*) were updated and upgraded to S3-level recommendations.

## Methods

This S3-level clinical practice guideline was drawn up in accordance with the criteria of the Association of the Scientific Medical Societies in Germany (AWMF, *Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften*) (10) and involved the systematical grading of the various endpoints (11). For details, see the *eMethods* section. All guideline documents are available in the AWMF database (<https://register.awmf.org/de/leitlinien/de/tail/053-007>).

## Results

The *Figure* provides a clinical algorithm for the diagnostic evaluation of neck pain and summarized treatment recommendations.

The goals of the diagnostic evaluation in patients with neck pain are as follows: potentially dangerous conditions should be ruled out with reasonable confidence during the initial patient contact; a basis for recommendations should be established; the patient should be protected from excessive, potentially harmful diagnostic testing (quaternary prevention). If history-taking and physical examination in patients with newly developed neck pain does not reveal any evidence of structural causes during the consultation, no further diagnostic measures should be pursued at this stage (expert consensus [EC]). Potential structural causes include:

- Fracture (traumatic, tumor-related, osteoporotic)
- Inflammation (infection, autoimmune disease)
- Radiculopathies/neuropathies
- Tumor/metastases.

*Table 1* lists information from the medical history indicative of structural causes of neck pain. Psychosocial and workplace-related factors should be considered from the onset of neck pain and over the course of treatment (EC).

The extent of the physical examination is determined by the insights obtained from the patient's history. If there is evidence of structural causes and/or conditions requiring urgent treatment, these should be further investigated. In the absence of such evidence, the physical examination should include at least the following elements:

- General condition and nutritional status; state of consciousness
- Inspection: skin appearance, deformities, signs of injury, posture, mobility
- Palpation: spinal processes and transverse processes, tense muscles, skin temperature
- Mobility testing: anteflexion, retroflexion, rotation, and lateral flexion.

If there is evidence of neurological deficits in the patient's history, in the opinion of the authors of this guideline, this basic examination ought to be supplemented by the following elements:

- Muscle strength testing according to Janda
- Manual dexterity (e.g., finger-nose test; diadochokinesis test)
- Sensitivity
- Balance/gait
- Asymmetry of reflexes (biceps reflex, brachioradialis reflex, triceps reflex)
- Spurling test (*Table 2*)
- Upper Limb Tension Test (*Table 2*).

The following elements of physical examination can indicate structural causes of neck pain:

- Neurological deficits
- Reduced general condition and/or nutritional status
- Erythema, deformities, signs of injury, marked protective posture resulting in severely restricted mobility
- Increased skin temperature
- Marked restriction of mobility.

Psychosocial and workplace-related factors should be considered from the onset of neck pain and over the course of treatment. Given that these factors can significantly increase the risk of chronification, information about them should be obtained during history-taking:

- Depression/distress
- Subjective concepts regarding neck pain; and
- Workplace-related factors, such as type of work, satisfaction with the job and possibly fear of losing one's job.

No imaging studies should be performed for acute or recurrent neck pain in the absence of relevant evidence of structural causes in

the medical history and physical examination (level of evidence [LoE] IV, grade of recommendation [GoR] A). Persistence of neck pain for longer than four weeks despite guideline-compliant treatment can indicate a structural cause which was initially not identified. The indication for imaging studies should be reviewed in patients experiencing persistent activity-limiting or progressive neck pain (after 4–6 week) despite guideline-compliant treatment (EK). In patients with very severe pain progression/-neurological deficits, the indication for imaging studies should be re-evaluated earlier than after four weeks, where appropriate. In the opinion of the authors of this guideline, radiography is not suitable for diagnosing structural causes of neck pain with sufficient reliability due to its lack of sensitivity and it ought not to be used for the primary investigation of structural causes of neck pain (EC). Thus, cross-sectional imaging (either computed tomography [CT] or magnetic resonance imaging [MRI]) is generally preferable when imaging is indicated.

