



SIGN 155 • Pharmacological management of migraine

A national clinical guideline

February 2018

KEY TO EVIDENCE STATEMENTS AND RECOMMENDATIONS

LEVELS OF EVIDENCE

- | | |
|-----------------|---|
| 1 ⁺⁺ | High-quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias |
| 1 ⁺ | Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias |
| 1 ⁻ | Meta-analyses, systematic reviews, or RCTs with a high risk of bias |
| | High-quality systematic reviews of case-control or cohort studies |
| 2 ⁺⁺ | High-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal |
| 2 ⁺ | Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal |
| 2 ⁻ | Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal |
| 3 | Non-analytic studies, eg case reports, case series |
| 4 | Expert opinion |

RECOMMENDATIONS

Some recommendations can be made with more certainty than others. The wording used in the recommendations in this guideline denotes the certainty with which the recommendation is made (the 'strength' of the recommendation).

The 'strength' of a recommendation takes into account the quality (level) of the evidence. Although higher-quality evidence is more likely to be associated with strong recommendations than lower-quality evidence, a particular level of quality does not automatically lead to a particular strength of recommendation.

Other factors that are taken into account when forming recommendations include: relevance to the NHS in Scotland; applicability of published evidence to the target population; consistency of the body of evidence, and the balance of benefits and harms of the options.

- | | |
|---|---|
| R | For ' strong ' recommendations on interventions that ' should ' be used, the guideline development group is confident that, for the vast majority of people, the intervention (or interventions) will do more good than harm. For ' strong ' recommendations on interventions that ' should not ' be used, the guideline development group is confident that, for the vast majority of people, the intervention (or interventions) will do more harm than good. |
| R | For ' conditional ' recommendations on interventions that should be ' considered ', the guideline development group is confident that the intervention will do more good than harm for most patients. The choice of intervention is therefore more likely to vary depending on a person's values and preferences, and so the healthcare professional should spend more time discussing the options with the patient. |

GOOD-PRACTICE POINTS

- ✓ Recommended best practice based on the clinical experience of the guideline development group.



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Scottish Intercollegiate Guidelines Network

Pharmacological management of migraine

A national clinical guideline



February 2018

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1 Introduction

1.1 THE NEED FOR A GUIDELINE

Headache is common, with a lifetime prevalence of over 90% of the general population in the United Kingdom (UK).¹ It accounts for 4.4% of consultations in primary care and 30% of neurology outpatient consultations.¹⁻⁴

Headache disorders are classified as either primary or secondary.⁵ Primary headache disorders are not associated with an underlying pathology and include migraine, tension-type, and cluster headache. Secondary headache disorders are attributed to an underlying pathological condition. Medication-overuse headache (MOH) is increasingly recognised as a problem and affects around 1% of the population worldwide, but can vary significantly between countries (0.5% to 2.6%).^{6,7} In patients with MOH, migraine is the most common underlying headache disorder (approximately 80%).

Migraine is the most common severe form of primary headache with a global prevalence of around one in seven people.⁸ The Global Burden of Disease study ranks migraine as the seventh most common cause of disability worldwide, rising to the third most common cause in the under 50s.⁹ It is estimated that migraine costs the UK around £3 billion a year in direct and indirect costs, taking into consideration the costs of healthcare, lost productivity and disability.¹⁰

Twice as many women as men are affected.¹¹ This is considered to be due to changes in hormone levels during the menstrual cycle, which can be more pronounced at puberty and perimenopause. Before puberty migraine frequency is the same in boys and girls.¹¹ Following the menopause migraine often improves.^{11,12}

Migraine is often underdiagnosed, misdiagnosed (eg as sinusitis) and undertreated in both primary and secondary care.¹³ In a multicentre primary care-based study more than 90% of patients presenting to primary care with headache had migraine.¹⁴

In recent years there have been advances in the diagnosis and treatment of migraine. There are new therapies on the horizon for both acute and preventative treatment of patients with migraine. Botulinum toxin A was approved for restricted use in Scotland by the Scottish Medicines Consortium (SMC) in February 2017 (see section 8.4). A number of devices are now available for the treatment of migraine that could potentially avoid the need for medication. There is, therefore, a need to update the evidence on existing treatments and evaluate the evidence for new treatments.

1.1.1 PATIENT PERSPECTIVE

Patients may have different perspectives on healthcare processes and outcomes from those of healthcare professionals. The involvement of patients in guideline development is therefore important to ensure that guidelines reflect their needs and concerns and address issues that matter to them.

Common concerns raised by patient groups and through research include:

- quality of life issues around coping with pain, sleep disturbance and restriction on daily activities, education, working and social life, and the impact it has on the family
- concerns around side effects of pharmacological therapies, medication overuse and feeling dependent on prophylactic therapies
- the need for clear information on the use of preventer medication.

1.2 REMIT OF THE GUIDELINE

1.2.1 OVERALL OBJECTIVES

This guideline provides recommendations based on current evidence for best practice in the acute and prophylactic management of adults with migraine using pharmacological therapies or devices. The focus is on adults with acute migraine and preventative treatment in patients with episodic or chronic migraine and medication-overuse headache. Studies of children with migraine were not included, however the recommendations could be considered for treating adolescents with migraine.

The guideline excludes complementary, physical and psychological therapies, and specialist surgical interventions.

This guideline updates and replaces section 6 of SIGN 107: Diagnosis and management of headache in adults.

1.2.2 COMMON COMORBIDITIES AND HEALTH ISSUES TO CONSIDER WHEN PRESCRIBING

Common comorbidities and coexisting health issues which have been considered when reviewing the evidence for this guideline are:

- asthma
- chronic pain
- fibromyalgia
- depression
- hypertension, cardiovascular and cerebrovascular risk
- obesity
- obstructive sleep apnoea
- women's hormonal and fertility issues (use of contraception, menopause, preconception, pregnancy).

Migraine with aura increases the risk of stroke. Combined oral contraception (COC) also increases the risk of stroke. The prescribing of hormonal contraception for women with migraine should follow Faculty of Sexual and Reproductive Healthcare guidance.¹⁵

1.2.3 DEFINITIONS

The international classification of headache disorders (ICHD) was first published in 1988 and updated in 2003. An updated version (ICHD Beta 3) was published in 2013 as a document open for comment (see Annex 2).⁵

Migraine is subdivided into migraine with and without aura. It is defined as episodic and chronic.

Episodic migraine

Episodic migraine occurs on less than 15 days per month and can be further subdivided into low frequency (1–9 days per month) and high frequency (10–14 days per month).⁵

Chronic migraine

Chronic migraine occurs on 15 or more days per month.⁵ In the first two versions of ICHD patients had to have 15 or more migraines per month. This group of patients is very small and it was increasingly recognised that this definition did not represent the majority of patients with chronic headache evolving from episodic migraine. The majority of patients with chronic migraine have background headache with superimposed migraine attacks. A consensus statement was produced in 2007 with a new definition of chronic migraine and this has been used in all subsequent studies on chronic migraine.¹⁶ Chronic migraine is now defined as headache on 15 or more days per month with superimposed migraine on eight or more days per month, for more than three months. This has been further refined in the ICHD beta 3 edition to allow migraine attacks to be with and without aura and also to include attacks that the patient believes are migraine and respond to acute treatment for migraine.⁵

Medication-overuse headache is defined as headache on 15 or more days per month that has evolved along with the frequent use of acute medication, for more than three months.⁵ In the majority of patients this is a complication of migraine and patients with MOH often have a chronic migraine pattern (*see section 5*). Importantly, not all patients with chronic migraine frequently using acute treatment have MOH; some have poorly-treated migraine. For triptans, opioids and combination analgesics 10 or more days use per month is considered sufficient to cause MOH, and for simple analgesics (eg aspirin, ibuprofen and paracetamol) 15 days per month.⁵ When prescribing acute treatment for migraine, patients should be counselled about the risk of MOH.

The majority of studies in this guideline use the ICHD-2 2003 definitions except for those on chronic migraine where the 2007 consensus statement is used.

The ICHD Beta 3 diagnostic criteria for migraine and MOH are listed in Annex 2.

1.2.4 TARGET USERS OF THE GUIDELINE

This guideline will be of interest to healthcare professionals in primary and secondary care, including general practitioners (GPs), headache nurses, neurologists, out-of-hours clinicians, pharmacists, and patients with migraine.

1.2.5 PATIENT VERSION

A patient version of this guideline is available from the SIGN website, www.sign.ac.uk.

1.3 STATEMENT OF INTENT

This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results.

The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at through a process of shared decision making with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be documented in the patient's medical records at the time the relevant decision is taken.

1.3.1 INFLUENCE OF FINANCIAL AND OTHER INTERESTS

It has been recognised that financial interests in, or close working relationships with, pharmaceutical companies may have an influence on the interpretation of evidence from clinical studies.

It is not possible to completely eliminate any possible bias from this source, nor even to quantify the degree of bias with any certainty. SIGN requires that all those involved in the work of guideline development should declare all financial interests, whether direct or indirect, annually for as long as they are actively working with the organisation. By being explicit about the influences to which contributors are subjected, SIGN acknowledges the risk of bias and makes it possible for guideline users or reviewers to assess for themselves how likely it is that the conclusions and guideline recommendations are based on a biased interpretation of the evidence.

Signed copies are retained by the SIGN Executive and a register of interests is available in the supporting material section for this guideline at www.sign.ac.uk.

1.3.2 PRESCRIBING OF LICENSED MEDICINES OUTWITH THEIR MARKETING AUTHORISATION

Recommendations within this guideline are based on the best clinical evidence. Some recommendations may be for medicines prescribed outwith the marketing authorisation (MA) also known as product licence. This is known as 'off-label' use.

Medicines may be prescribed 'off label' in the following circumstances:

- for an indication not specified within the marketing authorisation
- for administration via a different route
- for administration of a different dose
- for a different patient population.

An unlicensed medicine is a medicine which does not have MA for medicinal use in humans.

Generally 'off-label' prescribing of medicines becomes necessary if the clinical need cannot be met by licensed medicines within the marketing authorisation. Such use should be supported by appropriate evidence and experience.¹⁷

"Prescribing medicines outside the conditions of their marketing authorisation alters (and probably increases) the prescribers' professional responsibility and potential liability."¹⁷

The General Medical Council (GMC) recommends that when prescribing a medicine 'off label', doctors should:¹⁸

- be satisfied that there is no suitably licensed medicine that will meet the patient's need.
- be satisfied that there is sufficient evidence or experience of using the medicine to show its safety and efficacy.
- take responsibility for prescribing the medicine and for overseeing the patient's care, including monitoring the effects of the medicine, and any follow-up treatment, or ensure that arrangements are made for another suitable doctor to do so.
- Make a clear, accurate and legible record of all medicines prescribed and, when not following common practice, the reasons for prescribing an unlicensed medicine.

Non-medical prescribers should ensure that they are familiar with the legislative framework and their own professional prescribing standards.