The chapter “Self-Management” deals with the self-efficacy of patients. Physical activity should be recommended for nonspecific neck pain (LoE 1, GoR A). Given the heterogeneity of the interventions studied, it is not possible to derive a recommendation for a specific form of exercises as part of the self-management approach from the available scientific evidence. Consequently, the preferences of the patients are key. Immobilization ought not to be recommended for nonspecific neck pain (EC). The patient information also explicitly addresses this point. While no studies on immobilization for the treatment of nonspecific neck pain were found, in the opinion of the authors of this guideline, immobilization carries a significant risk of negative effects (medicalization, muscle atrophy). In contrast, self-application of heat ought to be recommended for nonspecific neck pain (LoE 1, GoR B). Given the weak evidence in support of the effectiveness of thermotherapeutic treatments, the authors consider prescribing these treatments (e.g., baths, mud treatments, red light therapy) at the cost of a solidarity-based system to be unjustified. However, heat can be easily self-applied in various forms, e.g., using a grain heat pillow. Cold can also be applied as long as it is perceived as agreeable or pain-relieving by the patient (EC).

According to the findings of this guideline development, especially the use of nonsteroidal anti-inflammatory drugs (NSAIDs) for acute nonspecific neck pain over the shortest possible period of time can be recommended as pharmacotherapy (LoE I, GoR 0); however, based on the current evidence, the effect size can be considered rather small (less than 10 points on a visual analog scale from 0 to 100) (12). NSAIDs ought not to be recommended for chronic nonspecific neck pain (mainly due to adverse effects, such as gastrointestinal effects, ranging from upper abdominal pain to stomach and intestinal ulcers, and an increase in cardiovascular risk with long-term use) (EC). NSAIDs should not be administered via the parenteral route (EC). As an alternative treatment, e.g. in the case of contraindications, metamizole is recommended in the smallest effective dose and over the shortest period possible in individual cases (EC). This applies to patients where the use of NSAIDs is not possible due to the risk of nephrological, gastrointestinal or

Table 1

Evidence of structural causes of neck pain in the medical history

| Ask regarding...                                                                                                                                                                                                                                                                                                                                                    | Evidence of structural causes of neck pain                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>● <b>Pain characteristics</b><br/>Quality (e.g. sharp, burning, dull); location; pain intensity (numerical analog scale); pain duration (time since onset, constant pain?); radiating into arm (specific dermatome/crossing dermatome boundaries); improvement through rest/certain posture/other; nighttime pain</li> </ul> | Radiating into arm (specific dermatome/crossing dermatome boundaries); nighttime pain                                                                                                         |
| <ul style="list-style-type: none"> <li>● <b>Neurological symptoms</b><br/>Motor deficits (including fine motor skills)/numbness/paresthesia (dermatome-specific); dizziness/unsteady gait/tinnitus/visual disturbances; bladder voiding dysfunction; rectal dysfunction</li> </ul>                                                                                  | Motor deficits (including fine motor skills)/numbness/paresthesia (dermatome-specific); dizziness/unsteady gait/tinnitus/visual disturbances; bladder voiding dysfunction; rectal dysfunction |
| <ul style="list-style-type: none"> <li>● <b>Symptoms of infection</b><br/>e.g., fever; chills; history of infection</li> </ul>                                                                                                                                                                                                                                      | e.g., fever; chills; history of infection                                                                                                                                                     |
| <ul style="list-style-type: none"> <li>● <b>Prior interventions</b><br/>e.g., medications, including injection; manipulation</li> </ul>                                                                                                                                                                                                                             | Medications, including injection; manipulation                                                                                                                                                |
| <ul style="list-style-type: none"> <li>● <b>Precipitating event</b><br/>e.g., history of injury (difference from possible earlier similar events)</li> </ul>                                                                                                                                                                                                        | History of adequate injury (difference from possible earlier similar events)                                                                                                                  |
| <ul style="list-style-type: none"> <li>● <b>Known systemic disease requiring steroid treatment</b><br/>Neoplasms; osteoporosis; autoimmune disease (e. g. rheumatoid arthritis, ankylosing spondylitis); diseases causing immunosuppression</li> </ul>                                                                                                              | One of the diseases is present                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>● <b>Diseases that are/were treated with immunosuppressants</b><br/>(including steroid medication)</li> </ul>                                                                                                                                                                                                                | One of the conditions present                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>● <b>B symptoms</b><br/>Weight loss, night sweats, drop in fitness</li> </ul>                                                                                                                                                                                                                                                | One of the symptoms present                                                                                                                                                                   |

cardiac side effects. Metamizole can be a well-tolerated alternative to NSAIDs in geriatric patients, too. In the light of rare, but serious adverse drug reactions (ADRs), the German Medical Association's Drug Commission (AkdÄ, *Arzneimittelkommission der deutschen Ärzteschaft*) recommends the use of metamizole only for approved indications (treatment of acute and chronic severe pain if other analgesics are contraindicated). In addition, the AkdÄ recommends to inform patients in detail especially about symptoms of agranulocytosis (fever, sore throat, oral mucosal lesions). If agranulocytosis is suspected and in case of longer-term use, AkdÄ recommends to monitor blood counts (13).

All other available analgesics as well as muscle relaxants are not recommended, neither for acute nor chronic neck pain. During the constituent meeting, a key question was formulated regarding the use of cannabis for neck pain. Since no conclusive studies addressing this question were found and due to the, in the opinion of the authors of this guideline, significant addictive potential of cannabis, a strong negative recommendation was issued. Conclusive studies on the effectiveness of herbal medicines, such as willow bark (*Salix alba*), devil's claw (*Harpagophytum procumbens*), and agents used in Japanese Kampo medicine are not available. For this reason, the authors of this guideline refrain from making recommendations regarding herbal medicines.

Table 2

Specific neurological tests in case the basic examination points to a neurological cause

| Function tests                 | Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Spurling test                  | Axial pressure and flexion of the head to the symptomatic side with the patient seated; resulting in compression of the intervertebral foramina. If this compression increases the pain, the Spurling sign is positive. This indicates the pain is of radicular origin.                                                                                                                                                                                                                                                    |
| Upper Limb Tension Test (ULTT) | Stretching/mobilization of the nerves of the upper with the patient in a lying position For each nerve (median nerve, radial nerve, ulnar nerve), different combinations of abduction, rotation, elbow and forearm positioning (videos available at: <a href="http://www.physio-pedia.com/Upper_Limb_Tension_Tests_(ULTTs)">www.physio-pedia.com/Upper_Limb_Tension_Tests_(ULTTs)</a> ). If the pain intensifies as a result of the respective movement, ULTT is positive. This indicates the pain is of radicular origin. |

Table 3

**Key Do's and Don't Do's in the management of nonspecific neck pain**

| Do                                           | Don't do                                                 |
|----------------------------------------------|----------------------------------------------------------|
| Medical history and physical examination     | Imaging in the absence of evidence of a structural cause |
| Recommendation of physical activity          | Immobilization                                           |
| Self-application of heat                     | Prescribing muscle relaxants                             |
| Patient education                            | Prescribing opioids                                      |
| Short-term use of NSAIDs (not parenterally!) | Prescribing massage for acute nonspecific neck pain      |

In the area of nonpharmacological therapy, positive recommendations for exercise therapy (in chronic neck pain; LoE I, GoR A) and patient education (in acute and chronic neck pain; LoE I, GoR B) are to be highlighted. Pain Neuroscience Education (PNE) is a particularly well-studied method of patient education. The goal of PNE is to educate patients about the physiological processes involved in their pain experience and to teach them to reshape their mindset and perception of pain. This method helps patients gain a better understanding of their condition and motivates them to actively participate in their treatment programs (14). According to the findings of a systematic review of seven randomized, controlled trials, PNE has positive effects on pain and kinesiophobia, i.e. fear of pain due to movement (mean effect size,  $d = 0.44$ ) (15).

The following nonpharmacological therapies can also be offered (GoR 0):

- Manipulation/mobilization (LoE I)
- Acupuncture (for the treatment of chronic nonspecific neck pain in combination with activating methods; LoE I)
- Soft tissue treatments (for the treatment of chronic nonspecific neck pain in combination with activating methods; LoE I)
- Exercise therapy (for the treatment of acute nonspecific neck pain; EC)
- Cognitive behavioral therapy (for the treatment of nonspecific neck pain as part of multimodal treatment concepts; LoE I)
- Digital health applications (LoE I).