Prior to any prescribing, the licensing status of a medication should be checked in the summary of product characteristics (www.medicines.org.uk). The prescriber must be competent, operate within the professional code of ethics of their statutory bodies and the prescribing practices of their employers.¹⁹

1.3.3 ADDITIONAL ADVICE FOR NHSSCOTLAND FROM HEALTHCARE IMPROVEMENT SCOTLAND

Specialist teams within Healthcare Improvement Scotland issue a range of advice that focuses on the safe and effective use of medicines and technologies in NHSScotland.

The Scottish Medicines Consortium (SMC) provides advice to NHS boards and their Area Drug and Therapeutics Committees about the status of all newly-licensed medicines, all new formulations of existing medicines and new indications for established products. NHSScotland should take account of this advice and ensure that medicines accepted for use are made available to meet clinical need where appropriate.

SMC advice relevant to this guideline is summarised in section 8.4.

2 Key recommendations

The following recommendations were highlighted by the guideline development group as the key clinical recommendations that should be prioritised for implementation.

Medical treatment is subdivided into acute and preventative. Acute treatment should be taken as early as possible in the headache phase with the aim of aborting an attack. It is given once, with the option of repeating after two hours (with the same or different treatment) if there is an inadequate response. Preventative treatment is taken continuously in order to reduce the frequency and severity of migraine attacks. Often a combination of acute and preventative treatment is needed.

For treatment to be effective, it is crucial that the correct diagnosis has been made. Diagnostic criteria for migraine and MOH are listed in Annex 2. Choice of treatment should take account of severity and frequency of attacks, other symptoms, patient preference, history of treatment and comorbid conditions.

Patients have a variable response to triptans and it is worth sequencing through the triptans to find the most effective treatment. When starting a preventative treatment a low dose should be used and treatment dose gradually increased. The minimum effective dose should be used and this may vary between patients. The need for ongoing prophylaxis should be considered after six to 12 months.

2.1 ACUTE TREATMENT

- R Aspirin (900 mg) is recommended as first-line treatment for patients with acute migraine.
- R Ibuprofen (400 mg) is recommended as first-line treatment for patients with acute migraine. If ineffective, the dose should be increased to 600 mg.
- R Triptans are recommended as first-line treatment for patients with acute migraine. The first choice is sumatriptan (50–100 mg), but others should be offered if sumatriptan fails.
- R Combination therapy using sumatriptan (50–85 mg) and naproxen (500 mg) should be considered for the treatment of patients with acute migraine.

2.2 PREVENTION OF MIGRAINE

- R Propranolol (80–160 mg daily) is recommended as a first-line prophylactic treatment for patients with episodic or chronic migraine.
- R Topiramate (50–100 mg daily) is recommended as a prophylactic treatment for patients with episodic or chronic migraine.
- R Amitriptyline (25–150 mg at night) should be considered as a prophylactic treatment for patients with episodic or chronic migraine.
- R Candesartan (16 mg daily) can be considered as a prophylactic treatment for patients with episodic or chronic migraine.

- R **Sodium valproate (400–1,500 mg daily) can be considered as a prophylactic treatment for patients with episodic or chronic migraine.**
- R Prescribers should be aware that sodium valproate is associated with an increased risk of foetal malformations and poorer cognitive outcomes in children exposed to valproate in utero. For women who may become pregnant sodium valproate should only be considered as a prophylactic treatment when:
- other treatment options have been exhausted
 - patients are using adequate contraception.
- Before commencing treatment women should be informed of:
- the risks associated with taking valproate during pregnancy
 - the risk that potentially harmful exposure to valproate may occur before a woman is aware she is pregnant
 - the need to use effective contraception
 - the need to seek further advice on migraine prophylaxis if pregnant or planning a pregnancy.
- R Botulinum toxin A is recommended for the prophylactic treatment of patients with chronic migraine where medication overuse has been addressed and patients have been appropriately treated with three or more oral migraine prophylactic treatments.

See section 1.2.3 and Annex 2 for the definition of chronic migraine.

2.3 MEDICATION-OVERUSE HEADACHE

- R **In patients overusing acute treatment, medication overuse should be addressed.**
- ✓ When starting acute treatment, healthcare professionals should warn patients about the risk of developing medication-overuse headache.

3 Treatment for patients with acute migraine

3.1 INTRODUCTION

Acute treatment is used either to abort an attack of migraine or to significantly reduce the severity of the headache and other symptoms. Acute treatment should be taken as soon as the patient knows they are developing a migraine headache.²⁰ In patients who have aura, it is recommended that triptans are taken at the start of the headache and not at the start of the aura (unless the aura and headache start at the same time).²⁰ It is given once, with the option of repeating after two hours (with the same or different treatment) if there is an inadequate response.

Treatment response is measured as pain free at two hours and sustained pain free at 24 hours. In addition, pain relief or headache relief (from severe/moderate to mild or no pain) is reported in some studies. A table of numbers needed to treat (NNTs) to achieve pain free at two hours for some acute therapies can be found in section 3.9.

Treatment can either be stepped or stratified.²⁰ In stepped treatment high-dose aspirin or ibuprofen is given first and, if not successful over three headaches, treatment is stepped up to triptans. In stratified treatment patients might, for example, use high dose aspirin for a milder headache and a triptan for a more severe headache. The strategy used should be tailored to patient preference.²⁰ Patients have a variable response to individual triptans and it is worth sequencing through different triptans to find the most effective one. Acute treatment will not always work for every migraine. Patients should be offered appropriate rescue medication for this situation, for example subcutaneous sumatriptan may be appropriate in some patients who don't respond to oral or nasal triptan. The risk of MOH should be discussed with every patient started on acute treatment.

It should be noted that all orodispersible (dissolve in the mouth) triptans are gastrically absorbed. In patients who vomit early in a migraine attack, nasal and subcutaneous triptans should be considered.²⁰ A significant proportion of the nasal dose is still gastrically absorbed. Antiemetics should be considered in patients with nausea or vomiting.

In patients with moderate to severe attacks combining a triptan with aspirin or a non-steroidal anti-inflammatory drug (NSAID) may be beneficial. Nasal or subcutaneous triptans should also be considered.²⁰

A treatment algorithm outlining good practice in acute treatment can be found in Annex 3.

- ✓ When starting acute treatment, healthcare professionals should warn patients about the risk of developing medication-overuse headache.

3.2 ASPIRIN

A Cochrane review of 13 studies (4,222 participants) reported that aspirin 900 mg and aspirin 1,000 mg were effective in achieving pain free at two hours compared to placebo (NNT=8.1). For sustained pain relief at 24 hours aspirin 1,000 mg had an NNT of 6.6 compared to placebo.²¹

1++

Aspirin alone had similar efficacy to sumatriptan 50 mg, and sumatriptan 100 mg was superior to aspirin and metoclopramide combined.²¹

1++

Associated symptoms of nausea, vomiting, photophobia (NNT=7.7) and phonophobia (NNT=6.6) were reduced by aspirin when compared to placebo. The addition of metoclopramide further reduced nausea (NNT=2.6) and vomiting.²¹

1++

Aspirin is a potential gastrointestinal irritant and may cause ulcers or gastrointestinal bleeding, however adverse effects from short-term use are mostly mild and transient.²¹ Aspirin should not be used in patients under 16 years of age due to the risk of Reye's syndrome.¹⁷ The use of aspirin during pregnancy, especially of intermittent high doses, should be avoided.²² Aspirin is contraindicated during the third trimester of pregnancy.¹⁷

1++

R | **Aspirin (900 mg) is recommended as first-line treatment for patients with acute migraine.**

✓ | Aspirin, in doses for migraine, is not an analgesic of choice during pregnancy and should not be used in the third trimester of pregnancy.¹⁷

3.3 NON-STEROIDAL ANTI-INFLAMMATORY DRUGS

A Cochrane review found ibuprofen to be superior to placebo in all doses between 200 mg and 600 mg for pain free at two hours and sustained pain relief at 24 hours for patients with acute migraine with moderate to severe baseline pain. The NNT for achieving the outcome of pain free at two hours was 9.7 for 200 mg and 7.2 for 400 mg.²³

1⁺⁺

Naproxen has also been found to be effective for two hour pain relief compared to placebo for patients with acute migraine. The NNT for pain free at two hours was 11. Results did not vary for doses of 500 mg and 825 mg.²⁴

1⁺⁺

Diclofenac potassium 50 mg is reported to have a relative benefit over placebo, relative risk (RR) 2.0 (95% confidence interval (CI) 1.6 to 2.6), NNT=8.9, for pain free at two hours in patients with acute migraine.²⁵

1⁺⁺

Naproxen and ibuprofen were also effective in relieving migraine-associated symptoms of nausea, photophobia, phonophobia and functional disability compared to placebo.^{23,24}

1⁺⁺

No serious adverse events were reported in the trials.²³⁻²⁵ NSAIDs can cause gastrointestinal problems with long-term use.¹⁷ They should also be used with caution in patients with asthma as NSAIDs may worsen the condition.¹⁷

1⁺⁺

In pregnancy, ibuprofen is the anti-inflammatory agent of first choice until gestational week 28. After 28 weeks of gestation, repeated use of ibuprofen should be avoided.²⁶

4

Ibuprofen is the only NSAID which is licensed for patients with acute migraine.

R | **Ibuprofen (400 mg) is recommended as first-line treatment for patients with acute migraine. If ineffective, the dose should be increased to 600 mg.**

3.4 PARACETAMOL

A Cochrane review identified three studies (717 participants) and reported a relative benefit of paracetamol 1,000 mg in achieving pain free at two hours as 1.8 (95% CI, 1.2 to 2.6), NNT=12, compared to placebo in patients with moderate or severe acute migraine.²⁷

1⁺⁺

In two studies including 1,140 patients with acute migraine, a combination of paracetamol 1,000 mg plus metoclopramide 10 mg had similar efficacy to sumatriptan 100 mg for headache relief at two hours (39% of participants reported relief using paracetamol and metoclopramide versus 42% for sumatriptan).²⁷

1⁺⁺

For pain free and sustained headache relief at 24 hours, paracetamol was more effective than placebo, but not compared to rizatriptan.²⁷

1⁺⁺

No serious adverse events were reported in the trials. Paracetamol is better tolerated than NSAIDs or triptans.²⁷

1⁺⁺

Paracetamol is commonly used in all trimesters of pregnancy although routine use should be avoided.^{22,26}

R | **Paracetamol (1,000 mg) can be considered for treatment of patients with acute migraine who are unable to take other acute therapies.**

✓ | Due to its safety profile, paracetamol is first choice for the short-term relief of mild to moderate headache during any trimester of pregnancy.^{22,26}

3.5 ANTIEMETICS

Metoclopramide 10 mg (oral) in combination with aspirin 900 mg had similar efficacy to 100 mg sumatriptan in achieving the outcome of pain free at two hours.²¹ Similar results were found for paracetamol 1,000 mg combined with metoclopramide 10 mg versus sumatriptan.²⁷ However, aspirin and metoclopramide provided significantly better relief of associated symptoms, with an NNT of 2.6 (95% CI 2.1 to 3.1). It was particularly beneficial in reducing vomiting, NNT=2.1 (95% CI 1.5 to 3.7).²¹

1⁺⁺

A randomised controlled trial (RCT) comparing different doses of metoclopramide found that all doses provided an improvement in pain response, measured using an 11-point numerical rating score for pain (NRS). Most patients improved by more than 50%. Individual improvement with metoclopramide was 4.7 NRS units for 10 mg, 4.9 for 20 mg and 5.3 for 40 mg.²⁸

1⁺

A meta-analysis found that phenothiazines are superior to placebo for complete headache relief up to one hour after treatment (odds ratio (OR) 15.02, 95% CI 7.57 to 29.82). There was no significant difference in efficacy for complete headache relief when compared to metoclopramide.²⁹

1⁺

Both prochlorperazine 10 mg and metoclopramide 20 mg (both coadministered with diphenhydramine and given intravenously) were found to be effective for pain relief at one hour for patients with acute migraine, as recorded on the NRS scale. At two hours the NRS for pain after treatment with prochlorperazine was 6.4 from a baseline NRS of 8.4, and for metoclopramide 5.9 from a baseline NRS of 8.8. The overall difference was 0.6 (95% CI -0.6 to 1.8), with an NNT of 17 for pain free at two hours.³⁰

1⁺

Reporting of side effects was inconsistent amongst trials.^{21,29} Most side effects were minor.²¹ Akathisia was reported in trials of metoclopramide and prochlorperazine in 5–9% of participants.^{28,30} Drowsiness and dizziness was also noted. More dropouts were noted as the dose of metoclopramide increased.²⁸

1⁺

R Metoclopramide (10 mg) or prochlorperazine (10 mg) can be considered in the treatment of headache in patients with acute migraine. They can be used either as an oral or parenteral formulation depending on presentation and setting.

R Metoclopramide (10 mg) or prochlorperazine (10 mg) should be considered for patients presenting with migraine-associated symptoms of nausea or vomiting. They can be used either as an oral or parenteral formulation depending on presentation and setting.

✓ Metoclopramide should not be used regularly due to the risk of extrapyramidal side effects.

1⁺⁺1⁺2⁺⁺**3.6 TRIPTANS**

For patients experiencing acute migraine, triptans are superior to placebo, for pain relief, pain free within two hours and sustained pain relief at 24 hours.³¹⁻³⁵

An overview of Cochrane reviews reported that sumatriptan is an effective abortive treatment for acute migraine episodes.³³ The subcutaneous route is the most effective in terms of pain relief at two hours from moderate to severe baseline pain, with an NNT of 2.5 for 4 mg and 2.3 for a 6 mg dose. Efficacy was significantly improved if treatment was taken early, while pain was mild. For oral sumatriptan 50 mg the NNT for pain free at two hours was 6.1 for moderate to severe baseline pain and 4.4 for mild baseline pain. For 100 mg sumatriptan the NNT was 4.7 for pain free at two hours for moderate to severe pain and 2.4 for mild pain. Intranasal sumatriptan is also effective for pain free at two hours (NNT=3.1).³³

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In studies comparing sumatriptan to other triptans, zolmitriptan and almotriptan showed similar efficacy.³³ Rizatriptan 10 mg was superior to all doses of sumatriptan for achieving pain free at two hours. Rizatriptan 5 mg had similar efficacy to sumatriptan 50 mg. Eletriptan 40 mg and 80 mg was superior to both doses of sumatriptan for the outcome of pain free at two hours and was associated with reduced need for rescue medication.³³

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Compared to other therapies, sumatriptan 100 mg was superior for achieving pain free at two hours than aspirin 900 mg with metoclopramide 10 mg, or paracetamol 1,000 mg and metoclopramide 10 mg. ³³ Sumatriptan was superior to effervescent aspirin 1,000 mg for headache relief at two hours. ³³	1++
For patients with menstrually-related migraine (MRM), sumatriptan resulted in a therapeutic gain with 25% of patients pain free at two hours with 50 mg and 34% with 100 mg compared to placebo. ³⁵ Rizatriptan, frovatriptan and zolmitriptan were also reported to provide benefit for acute treatment of patients with MRM. ^{34,35}	1++ 1*
Adverse events reported in the trials were described as mild to moderate. Serious adverse events were rare. ^{33 31}	1++
Patients using rizatriptan and propranolol should be given a maximum dose of 5 mg rizatriptan due to the risk of interactions and rizatriptan should not be taken within two hours of taking propranolol. ¹⁷	
One study of cardiovascular outcomes with triptan use reported an OR of 0.86 (95% CI 0.52 to 1.43), for a serious cardiovascular event. ³⁶ Triptans are contraindicated in patients with uncontrolled hypertension and in symptomatic cardiovascular and cerebrovascular disease. ¹⁷ Trials of triptans have focused on a population aged 18–65 years. There is therefore no information on triptan use in the over 65s. Hypertension, cardiovascular disease and cerebrovascular disease are all more common in older people. Age is not a contraindication to use of triptans but age and vascular risk factors should be taken into account before prescribing triptans in the over 65s. ¹⁷	2++
The United States Food and Drug Administration (FDA) issued a warning following a small number of case reports of serotonin syndrome in patients whilst taking triptans and selective serotonin reuptake inhibitors (SSRIs). This has been reviewed and a consensus statement produced by the American Headache Society. Clinical information in the FDA report was lacking and it was concluded that there is insufficient information to determine whether there is an increased risk of serotonin syndrome in patients taking triptans and SSRIs together compared with patients taking SSRIs alone. Given the frequency of coprescribing any risk is very small. It is therefore reasonable to prescribe triptans in patients on SSRIs. ³⁷	4
Registry data has given increasing confidence in the use of triptans in pregnancy. A meta-analysis on the use of triptans, in particular sumatriptan, at all stages of pregnancy compared with women with migraine who did not use triptans showed that the use of triptans in pregnancy is not associated with an increased risk of major congenital malformation or prematurity. ³⁸ This is supported by an additional cohort study. ³⁹ The risk of spontaneous abortion rates was reported to be higher (OR 1.41, 95% CI 1.11 to 1.80) in the meta-analysis, but this was not assessed in all of the studies and was based on a small number of patients. ³⁸ A more recent, larger cohort study (432 women) reported there was no increased risk of spontaneous abortion with triptan use. ³⁹	2++
A further cohort study, where women completed validated questionnaires about their child at 18 and 36 months, suggested that prenatal triptan use (primarily in the first trimester) may be associated with externalising behaviour problems (1.36-fold risk). ⁴⁰ The evidence is subject to possible confounders and should be interpreted with caution.	2+
Sumatriptan is the preferred triptan based on efficacy, safety profile and cost. For patients with early vomiting, a nasal or subcutaneous triptan may be more effective. Nasal zolmitriptan 5 mg and sumatriptan 6 mg subcutaneous are effective (see Table 1, section 3.9). Where treatment with paracetamol (all trimesters) or ibuprofen (first and second trimester only) fail, the use of triptans, in particular sumatriptan, in all stages of pregnancy can be considered. None of the triptans are classed as non-teratogenic.	

- R **Triptans are recommended as first-line treatment for patients with acute migraine. The first choice is sumatriptan (50–100 mg), but others should be offered if sumatriptan fails.**
- R **In patients with severe acute migraine or early vomiting, nasal zolmitriptan or subcutaneous sumatriptan should be considered.**
- R **Triptans are recommended for the treatment of patients with acute migraine associated with menstruation.**
- R **Sumatriptan can be considered for treatment of acute migraine in pregnant women in all stages of pregnancy. The risks associated with use should be discussed before commencing treatment.**

3.7 COMBINED THERAPIES

A combination of sumatriptan 50–85 mg and naproxen 500 mg is better than placebo or monotherapy with active comparators in patients with acute migraine.⁴¹ Fifty percent of patients with mild pain were pain free at two hours with combination therapy compared to 18% in the placebo group (NNT=3.1, 95% CI 2.9 to 3.5). When baseline pain was moderate to severe the NNT was 4.9 (95% CI 4.3 to 5.7) compared to placebo.⁴¹ The associated features of nausea, photophobia, phonophobia and functional disability were also better managed when combination therapy was used compared to placebo or monotherapy.⁴¹

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The relative benefit of combination therapy when compared to sumatriptan alone was 1.4 with a NNT of 10. However, compared to naproxen alone combination therapy was clearly superior, with a relative benefit of 2.0, NNT=6.1.⁴¹

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Adverse effects were more common with combination therapy than placebo or naproxen alone, but were reported to be mild.⁴¹

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- R **Combination therapy using sumatriptan (50–85 mg) and naproxen (500 mg) should be considered for the treatment of patients with acute migraine.**

3.8 STEROIDS

Two meta-analyses reported that use of steroids (prednisolone or dexamethasone) in addition to other acute treatments provided a small benefit in reducing the rate of moderate or severe headache at 24–72 hours (NNT=10).^{42,43} The studies included in the meta-analyses were small and some reported no statistical difference to placebo. There was also heterogeneity in the additional acute therapies used. Pooled data from six studies reporting a secondary outcome of totally resolved migraine showed no significant benefit from steroids compared to placebo.⁴³

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Adverse events were mild and transient.^{42,43} In all but one study steroids were delivered intravenously to patients presenting to the emergency department. Intravenous steroids are not a viable option in routine practice.

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No evidence was identified on the use of prednisolone as a tapered treatment in patients with prolonged migraine (>3 days).

3.9 COMPARISON OF THERAPIES

Table 1 lists the NNTs for therapies to achieve the outcome of pain free at two hours from a baseline of moderate to severe pain, collated from the Cochrane reviews discussed in sections 3.2 to 3.8. It is not an exhaustive list of available therapies. Other triptans are effective (*see section 3.6 for details*), but were not measured against placebo so NNTs could not be calculated for comparison. A treatment algorithm outlining good practice in acute treatment can be found in Annex 3.