Negative recommendations are issued for acupuncture for acute nonspecific neck pain (LoE V, GoR B), mechanical traction (LoE I, GoR B) and methods of physical therapy, such as laser therapy (LoE II, GoR B), electrotherapy (LoE I, GoR B), and ultrasound (EC). Soft tissue treatments such as massage ought not to be prescribed for the treatment of acute nonspecific neck pain (EC). Kinesiotaping ought not to be prescribed for the treatment of nonspecific neck pain (LoE II, GoR B). The effectiveness of the last mentioned types of treatment is not sufficiently proven and they carry the risk of promoting passivity. This conflicts with the goal of increasing the activity of those affected (activating therapeutic measures have shown high effect sizes,  $[d > 1.0]$  [16]).

## Discussion

This guideline illustrates that patients with neck pain benefit from activating therapeutic approaches (in the form of self-initiated

physical activity, e.g. regularly performed simple exercises for mobilizing the cervical spine), provided structural causes and potentially dangerous conditions have been ruled out. Short-term use of NSAIDs can be useful as it helps to make exercising less painful and to prevent possible algophobic protective posture; the application of heat, or in some cases cold, can also be beneficial. The recommended patient education (17) can prevent incorrect ideas about the illness model and a passive attitude.

With 20 evidence-based and 23 consensus-based recommendations, the proportion of evidence-based recommendations is (only) 47%, highlighting the need for further randomized, controlled trials with adequate sample sizes, primarily on the diagnostic evaluation of nonspecific neck pain, but also on pharmacological and nonpharmacological therapies for the condition. In addition, an international reporting standard for studies on neck pain should be established so that all patient characteristics and endpoints relevant to clinical decision-making can be taken into account in future analyses.

With the aim of improving the quality of care for patients with nonspecific neck pain already today, the authors of this guideline provide a summary version in the form of "Choosing wisely" recommendations (Top 5 Do's and Don't do's; Table 3) (18) in addition to the long version, short version and patient summary of the guideline.

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## Conflict of interest

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Clinical guidelines are not peer-reviewed in Deutsches Ärzteblatt, as well as in many other journals, because S3-level clinical practice guidelines are texts which have already been repeatedly evaluated, discussed and broadly consented by experts (peers).

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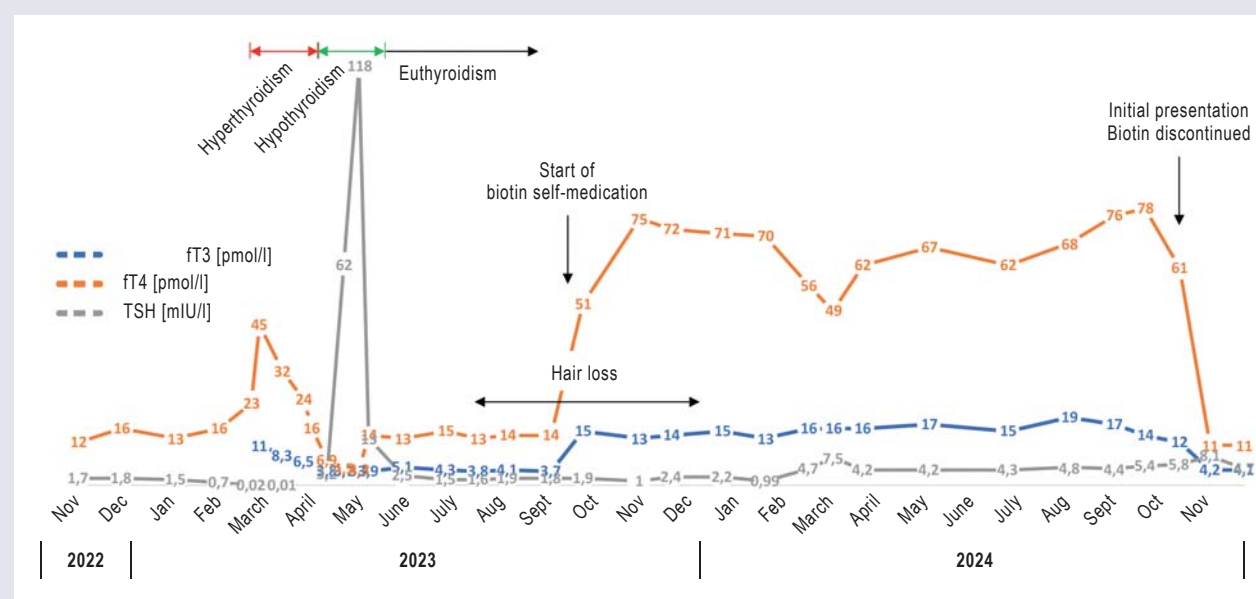
**Corresponding author**  
 Prof. Dr. med. Thomas Kötter  
 thomas.koetter@uni-luebeck.de