Table 1: Calculated numbers needed to treat for acute migraine therapies for an outcome of pain free at two hours in patients with moderate to severe pain, compared to placebo

Therapy	NNT
Simple analgesics	
Aspirin 900 mg or 1,000 mg ²¹	8.1
Diclofenac potassium 50 mg ²⁵	8.9
Ibuprofen 400 mg ²³	7.2
Ibuprofen 200 mg ²³	9.7
Naproxen 500 mg or 825 mg ²⁴	11
Paracetamol 1,000 mg ²⁷	12
Oral triptans	
Sumatriptan 50 mg ³³	6.1
Sumatriptan 100 mg ³³	4.7
Zolmitriptan 5 mg ³¹	4.8
Zolmitriptan 2.5 mg ³¹	5.0
Nasal sprays	
Sumatriptan 20 mg ³³	4.7
Zolmitriptan 5 mg ³¹	3.0
Subcutaneous injection	
Sumatriptan 6 mg ³³	2.3
Combination therapy	
Sumatriptan 50–85 mg and naproxen 500 mg ⁴¹	4.9

4 Pharmacological prevention of migraine

4.1 INTRODUCTION

This section considers the preventative treatment options for patients with episodic and chronic migraine. Most of the available evidence is based on studies of a patient population with episodic migraine rather than chronic migraine (*for definitions, see section 1.2.3*). There is limited data to make specific treatment recommendations for patients with chronic migraine. Recommendations are therefore based on the premise that chronic migraine and episodic migraine are on a spectrum of the same condition and patients with chronic migraine may benefit from the therapies found to be effective for prophylaxis of episodic migraine.

Migraine can have considerable impact on quality of life and daily function. Modest improvements in the frequency or severity of migraine headaches may provide considerable benefits to an individual. Within trials, a reduction in migraine headache severity and/or frequency of 30–50% is regarded as a successful outcome. The decision about when to start migraine prophylaxis is best guided by establishing the impact of migraine on each patient, rather than just focusing on the absolute number of headaches or migraines per month. For example, a few severe incapacitating migraines per month may warrant prophylactic treatment whereas more frequent but milder migraines that have little impact on daily function may not warrant treatment. Overusing acute medication can limit the effectiveness of preventative medication and medication overuse should also be assessed and addressed.⁴⁴ Prophylactic treatment should be used for at least three months at the maximum tolerated dose before deciding if it is effective or not. In many patients prophylactic medication can be successfully phased out again and the need for ongoing prophylaxis should be considered after six to 12 months.⁴⁵

An algorithm of a suggested treatment pathway can be found in Annex 3. The decision regarding which medication to try first is dependent on evidence of effectiveness, patient comorbidities, other risk factors, drug interactions and patient preference. It is important to ensure adequate contraception whilst on preventative therapies as some have risks of teratogenicity and others can potentially cause harm to unborn babies. Given that migraine without aura often improves during pregnancy women should aim to stop migraine prophylactic treatments before pregnancy.¹² Migraine with aura often continues unchanged.¹² Before commencing treatment, potential harmful effects of therapies need to be discussed with women who are, or may become, pregnant. No evidence was identified on which to base recommendations on preventative treatments for women during pregnancy.

4.2 BETA BLOCKERS

A well-conducted systematic review identified a large number of trials on the use of beta blockers for prophylaxis of migraine, mostly from the 1980s. The individual trials were rated as low quality and of short duration (<3 months).⁴⁶ Propranolol (80–160 mg) reduced the frequency of episodic migraine by ≥50% compared to placebo (NNT=4, 95% CI 3 to 7).⁴⁶ Metoprolol (200 mg daily, slow release) reduced migraine severity, but no consistent benefits in reduction of migraine frequency or use of acute analgesics was shown.⁴⁶ Atenolol 50–200 mg daily was reported to reduce frequency of episodic migraine and use of acute therapies.⁴⁶

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Direct comparative trials of the effectiveness of propranolol with other medications used for migraine prevention in patients with episodic and chronic migraine were of low quality due to risk of bias and failure to analyse data according to intention-to-treat principles. Within these constraints the likelihood of a 50% reduction in headache frequency did not differ between propranolol and topiramate. Propranolol was better than nifedipine but there was no clear evidence to suggest it was better than other beta blockers such as metoprolol and timolol. Similarly there was no difference when compared to amitriptyline or nortriptyline. The use of combined tricyclic antidepressant and propranolol was no better than propranolol monotherapy.⁴⁶

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Propranolol use led to treatment side effects more commonly than placebo and specific adverse events leading to discontinuation included nausea (43 per 1,000 treated) and diarrhoea (89 per 1,000 treated).⁴⁶ However, it is a well-established therapy and is widely used in NHS Scotland. Beta blockers should be used

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with caution if the patient has a history of asthma.¹⁷ Patients using rizatriptan and propranolol should be given a maximum dose of 5 mg rizatriptan as propranolol increases the plasma concentration of rizatriptan. Rizatriptan should not be taken within two hours of taking propranolol.¹⁷

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- R Propranolol (80–160 mg daily) is recommended as a first-line prophylactic treatment for patients with episodic or chronic migraine.**

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4.3 TOPIRAMATE

Three systematic reviews reported on the efficacy of topiramate compared to placebo in patients with episodic and chronic migraine.^{46–48} Pooled analysis from nine RCTs (1,700 patients; treatment duration 4–52 weeks) comparing topiramate to placebo reported use of topiramate resulted in twice as many patients reporting a ≥50% reduction in headache frequency (RR 2.02, 95% CI 1.57 to 2.60; NNT=4, 95% CI 3 to 6), one less headache per 28 days and an improvement in quality of life outcomes.⁴⁸ In patients with chronic migraine, low-quality evidence suggests that topiramate reduces monthly migraine days, frequency of associated symptoms and is more effective in reducing monthly migraine attacks by 25% when compared to placebo.⁴⁶ Topiramate also improved quality of life and migraine-related disability scores.⁴⁶

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Topiramate at doses of 50–200 mg daily is effective in reducing monthly migraine frequency and monthly migraine days by 50% or more (absolute reduction of five migraine days/month for topiramate at a dose of 100 mg/day).⁴⁶ Meta-analysis of three trials that used multiple doses of topiramate demonstrated that 200 mg daily is no more effective than 100 mg daily.⁴⁸ Improvement in quality of life measures, general health status, self-reported vitality and use of acute drugs was also reported.⁴⁶

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In seven trials of topiramate versus active comparators (amitriptyline, flunarizine, propranolol, sodium valproate and relaxation) topiramate was found to be no better than any comparator except for a small, but significant, benefit over sodium valproate. However, these trials were underpowered and further evidence is needed to confirm these findings.⁴⁸

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Topiramate 100 mg daily was associated with a higher rate of adverse events than placebo, although these were mild to moderate.^{47,48} Adverse effects include nausea, paraesthesia, anorexia and weight loss.^{47–49} Cognitive adverse effects are common, vary in severity, tend to be dose-related and often define drug tolerability.⁵⁰ As depression is also a common side effect, topiramate should be used with caution in patients with depression.¹⁷ Exposure to topiramate during the first trimester of pregnancy has an increased risk of abnormal oral cleft development in infants (OR 6.2, 95% CI 3.13 to 12.51).⁵¹ It should not be used by women who are breastfeeding as it can be present in breast milk.¹⁷

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Topiramate is accepted for use in NHSScotland by the SMC for the prevention of migraine in patients who have not responded to at least one other prophylactic therapy (see section 8.4).

- R Topiramate (50–100 mg daily) is recommended as a prophylactic treatment for patients with episodic or chronic migraine.**

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- R Before commencing treatment women who may become pregnant should be advised of the associated risks of topiramate during pregnancy, the need to use effective contraception and the need to seek further advice on migraine prophylaxis if pregnant or planning a pregnancy.**

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4.4 TRICYCLIC ANTIDEPRESSANTS

A systematic review reported patients with episodic migraine (on average 4.7 migraines per month) treated with tricyclic antidepressants (TCAs) experienced a reduction of 1.4 headaches per month.⁵² Study duration varied from four to 24 weeks and the studies were rated as having a high risk of bias.⁵² The average dose of TCA used was 50% of the maximum dose (eg the dose range for amitriptyline was 10 mg to 150 mg with a pooled mean dose of 80 mg). In most studies doses were titrated. There was some evidence that higher doses resulted in greater benefit but the difference between higher and lower doses was not significant. Patients with episodic migraine taking TCAs had an 80% chance of a 50% improvement in headaches

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(RR 1.80, 95% CI 1.24 to 2.62) compared to placebo. There was a small ongoing reduction in headache frequency with continued treatment with TCAs.⁵²

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A further meta-analysis found that amitriptyline (100 mg) was more effective than placebo in achieving a ≥50% reduction in headache frequency but more so in those with higher headache frequencies. This was based on low-quality evidence.⁴⁶

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In comparative trials, low-dose (eg an average amitriptyline dose of 50 mg) TCAs were more likely to produce at least a 50% improvement in episodic migraine headache frequency than SSRIs. Studies comparing beta blockers and TCAs, amitriptyline and topiramate, and amitriptyline and flunarizine found no difference in the likelihood of gaining a 50% reduction in headache attacks. However there are relatively few trials and most were underpowered to assess clinical equivalence.⁴⁶

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Across 37 studies of various TCAs, only dry mouth and drowsiness were reported as more frequent in the TCA group than the placebo group. Some TCAs are less sedating than others.¹⁷ Withdrawal from treatment due to an adverse event was similar between patients taking placebo or TCA.⁵² TCAs are unlicensed for the treatment of patients with migraine (see section 1.3.2).

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- R Amitriptyline (25–150 mg at night) should be considered as a prophylactic treatment for patients with episodic or chronic migraine.
- R In patients who cannot tolerate amitriptyline a less sedating tricyclic antidepressant should be considered.

4.5 CANDESARTAN

A systematic review identified two small RCTs of moderate quality that demonstrated the efficacy of candesartan (16 mg).⁵³ One of the studies reported a relative reduction of 26% in headache days.⁵⁴ In the other study, candesartan had similar efficacy to propranolol 160 mg for the secondary outcome of ≥50% reduction in migraine days (proportion of responders: 43% for candesartan, 40% for propranolol and 23% for placebo).⁵⁵ Candesartan is usually well tolerated and early trial data suggested no increase in the rate of adverse events compared to the placebo rate.⁵⁴

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The evidence base for candesartan is small and further trials are unlikely to be conducted. However, candesartan is a widely used and inexpensive drug with a good side-effect profile, and no potential cognitive effects.

- R Candesartan (16 mg daily) can be considered as a prophylactic treatment for patients with episodic or chronic migraine.

4.6 SODIUM VALPROATE

For patients with episodic migraine, sodium valproate is more effective than placebo providing a ≥50% reduction in headache frequency over eight to twelve weeks (RR 2.83, 95% CI 1.27 to 6.31; NNT=3, 95% CI 2 to 9) in pooled data from two small trials (n=63), using doses ranging from 400–1500 mg daily.⁵⁶ There was no difference in efficacy when compared to flunarizine, and sodium valproate 500 mg was not as effective as high-dose topiramate (400 mg) in pooled analysis of two small trials.⁵⁶

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There was variable reporting on adverse effects in the trials included in the Cochrane review. Those reported were mild but common and included fatigue, dizziness, tremor and weight gain.⁵⁶ Children exposed to sodium valproate in utero are at high risk of serious developmental disorders and congenital malformations.⁵⁷ Sources of further advice for prescribing sodium valproate for women who may become pregnant are available in section 7.2 and the Medicines and Healthcare products Regulatory Agency (MHRA) patient information card and checklist can be found in Annex 4. Sodium valproate is unlicensed for the treatment of patients with migraine (see section 1.3.2).

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- R **Sodium valproate (400–1,500 mg daily) can be considered as a prophylactic treatment for patients with episodic or chronic migraine.**
- R Prescribers should be aware that sodium valproate is associated with an increased risk of foetal malformations and poorer cognitive outcomes in children exposed to valproate in utero. For women who may become pregnant sodium valproate should only be considered as a prophylactic treatment when:
- other treatment options have been exhausted
 - patients are using adequate contraception.
- Before commencing treatment women should be informed of:**
- the risks associated with taking valproate during pregnancy
 - the risk that potentially harmful exposure to valproate may occur before a woman is aware she is pregnant
 - the need to use effective contraception
 - the need to seek further advice on migraine prophylaxis if pregnant or planning a pregnancy.
- ✓ When prescribing sodium valproate for women who may become pregnant the MHRA checklist must be used (see Annex 4).

4.7 CALCIUM CHANNEL BLOCKERS

Low-quality studies, mostly from the 1980s and of variable design and size, reported some, but not consistent, benefit from verapamil, nimodipine, nifedipine or nicardipine over placebo in patients with episodic or chronic migraine.^{46,53}

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Meta-analysis of seven trials of flunarazine at a dose of 10 mg daily reported a moderate benefit in patients with episodic migraine compared to placebo. The standardised mean difference (SMD) for reduction in headache frequency was -0.60 (95% CI -1.2 to 0.005) at eight weeks and -0.84 (95% CI -1.3 to 0.34) at 12 weeks. No significant benefit was found at four weeks.⁵³ The trials included in the meta-analysis were small.

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Comparative trial data was limited, but there is some evidence that flunarazine has similar efficacy to propranolol, topiramate and sodium valproate.^{53,58}

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Flunarazine is often well tolerated.⁵⁸ Depression is a possible side effect, so it should be used with caution in patients with depression.^{58,59}

Flunarazine is not licensed for use in the UK. Provision is normally via hospital prescription by a specialist headache service. Clinicians should be familiar with the side-effect profile.⁵⁹

- R **Flunarazine (10 mg daily) should be considered as a prophylactic treatment for patients with episodic or chronic migraine.**

4.8 PIZOTIFEN

Pizotifen is a long-established, licensed prophylactic agent and is commonly used in the UK. Most of the studies on pizotifen were conducted in the 1970s, using doses ranging from 1.5–6 mg daily. Between 30% and 50% of patients have reported that using pizotifen reduces migraine frequency.⁶⁰

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Two multicentre studies, one a double blind placebo-controlled trial (study 1) and the other an open study (study 2) were conducted to assess if pizotifen prophylaxis (in doses of 1.5 mg per day) reduced the frequency of migraine. The median of the monthly migraine rate was lower in patients receiving pizotifen and sumatriptan than in those receiving placebo and sumatriptan (study 1; 3.5 versus 3.9), or sumatriptan alone (study 2; 2.9 versus 3.2). The authors concluded that pizotifen may be better reserved for those patients who have four or more migraines per month.⁶⁰

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There is insufficient evidence to support a recommendation, but it is a well-established therapy which is widely used.

4.9 GABAPENTIN AND PREGABALIN

There is limited evidence from two small trials of gabapentin that high doses (1,800–2,400 mg) are significantly superior to placebo for patients with episodic migraine, but the pooled data from six trials of gabapentin (1,000 patients) suggest no consistent benefit over placebo in the prophylaxis of adults with episodic migraine at any dose.⁶¹

Adverse effects were common, particularly with high doses of gabapentin, including fatigue, dizziness, flu-like symptoms, somnolence and cognitive disturbance.⁶¹

There is a lack of evidence on the use of pregabalin in patients with episodic migraine.⁶¹

If migraine is part of a chronic pain syndrome, further advice on the use of pregabalin is available in SIGN 136: Management of chronic pain.⁶²

Use of gabapentin or pregabalin is associated with increased risk of addiction.⁶³

R Gabapentin should not be considered as a prophylactic treatment for patients with episodic or chronic migraine.

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4.10 ANGIOTENSIN-CONVERTING ENZYME INHIBITORS

A systematic review identified one trial of 60 patients with episodic migraine (with or without hypertension), where 12 weeks of treatment with lisinopril was better than placebo in reducing migraine days/severity and body pain, but did not reduce use of acute therapies.⁴⁶ Another small RCT (n=24) found captopril reduced headache and improved depression over 32 weeks.⁴⁶

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4.11 SELECTIVE SEROTONIN REUPTAKE INHIBITORS AND SEROTONIN NOREPINEPHRINE REUPTAKE INHIBITORS

A Cochrane review identified 11 RCTs of the use of SSRIs and one RCT of venlafaxine, a serotonin norepinephrine reuptake inhibitor (SNRI) for the management of patients with migraine.⁶⁴ Most of the studies were considered poor in quality, due to incomplete reporting of adverse events, lack of adequate follow up, lack of power and inconsistent use of outcome events. Overall, there was a lack of evidence to support the use of SSRIs or venlafaxine for migraine prophylaxis. One trial suggested that venlafaxine had similar efficacy to amitriptyline but was better tolerated.⁶⁴

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4.12 OTHER ANTIEPILEPTICS

A Cochrane review found no consistent evidence of efficacy in patients with episodic migraine for acetazolamide, lamotrigine, clonazepam, oxcarbazepine, viagabatrin or zonisamide when compared to placebo.⁶⁵ Levetiracetam 1,000 mg daily was superior to placebo in reducing headache frequency and in the proportion of headache responders, but was not superior to topiramate 100 mg daily in reducing headache frequency. Further trials are needed to determine its efficacy. Carbamazepine was superior to placebo in the proportion of responders, which was deemed clinically significant, but high rates of adverse events were noted.⁶⁵

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4.13 BOTULINUM TOXIN A

Systematic reviews on the efficacy of botulinum toxin A are based mainly on two large multicentre RCTs, the Phase III REsearch Evaluating Migraine Prophylaxis Therapy (PREEMPT) 1 and PREEMPT 2. Both trials were conducted in patients with chronic migraine over 24 weeks. Patients received two sets of injections at 12 week intervals, followed by an open label phase.^{46,66,67}

In PREEMPT 1 the primary endpoint of reduction in headache episodes from baseline compared to placebo was negative. However, there was significant reduction in secondary endpoints of headache days with botulinum toxin A versus placebo (-7.8 v -6.4; p=0.006) and migraine days (-7.6 v -6.1; p=0.002).⁶⁸

In PREEMPT 2 the primary endpoint was changed (prior to completion of the trial and before analysis) to reduction in headache days. It was stated that this was a better measure than headache episodes in patients with chronic migraine due to the prolonged, continuous nature of their headaches. There was a significant reduction in both headache days for botulinum toxin A versus placebo (-9.0 v -6.7; p<0.001) and migraine days (-8.7 v -6.3; p<0.001) compared with baseline. There was also a significant reduction in headache episodes in PREEMPT 2 for botulinum toxin A versus placebo (-5.3 v -4.6; p=0.003).⁶⁹

Post hoc analysis of pooled data from both trials of those patients who had previously used three or more migraine preventatives reported a bigger difference, compared to placebo, in headache days and migraine days for botulinum toxin A (-7.4 v -4.7; p<0.001) and migraine days (-7.1 v -4.3; p<0.001) compared with baseline.⁷⁰

In both PREEMPT trials about two thirds of the patients overused abortive treatments. In such patients MOH should be addressed first (see section 5). However, in patients where treatment of MOH has been unsuccessful, botulinum toxin A should still be considered.

A meta-analysis of trials of patients with episodic migraine or tension-type headache found no difference in efficacy compared to placebo.⁶⁶

Five individual RCTs provided low-strength evidence about the comparative effectiveness of botulinum toxin A versus other drugs for chronic migraine prevention in 350 adults ages 18–65 with 12–24 migraine days per month. No significant differences in likelihood of migraine prevention or improvement in migraine disability assessment were found for botulinum toxin A compared to topiramate. Absolute scores of the Headache Impact Test were significantly better with topiramate than botulinum toxin A, however, the need for acute drugs did not differ between the two. A single RCT examined the comparative effectiveness of botulinum toxin A versus divalproex sodium and found no differences between the two drugs for migraine prevention, migraine-related disability, or quality of life.⁴⁶

Adverse events were slightly more common in patients injected with botulinum toxin A compared to placebo (RR 1.25, 95% CI, 1.14 to 1.36), although they were not more likely to withdraw from the study as a result. Adverse events included ptosis, muscle weakness, neck pain and stiffness, paraesthesia and skin tightness.^{46,66}

Botulinum toxin A (Botox[®]) has been accepted with restricted use in NHSScotland for adults with chronic migraine (headaches on at least 15 days per month of which at least eight days are with migraine) whose condition has failed to respond to ≥3 prior oral prophylactic treatments, where medication overuse has been appropriately managed.⁷⁰ This was based on clinical effectiveness and a cost-utility analysis (Markov model) which compared botulinum toxin A to best supportive care, over a three-year time horizon. The analysis reported that botulinum toxin A resulted in an incremental cost-effectiveness ratio (ICER) of £10,816 and quality-adjusted life year (QALY) gain of 0.12.⁷⁰ Botulinum toxin A is required to be administered by appropriately trained personnel in hospital specialist centres, which may have implications for service delivery.

- R **Botulinum toxin A is not recommended for the prophylactic treatment of patients with episodic migraine.**
- R **Botulinum toxin A is recommended for the prophylactic treatment of patients with chronic migraine where medication overuse has been addressed and patients have been appropriately treated with three or more oral migraine prophylactic treatments.**

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- ✓ Botulinum toxin A should only be administered by appropriately trained individuals under the supervision of a headache clinic or the local neurology service.

4.14 OCCIPITAL NERVE BLOCK

Four small RCTs measured short-term benefit (one week up to 28 days) of greater occipital nerve (GON) blocks. Each trial used different regimens. Three of the trials reported a reduction in headache frequency compared to placebo.⁷¹⁻⁷³ The other trial reported no difference, however this could have been due to the placebo group receiving a small dose of lidocaine.⁷⁴ Although they are used in headache clinics in Scotland further evidence is required before recommendations for use can be made.

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4.15 CALCITONIN GENE-RELATED PEPTIDE

Calcitonin gene-related peptide (CGRP) monoclonal antibodies are in development for the treatment of patients with migraine. Four well-conducted phase 2 RCTs on CGRP monoclonal antibodies for patients with frequent episodic migraine were identified.⁷⁵⁻⁷⁸ All four showed that the treatment was more effective than placebo and safe. Few adverse effects were reported. Two phase 3 RCTs on CGRP monoclonal antibodies were identified, one in patients with episodic migraine and one in patients with chronic migraine.^{79,80} Both showed that treatment was more effective than placebo and safe. Assessment by regulatory bodies and results from further phase 3 trials are awaited.