**Supplementary material**  
 Complete list of full references, eMethods, eTable, eBox:  
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## CLINICAL SNAPSHOT



# Biotin Interference in Thyroid Function Tests



## Thyroid function values

A 40-year-old female patient with kidney disease requiring dialysis developed abnormal thyroid values following the resolution of subacute thyroiditis (De Quervain's thyroiditis): slightly elevated TSH (5.8 mIU/l) and significantly elevated fT4 (61 pmol/l) and fT3 (12 pmol/l). Clinically, the patient was euthyroid, which presumably delayed the further diagnostic work-up. The abnormal constellation of laboratory values was caused by the patient's self-initiated, daily use of high-dose biotin (10 mg) to treat hair loss (telogen effluvium) following the hypothyroid phase of thyroiditis. Biotin interferes with biotin-streptavidin-based immunoassays and can cause falsely high free thyroid hormone levels. Following discontinuation of biotin, laboratory values normalized fully. Biotin preparations are widely used and available over the counter even in high doses; however, their potential to interfere with biotin-based immunoassays (producing both falsely high results in the case of competitive assays, as described here for fT3 and fT4, and falsely low results in sandwich assays, such as troponin and TSH) is often overlooked. In the case of unexplained constellations of thyroid values, especially when those do not correlate with the clinical presentation, patients should be specifically asked about biotin use and advised to pause use before re-testing in order to avoid inappropriate diagnostic and therapeutic measures.

**Dr. med. Martin Rußwurm, PD Dr. med. Johannes Wild,** Zentrum für Innere Medizin, Schwerpunkt Nephrologie, Transplantationsmedizin und internistische Intensivmedizin, martin.russwurm@staff.uni-marburg.de

**Dr. med. Joachim Göbel,** Zentrum für Innere Medizin, Schwerpunkt Gastroenterologie, Endokrinologie, Stoffwechsel und klinische Infektiologie

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Supplementary material to accompany the article

# Nonspecific Neck Pain

by Ahmad El-Allawy, Nils Hecht, Kerstin Luedtke, Philipp Schleicher, Norbert Weidner, and Thomas Kötter

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## eMETHODS

The guideline was developed in accordance with the guideline author manual of the German Society of General Practice and Family Medicine (DEGAM, Deutsche Gesellschaft für Allgemein- und Familienmedizin) which in turn is based on the Guidance Manual and Rules for Guideline Development of the Association of the Scientific Medical Societies in Germany (AWMF, Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften) (10). During the preparatory phase, the steering committee selected the professional societies to be involved with the goal of including all professional groups relevant to the provision of care for patients with neck pain. The mandate holders were then nominated by the selected professional societies. In addition, a mandate holder of a patient organization was involved as a voting member of the guideline groups. During a constituent meeting, key questions were agreed upon which were then addressed through systematic literature searches.

This search of the PubMed database for existing guidelines, systematic reviews and primary studies was conducted from February 2023 to August 2023. Of 7339 database entries, 675 articles were screened in full text. 23 randomized controlled trials, 13 systematic reviews and one existing guideline were identified and served as the basis for the formulation of recommendations. Four members of the project team performed the data extraction independently of each other. Any discrepancies were resolved by means of discussion. Meta-analyses of the data were performed, where possible, to calculate a pooled effect estimate.