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One phase 2 study on the CGRP receptor antagonist telcagepant was identified.⁸¹ The trial was terminated early due to hepatotoxicity concerns in two patients.

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4.16 MENSTRUAL MIGRAINE PROPHYLAXIS

The drop in oestrogen just prior to menstruation is a known trigger for migraine and in women migraine is more frequent, more severe and harder to treat just before and during menstruation.^{11,12} In some women migraine only occurs (pure menstrual migraine) or predominantly occurs (menstrually-related migraine) from two days before the start of bleeding until three days after. In these women perimenstrual strategies may be used instead of, or in addition to, standard, continuous prophylaxis. The menstrual cycle has to be regular for treatment to be effective.

4.16.1 TRIPTANS

A meta-analysis found that triptans reduce the occurrence of menstrual migraine (both menstrually-related migraine and pure menstrual migraine) compared to placebo. Table 2 shows the numbers needed to treat for reduction of menstrual migraine with triptans.³⁴

Table 2: Numbers needed to treat for reduction of menstrual migraine with triptans³⁴

Triptan	NNT	Number of patients
Frovatriptan 2.5 mg daily	7.22	633
Frovatriptan 2.5 mg twice daily	3.90	584
Naratriptan 1 mg twice daily*	7.99	392
Zolmitriptan 2.5 mg twice daily	4.98	80
Zolmitriptan 2.5 mg 3 times daily	2.52	83

*1 mg twice daily naratriptan is not available in the UK. NNT for 2.5 mg daily was not available

Frovatriptan once daily and twice daily was also effective in reducing the secondary outcomes of migraine severity and rescue medication needed. Drug-related adverse events were low and similar to placebo for both doses. Zolmitriptan 2.5 mg twice and three-times daily also reduced the need for rescue medication and drug-related adverse events were similar for treatment and placebo in two small trials.³⁴

1+

A pilot open-label study which assessed frovatriptan versus transdermal oestrogens or naproxen found that the incidence of menstrual migraine was significantly lower when using frovatriptan than the other therapies.⁸² | 1+

- R **Frovatriptan** (2.5 mg twice daily) **should be considered as a prophylactic treatment in women with perimenstrual migraine from two days before until three days after bleeding starts.**
- R **Zolmitriptan** (2.5 mg three times daily) **or naratriptan** (2.5 mg twice daily) **can be considered as alternatives to frovatriptan as prophylactic treatment in women with perimenstrual migraine from two days before until three days after bleeding starts.**
- ✓ Women with menstrual-related migraine who are using triptans at other times of the month should be advised that additional perimenstrual prophylaxis increases the risk of developing medication overuse headache.

4.16.2 PROSTAGLANDIN INHIBITORS

While there is a small amount of evidence that mefenamic acid is effective for acute treatment of patients with menstrual migraine no trials on its use in perimenstrual prophylaxis were identified.⁸² | 1+

4.16.3 NON-STEROIDAL ANTI-INFLAMMATORY DRUGS

One RCT reported significant headache improvement with naproxen, reaching over 50% after three months, however there was little difference when compared to placebo.⁸² | 1+

4.16.4 OESTROGENS

One small crossover RCT (n=37) assessing perimenstrual oestradiol supplement, applied from the tenth day after the first day of peak fertility until the second full day of menstruation, reported a 22% reduction in migraine days but was followed by a rebound 40% increase in the five days following oestradiol.⁸² | 1+

4.16.5 HORMONAL PROPHYLAXIS

Three studies were identified on the use of combined oral contraception. All reported benefit in menstrual migraine prophylaxis, but were of insufficient quality to be conclusive.⁸² | 1+

5 Medication-overuse headache

Most medication-overuse headache is a complication of migraine.⁶ Frequent use of acute medications for the treatment of migraine increases the frequency and intensity of headache. The treatment becomes the cause rather than the cure and a vicious cycle of increased medication use and increasing headache ensues. In this group of patients withdrawing the overused medication can reduce the headache frequency and intensity again. Withdrawing overused medication is often associated with transient worsening of headache frequency and intensity and patients should be warned to expect this.

Risk factors for the development of MOH include frequent headache, frequent acute medication use, another painful condition and psychiatric comorbidity.⁶ Use of triptans, ergots, combination analgesics and/or opioids 10 or more days per month and simple analgesics 15 or more days per month is accepted to cause MOH (see Annex 2).⁵ Importantly, not all patients overusing acute treatments have MOH and some just have poorly-treated migraine.⁶

The best treatment for MOH is not clear. A range of small RCTs, non-comparative observational, and retrospective studies report that various strategies are effective in reducing MOH:

- abrupt withdrawal alone (either by simple advice or by a structured detoxification programme)⁸³⁻⁸⁶
- abrupt withdrawal with prophylaxis^{84,86-92}
- prophylaxis without withdrawal.⁹³⁻⁹⁶

1+
3

There is a lack of comparative studies to determine whether all patients should undergo acute medication withdrawal (either with simple advice or a detoxification programme) before starting preventative medication and whether preventative therapy should be started early or delayed until after the effect of completing withdrawal/detoxification is determined. The length of withdrawal period before starting preventative medication has not been clearly defined.

1+
2+
3

There is a lack of evidence regarding whether detoxification is best achieved in primary care, specialised (neurology) outpatient care or in-hospital care. A small open study did not find any differences in rates of complete drug withdrawal or headache frequency in patients attending as in- or outpatients, and recommended outpatient withdrawal in the first instance for patients with uncomplicated MOH.⁹⁷ Patients with complex MOH may benefit from multidisciplinary treatment programmes.⁸⁴ Results from an RCT of 137 patients with complicated MOH showed that inpatient withdrawal may be more effective than advice alone or an outpatient strategy.⁸⁶ Comorbidities may reduce the chance of successful withdrawal.⁹⁸

1++
1+
3

For prophylactic therapy, there is evidence to support the use of botulinum toxin A without the need for abrupt withdrawal of overused medication.⁹⁹⁻¹⁰¹ Botulinum toxin A is not, however, accepted for use by the SMC for this indication (see section 8.4). Small RCTs have also reported a reduction in headache days using topiramate or valproate.^{93,102} In a non-comparative observational study, patients who had previously not responded to prophylactic treatment responded to the previously ineffective treatment if reintroduced once medication overuse had been addressed.⁴⁴

1++

Two well-conducted, small RCTs comparing prednisolone with placebo and one comparing prednisolone with celecoxib found no difference in headache severity during the withdrawal period.¹⁰³⁻¹⁰⁵ Given that steroids are associated with side effects and there is no evidence of benefit, prednisolone should not be used routinely for the management of patients with MOH.

Naproxen is often used in clinical practice as a transitional treatment. No evidence was identified for this use in patients with MOH.

No studies were identified on the use of greater occipital nerve blocks, or combinations of triptans, analgesics, NSAIDs or opioids for the management of patients with MOH.

- R In patients overusing acute treatment, medication overuse should be addressed.
- R The choice of strategy to address medication overuse should be tailored to the individual patient and may be influenced by comorbidities. Strategies include:
 - abrupt withdrawal alone and preventative treatment may then be considered after a delay
 - abrupt withdrawal and immediately starting preventative treatment
 - starting a preventative treatment without withdrawal.
- ✓ Consider withdrawing regular opioids gradually.
- R Prednisolone should not be used routinely in the management of patients with medication-overuse headache.

6 Devices for migraine therapy

Devices may offer an alternative, or an addition, to pharmacological therapies, but few trials have been conducted on their efficacy and safety.^{106,107} A small number of trials are ongoing.

6.1 VAGUS NERVE STIMULATION

One small RCT on the safety and tolerability of non-invasive vagus nerve stimulation (VNS) for the prevention of migraine reported no safety issues and tolerability was comparable to sham treatment. The study was not sufficiently powered to determine efficacy.¹⁰⁸ No further RCTs were identified.

1+

6.2 TRANSCUTANEOUS SUPRAORBITAL NERVE STIMULATION

No RCTs were identified on the use of transcutaneous supraorbital nerve stimulation (TSNS) for patients with either acute or chronic migraine.

6.3 TRANSCRANIAL MAGNETIC STIMULATION

Only one RCT was identified in the use of transcranial magnetic stimulation (TMS) for the acute treatment of patients with migraine. Following treatment for one migraine, 39% of patients had a pain-free response at two hours compared to 22% of patients given sham treatment. There was a therapeutic gain of 17%.¹⁰⁹

1++

Two small RCTs reported conflicting results on the efficacy of TMS for migraine prevention. One trial reported benefit at one month, while another showed the sham treatment was superior after eight weeks.^{110,111} Further, larger trials are required.

1+

7 Provision of information

This section reflects the issues likely to be of most concern to patients and their carers. These points are provided for use by health professionals when discussing migraine with patients and carers and in guiding the production of locally-produced information materials.

7.1 PUBLICATIONS FROM SIGN

SIGN patient versions of guidelines are documents that 'translate' guideline recommendations and their rationales, originally developed for healthcare professionals, into a form that is more easily understood and used by patients and the public. They are intended to:

- help patients and carers understand what the latest evidence supports around diagnosis, treatment and self care
- empower patients to participate fully in decisions around management of their condition in discussion with healthcare professionals
- highlight for patients where there are areas of uncertainty.

A copy of the patient version of this guideline is available from www.sign.ac.uk/assets/pat155.pdf. Patients may also find the following booklet helpful: Managing chronic pain: a booklet for patients and carers. SIGN (2013) www.sign.ac.uk/assets/pat136.pdf

7.2 SOURCES OF FURTHER INFORMATION

Association of British Neurologists

www.abn.org

The Association of British Neurologists aims to promote excellent standards of care and champion high-quality education and world-class research in neurology.

The British Association for the Study of Headache

www.bash.org.uk

The British Association for the Study of Headache (BASH) is the United Kingdom national society member of the International Headache Society (IHS) and the European Headache Federation (EHF). It is open to all healthcare professionals with an interest in headache.

The Migraine Trust

52–53 Russell Square, London, WC1B 4HP

Tel: 020 7631 6970

www.migrainetrust.org • Email: www.migrainetrust.org/about-us/contact-us/contact-us

The Migraine Trust charity aims to improve the lives of people with migraine through research and education.

Migraine Action

4th Floor, 27 East Street, Leicester, LE1 6NB

Tel: 08456 011 033, 10:00am - 4:00pm, Monday to Friday. Calls cost 5p per minute plus the phone company's access charge.

www.migraine.org.uk • Email: info@migraine.org.uk

Migraine Action is a national advisory and support charity for people affected by migraine.

Toolkit on the risks of valproate medicines in female patients

www.gov.uk/government/publications/toolkit-on-the-risks-of-valproate-medicines-in-female-patients

This website provides guidance for healthcare professionals and patients on prescribing and dispensing valproate.

7.3

CHECKLIST FOR PROVISION OF INFORMATION TO PATIENTS

This section gives examples of the information patients/carers may find helpful at the key stages of the patient journey. The checklist was designed by members of the guideline development group based on their experience and their understanding of the evidence base. The checklist is neither exhaustive nor exclusive.

Initial consultation with GP	<ul style="list-style-type: none"> • Exclude a serious cause for headache by appropriate history and examination. • If time allows: <ul style="list-style-type: none"> ◦ Make a diagnosis if possible (remember the majority of patients with disabling headache will have migraine). ◦ Consider if the headache/migraine is episodic (<15 days a month) or chronic (>15 days a month). ◦ If a migraine diagnosis has been made, consider providing appropriate information leaflets or web addresses on migraine and its treatment, potential side effects and medication overuse headache (see section 7.1). ◦ Ask the patient to complete a migraine diary. The diary may include: <ul style="list-style-type: none"> ◦ all headaches and their severity ◦ medication taken ◦ menstruation ◦ normal activities missed. <p>Possible additional information:</p> <ul style="list-style-type: none"> ◦ food and drink ◦ sleep times ◦ exercise ◦ stressful days ◦ complementary therapies used. <p>Ask what medication and what doses the patient has tried so far. Consider acute and/or prophylactic treatment where appropriate.</p> <p>If appropriate, give the patient an explanation that they have a primary headache called migraine.</p>
First follow up with GP (after 2–8 weeks)	<ul style="list-style-type: none"> • Consolidate the first consultation which may involve repeating some of the initial consultation. • Find out what medication and what doses the patient has tried so far. • Consider the possibility of medication overuse and discuss the withdrawal of drugs where necessary. • Consider the impact the headaches have on the patient's work, education, family and social life. • Consider acute and/or prophylactic treatment where appropriate. • Give clear advice on timing of acute treatment. • Check that the patient has been given appropriate information leaflets or web addresses on migraine. • Look at any migraine diary they have completed and, if appropriate, ask them to continue it until the next review with any changes, if needed.

Follow-up review with GP (after 6–8 weeks)	<ul style="list-style-type: none"> Review the migraine diary for frequency and severity of headaches, medication and triggers for migraine. Discuss lifestyle improvements. If appropriate discuss the impact headaches have on education, job, family, social life and holidays. If appropriate discuss other factors, such as pre- and postpregnancy planning. Review current medication and any changes needed. Tell the patient that other treatments are available should they be needed but several drugs may need to be tried to find the best medication and other health problems need to be taken into account.
Further follow up reviews with GP	<ul style="list-style-type: none"> As above. Review of current medication should include dose, side effects and headache recurrence if it occurs after initial acute treatment. Consider whether referral to a hospital specialist is required, eg because of treatment failure or uncertain diagnosis.

8 Implementing the guideline

This section provides advice on the resource implications associated with implementing the key clinical recommendations, and advice on audit as a tool to aid implementation.

8.1 IMPLEMENTATION STRATEGY

Implementation of national clinical guidelines is the responsibility of each NHS board and is an essential part of clinical governance. Mechanisms should be in place to review care provided against the guideline recommendations. The reasons for any differences should be assessed and addressed where appropriate. Local arrangements should then be made to implement the national guideline in individual hospitals, units and practices.

Implementation of this guideline will be encouraged and supported by SIGN. The implementation strategy for this guideline encompasses the following tools and activities.

8.2 RESOURCE IMPLICATIONS OF KEY RECOMMENDATIONS

No recommendations are considered likely to reach the £5 million threshold which warrants full cost-impact analysis.

Botulinum toxin A injections require to be administered by appropriately trained personnel in hospital specialist centres. This may have implications for service delivery as well as for the patient. The decision to treat with botulinum toxin A may require additional consultation time and additional time and resource to administer the treatment.⁷⁰

8.3 AUDITING CURRENT PRACTICE

A first step in implementing a clinical practice guideline is to gain an understanding of current clinical practice. Audit tools designed around guideline recommendations can assist in this process. Audit tools should be comprehensive but not time consuming to use. Successful implementation and audit of guideline recommendations requires good communication between staff and multidisciplinary team working.

The guideline development group has identified the following as possible areas to audit to assist with the implementation of this guideline:

- GPs to review patients with migraine ordering on average 10 or more doses of triptan per month in their practice to identify patients who are not controlled or at risk of MOH
- An audit of the percentage of patients who have used three or more preventers prior to referral to a secondary headache unit.

8.4 ADVICE FOR NHSSCOTLAND FROM THE SCOTTISH MEDICINES CONSORTIUM

Sumatriptan succinate (Imigran Radis®) film-coated tablets are accepted for use within NHSScotland for acute relief of migraine attacks, with or without aura, provided there is a clear diagnosis of migraine (October 2004).

www.scottishmedicines.org.uk/SMC_Advice/Advice/Sumatriptan_succinate__Imigran_Radis__174__/Sumatriptan_succinate__Imigran_Radis__

Frovatriptan (Migard) is accepted for use within NHSScotland for treatment of the headache phase of migraine attacks with or without aura (February 2004).

www.scottishmedicines.org.uk/SMC_Advice/Advice/Frovatriptan__Migard__/Frovatriptan__Migard__

Topiramate (Topamax®) is accepted for restricted use within NHSScotland for the prophylaxis of migraine headache in adults. It should be restricted to patients who have not responded to prophylactic treatment with at least one other agent (August 2006).

www.scottishmedicines.org.uk/SMC_Advice/Advice/topiramate_25_50mg_tablets_25_50mg_sprinkle_capsules_Topamax/_topiramate_25_50mg_tablets_25_50mg_sprinkle_capsules_Topamax_

Advice regarding specialist prescribing has been superseded by the prescribing advice in the summary of product characteristics which no longer includes this requirement. www.medicines.org.uk/emc/medicine/6768

Botulinum toxin A (Botox[®]) is accepted for restricted use for the prophylaxis of headaches in adults with chronic migraine (headaches on at least 15 days per month of which at least 8 days are with migraine) whose condition has failed to respond to ≥3 prior oral prophylactic treatments, where medication overuse has been appropriately managed (February 2017).

www.scottishmedicines.org.uk/SMC_Advice/Advice/692_11_botulinum_toxin_type_a_BOTOX/botulinum_toxin_A_Botox_2nd_Resub

9 The evidence base

9.1 SYSTEMATIC LITERATURE REVIEW

The evidence base for this guideline was synthesised in accordance with SIGN methodology. A systematic review of the literature was carried out using an explicit search strategy devised by a SIGN Evidence and Information Scientist. Databases searched include Medline, Embase, Cinahl, PsycINFO and the Cochrane Library. The year range covered was 2011–2016. Internet searches were carried out on various websites including the US National Guidelines Clearinghouse. The main searches were supplemented by material identified by individual members of the development group. Each of the selected papers was evaluated by two Evidence and Information Scientists using standard SIGN methodological checklists before conclusions were considered as evidence by the guideline development group. The search strategies are available on the SIGN website, www.sign.ac.uk

9.1.1 LITERATURE SEARCH FOR PATIENT ISSUES

At the start of the guideline development process, a SIGN Evidence and Information Scientist conducted a literature search for qualitative and quantitative studies that addressed patient issues of relevance to patients with migraine. Databases searched include Medline, Embase, Cinahl and PsycINFO, and the results were summarised by the SIGN Patient Involvement Officer and presented to the guideline development group.

9.1.2 LITERATURE SEARCH FOR COST-EFFECTIVENESS EVIDENCE

The guideline development group identified key questions with potential cost-effectiveness implications, based on the following criteria, where it was judged particularly important to gain an understanding of the additional costs and benefits of different treatment strategies:

- treatments which may have a significant resource impact
- opportunities for significant disinvestment or resource release
- the potential need for significant service redesign
- cost-effectiveness evidence could aid implementation of a recommendation.

A systematic literature search for economic evidence for these questions was carried out by a SIGN Evidence and Information Scientist covering the years 2011–2016. Databases searched include Medline, Embase and NHS Economic Evaluation Database (NHS EED). Each of the selected papers was evaluated by a Health Economist, and considered for clinical relevance by guideline group members.

Interventions are considered to be cost effective if they fall below the commonly-accepted UK threshold of £20,000 per Quality-Adjusted Life Year (QALY).

9.2 RECOMMENDATIONS FOR RESEARCH

The guideline development group was not able to identify sufficient evidence to answer all of the key questions asked in this guideline (see Annex 1). The following areas for further research have been identified:

- RCTs to determine the efficacy of TCAs in patients with chronic and frequent episodic migraine. There is a need for longer duration trials with head-to-head comparisons with other preventative treatments. The optimum dose needs to be established. Comparisons of the side-effect profile and effectiveness of amitriptyline and nortriptyline are also needed.
- RCTs to determine the efficacy of lamotrigine in the prophylactic treatment of aura symptoms in migraine.
- Well-designed RCTs of pregabalin in patients with episodic and chronic migraine.
- RCTs to determine the role of levetiracetam in migraine prophylaxis, particularly because of its relative lack of adverse effects and lack of interactions with other drug therapies.
- RCTs comparing flunarizine with placebo, between drugs in this class, and with other pharmacological therapies for the prophylactic treatment of patients with migraine.

- RCTs comparing candesartan with placebo, between drugs in this class, and with other pharmacological therapies for the prophylactic treatment of patients with migraine.
- Studies into the optimum treatment regime and a clear GON protocol (ie inclusion of steroid, volume and site of injection).
- RCTs to determine the efficacy and safety of combination therapies for the prophylactic treatment of patients with chronic migraine.
- RCTs to determine the efficacy of continuous combined oral contraceptives for the prophylactic treatment of patients with perimenstrual migraine.
- RCTs directly comparing the three different strategies for treating patients with MOH; abrupt withdrawal alone, withdrawal with immediate prophylaxis, prophylaxis without withdrawal.
- RCTs on the use of NSAIDs as a transitional treatment for patients with MOH.
- RCTs to determine the efficacy of devices (VNS, TSNS, TMS) for acute therapy or the prophylactic treatment of patients with migraine.

9.3 REVIEW AND UPDATING

This guideline was issued in 2018 and will be considered for review in three years. The review history, and any updates to the guideline in the interim period, will be noted in the review report, which is available in the supporting material section for this guideline on the SIGN website: www.sign.ac.uk

Comments on new evidence that would update this guideline are welcome and should be sent to the SIGN Executive, Gyle Square, 1 South Gyle Crescent, Edinburgh, EH12 9EB (email: sign@sign.ac.uk).

10 Development of the guideline

10.1 INTRODUCTION

SIGN is a collaborative network of clinicians, other healthcare professionals and patient organisations and is part of Healthcare Improvement Scotland. SIGN guidelines are developed by multidisciplinary groups of practising healthcare professionals using a standard methodology based on a systematic review of the evidence. Further details about SIGN and the guideline development methodology are contained in 'SIGN 50: A Guideline Developer's Handbook' available at www.sign.ac.uk

This guideline was developed according to the 2015 edition of SIGN 50.