In line with the Grading of Recommendations, Assessment, Development and Evaluations (GRADE) approach, summary of findings tables and modified evidence to decision (EtD) frameworks were created (11) to enable transparent derivation of recommendations from the processed evidence. To this end, an assessment of the confidence in the effect estimator was performed for each endpoint with available data, taking into account risk of bias, precision, consistency, directness, and publication bias. The MAGICapp ([www.app.magicapp.org/](http://www.app.magicapp.org/)) was used to perform all of these steps.

The recommendations and background texts were consented in two conferences. In the interval between the first and second consensus conferences, the provisional guideline was clinically tested in general medical practice and physiotherapeutic practice settings (19); in a consultation phase, the interested public was given the opportunity to comment.

Concurrently, a short version and a patient information were developed. All documents, including a guideline report with detailed presentation of search strategy, search results, and results of the evidence assessment are available in the AWMF database.

## Guideline collaborators

- Prof. Dr. Annette Becker  
Philips-Universität Marburg, Institut für Allgemeinmedizin, Karl-von-Frisch-Straße 4, 35032 Marburg, Germany
- Carl Christopher Büttner  
Physio Deutschland – Deutscher Verband für Physiotherapie e.V., Deutzer Freiheit 72–74, 50679 Köln, Germany
- Prof. Dr. Jean-François Chenot  
Universitätsmedizin Greifswald, Institut für Community Medicine, Abteilung Allgemeinmedizin, Walther-Rathenau-Straße 11, 17475 Greifswald, Germany
- Dr. Stephan Hoffmann  
Praxis Hoffmann, An den Salzwiesen 1, 24217 Schönberg/Holm, Germany
- Dr. Jana Husemann  
Hausärztinnen- und Hausärzterverband Hamburg e.V., Humboldtstraße 56, 22083 Hamburg, Germany
- Camilla Kapitza  
Hochschule Osnabrück, Fakultät Wirtschafts- und Sozialwissenschaften, Albrechtstraße 30, 49076 Osnabrück, Germany
- Prof. Dr. Rigobert Klett  
Deutsche Gesellschaft für Manuelle Medizin e.V., Westbahnhofstraße 2, 07745 Jena, Germany
- Dr. Cathleen Muche-Borowski  
Universitätsklinikum Hamburg-Eppendorf, Institut und Poliklinik für Allgemeinmedizin, Martinistraße 52, 20246 Hamburg, Germany
- Dr. Paul Nilges  
Deutsche Gesellschaft für Psychologische Schmerztherapie und -Forschung DGPSF e.V., Obere Rheingasse 3, 56154 Boppard, Germany
- Heike Norda  
UVSD SchmerzLOS e.V., Unabhängige Vereinigung aktiver Schmerzpatienten in Deutschland, Fürstthof 24, 24534 Neumünster, Germany
- Dr. Markus Schneider  
Deutsche Schmerzgesellschaft e.V., Alt-Moabit 101b, 10559 Berlin, Germany
- Dr. Denise Wilfling  
Medizinische Universität Graz, Institut für Pflegewissenschaft, Neue Stiftingtalstraße 6/VI, 8010 Graz, Austria

## eTable

## Participating professional societies and organizations

| Professional society                                              | Mandate holder                 |
|-------------------------------------------------------------------|--------------------------------|
| German Society of General Practice and Family Medicine (DEGAM)    | Prof. Dr. Thomas Kötter        |
| German Society of Manual Medicine (DGMM)                          | Prof. Dr. Rigobert Klett       |
| German Society of Neurosurgery (DGNC)                             | PD Dr. Nils Hecht              |
| German Society of Neurology                                       | Prof. Dr. med. Norbert Weidner |
| German Society for Orthopedics and Trauma Surgery (DGOU)          | Dr. Philipp Schleicher         |
| German Society of Physiotherapy Science (DGPTW))                  | Prof. Dr. Kerstin Lüdtké       |
| German Society of Psychological Pain Therapy and Research (DGPSF) | Dr. Paul Nilges                |
| German Pain Society (DSG)                                         | Dr. Markus Schneider           |
| UVSD SchmerzLos e.V.                                              | Heike Norda                    |