10.2 THE GUIDELINE DEVELOPMENT GROUP

Dr Callum Duncan (<i>Chair</i>)	<i>Consultant Neurologist, Aberdeen Royal Infirmary</i>
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Ms Arlene Coulson	<i>Neurology Specialist Clinical Pharmacist, NHS Tayside</i>
Mr Brian O'Toole	<i>Health Economist, Healthcare Improvement Scotland</i>
Dr Shona Scott	<i>Neurology Registrar, Western General Hospital, Edinburgh</i>
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Dr Sandeep Sharma	<i>General Practitioner, Bonnybank Medical Practice, Bonnybridge</i>
Dr Carolyn Sleith	<i>Evidence and Information Scientist, Healthcare Improvement Scotland</i>
Ms Ailsa Stein	<i>Programme Manager, SIGN</i>
Dr David PB Watson	<i>General Practitioner, Hamilton Medical Group, Aberdeen</i>
Ms Katrine West	<i>Patient Representative, Edinburgh</i>

The membership of the guideline development group was confirmed following consultation with the member organisations of SIGN. All members of the guideline development group made declarations of interest. A register of interests is available in the supporting material section for this guideline at www.sign.ac.uk

Guideline development and literature review expertise, support and facilitation were provided by the SIGN Executive and Healthcare Improvement Scotland staff. All members of the SIGN Executive make yearly declarations of interest. A register of interests is available on the contacts page of the SIGN website www.sign.ac.uk

Mr Euan Bremner	<i>Project Officer</i>
Ms Juliet Brown	<i>Evidence and Information Scientist, Healthcare Improvement Scotland</i>
Ms Karen Graham	<i>Patient and Public Involvement Adviser</i>
Ms Karen King	<i>Distribution and Office Co-ordinator</i>
Mr Stuart Neville	<i>Publications Designer</i>
Ms Gaynor Rattray	<i>Guideline Co-ordinator</i>

10.3 ACKNOWLEDGEMENTS

SIGN is grateful to the following former members of the guideline development group and others who have contributed to the development of the guideline.

Ms Catherine Gillies	<i>Headache Nurse Practitioner, Queen Elizabeth University Hospital, Glasgow</i>
Ms Jennifer Gray	<i>Specialist Clinical Pharmacist in Neurosurgery, Ninewells Hospital, Dundee</i>
Mr Conor McKay	<i>Patient Representative, Inverurie</i>

10.4 CONSULTATION AND PEER REVIEW

10.4.1 NATIONAL OPEN MEETING

A national open meeting is the main consultative phase of SIGN guideline development, at which the guideline development group presents its draft recommendations for the first time. The national open meeting for this guideline was held on 15 June 2017 and was attended by 45 representatives of the key specialties relevant to the guideline. The draft guideline was also available on the SIGN website for a limited period at this stage to allow those unable to attend the meeting to contribute to the development of the guideline.

10.4.2 SPECIALIST REVIEWERS

This guideline was reviewed in draft form by the following independent expert referees, who were asked to comment primarily on the comprehensiveness and accuracy of interpretation of the evidence base supporting the recommendations in the guideline. The guideline group addresses every comment made by an external reviewer, and must justify any disagreement with the reviewers' comments. A report of the peer review comments and responses is available in the supporting material section for this guideline on the SIGN website. All expert referees made declarations of interest and further details of these are available on request from the SIGN Executive.

SIGN is very grateful to all of these experts for their contribution to the guideline.

Dr Fayyaz Ahmed	<i>Consultant Neurologist and Honorary Senior Lecturer, Hull York Medical School</i>
Dr Anish Bahra	<i>Consultant Neurologist, National Hospital for Neurology and Neurosurgery, London</i>
Dr Anne Coker	<i>General Practitioner with a Special Interest in Headache, Dundee</i>
Dr Richard Davenport	<i>Consultant Neurologist, Western General Hospital, Edinburgh</i>
Dr Kay Kennis	<i>General Practitioner with a Special Interest in Headache, Bradford</i>
Dr David Kernick	<i>General Practitioner with a Special Interest in Headache, Exeter</i>
Professor Anne MacGregor	<i>Consultant Gynaecologist, The Royal London Hospital</i>
Dr Mireia Moragas Garrido	<i>Consultant Neurologist, Western General Hospital, Edinburgh</i>
Ms Lesley Murray	<i>Advanced Pharmacist for Neurology, NHS Greater Glasgow and Clyde</i>
Dr Richard Peatfield	<i>Consultant Neurologist, Charing Cross Hospital, London</i>
Dr Alok Tyagi	<i>Consultant Neurologist, Queen Elizabeth University Hospital, Glasgow</i>
Ms Rebecca Wicks	<i>Clinical Support Pharmacist, Right Medicine Pharmacy, Stirling</i>
Dr Ann Wilkinson	<i>Patient representative, Burton-on-Trent</i>

10.4.3 SIGN EDITORIAL GROUP

As a final quality-control check, the guideline is reviewed by an editorial group comprising the relevant specialty representatives on SIGN Council to ensure that the specialist reviewers' comments have been addressed adequately and that any risk of bias in the guideline development process as a whole has been minimised. The editorial group for this guideline was as follows:

Dr Jenny Bennison	<i>Royal College of General Practitioners</i>
Mr Gary Cook	<i>Royal Pharmaceutical Society</i>
Dr Roberta James	<i>SIGN Programme Lead; Co-Editor</i>
Professor John Kinsella	<i>Chair of SIGN; Co-Editor</i>
Ms Karen Macpherson	<i>Lead Health Services Researcher, Healthcare Improvement Scotland</i>
Dr David Stephens	<i>Royal College of General Practitioners</i>

All members of SIGN Council make yearly declarations of interest. A register of interests is available on the SIGN Council Membership page of the SIGN website www.sign.ac.uk

Abbreviations

CGRP	calcitonin gene-related peptide
CI	confidence interval
COC	combined oral contraception
FDA	Food and Drug Administration
GMC	General Medical Council
GON	greater occipital nerve
GP	general practitioner
ICER	incremental cost-effectiveness ratio
ICHD	International Classification of Headache Disorders
MA	marketing authorisation
MHRA	Medicines and Healthcare products Regulatory Agency
MOH	medication-overuse headache
MRM	menstrually-related migraine
NICE	National Institute for Health and Care Excellence
NNT	number needed to treat
NRS	numerical rating score
NSAID	Non-steroidal anti-inflammatory drug
OR	odds ratio
PREEMPT	Phase III REsearch Evaluating Migraine Prophylaxis Therapy
QALY	quality-adjusted life year
RCT	randomised controlled trial
RR	relative risk
SIGN	Scottish Intercollegiate Guidelines Network
SMC	Scottish Medicines Consortium
SMD	standardised mean difference
SNRI	serotonin norepinephrine reuptake inhibitor
SSRI	selective serotonin reuptake inhibitor
TCA	tricyclic antidepressant
TMS	transcranial magnetic stimulation
TSNS	transcutaneous supraorbital nerve stimulation
UK	United Kingdom
VNS	vagus nerve stimulation

Annex 1

Key questions used to develop the guideline

This guideline is based on a series of structured key questions that define the target population, the intervention, diagnostic test, or exposure under investigation, the comparison(s) used and the outcomes used to measure efficacy, effectiveness, or risk. These questions form the basis of the systematic literature search.

Guideline section	Key question
3	<p>1. What is the clinical and cost effectiveness of abortive treatments for adults with acute migraine?</p> <ul style="list-style-type: none"> a. Triptans b. Aspirin c. Non-steroidal anti-inflammatory drugs (NSAIDs) (high dose aspirin, ibuprofen, naproxen) d. Combinations of triptans and NSAIDs or aspirin and paracetamol e. Antiemetics (prochlorperazine, domperidone, metoclopramide) f. Steroids (prednisolone, methylprednisolone, dexamethasone) g. Paracetamol (acetaminophen) <p>Comparison: placebo, other pharmacological therapies, device therapies</p> <p>Outcomes: pain free, pain free within two hours, sustained pain relief at 24 hours, adverse effects, QALYs, ICER</p> <p>Consider comorbidities: chronic pain, fibromyalgia, depression, prepregnancy, pregnancy, menopause, contraception, cardiovascular risk, hypertension stroke/cerebrovascular risk.</p>
6	<p>2. What is the clinical and cost effectiveness of treatment with devices for adults with acute migraine?</p> <ul style="list-style-type: none"> a. Gamma core (vagal nerve stimulation) b. Cefaly (transcutaneous supraorbital nerve stimulation) c. Transcutaneous/transcranial magnetic stimulation <p>Comparison: placebo, other devices, pharmacological treatment</p> <p>Outcomes: pain free within two hours, adverse effects, QALYs, ICER</p> <p>Consider comorbidities: chronic pain, fibromyalgia, depression, prepregnancy, pregnancy, menopause, contraception, cardiovascular risk, hypertension stroke/cerebrovascular risk.</p>

4	<p>3. What is the clinical and cost effectiveness of preventative treatment for adults with episodic or chronic migraine?</p> <ul style="list-style-type: none"> a. Beta blockers (atenolol, metoprolol, propranolol, bisoprolol, timolol, nadolol) b. Tricyclic antidepressants (amitriptyline, nortriptyline, dosulepin) c. Serotonin norepinephrine reuptake inhibitors (duloxetine, venlafaxine) d. Antiepileptics (topiramate, valproate, zonisamide, pregabalin, levitiracetam, gabapentin) e. Pizotifen f. Calcium channel blockers (flunarizine, verapamil) g. Angiotensin-II receptor blockers (candesartan) h. Angiotensin-converting enzyme inhibitors (lisinopril, ramipril) i. Calcitonin gene related peptide antagonists j. Occipital nerve block k. Botulinum toxin A l. Perimenstrual prophylaxis (oestrogen gel, prostaglandin inhibitors: naproxen, mefenamic acid, frovatriptan, naratriptan, zolmitriptan) <p>Comparison: placebo, other pharmacological therapies, device therapies</p> <p>Outcomes: 30% or 50% reduction in number of headache days per cycle, reduction in number of migraine episodes, days or headache days, reduction in migraine disability assessment questionnaire (MIDAS, HIT6) scores, adverse effects, QALYs, ICER</p> <p>Consider comorbidities: chronic pain, fibromyalgia, depression, prepregnancy, pregnancy, menopause, contraception, cardiovascular risk, hypertension stroke/cerebrovascular risk.</p>
6	<p>4. What is the clinical and cost effectiveness of preventative treatment with devices for adults with episodic or chronic migraine?</p> <ul style="list-style-type: none"> a. Gamma core (vagal nerve stimulation) b. Cefaly (transcutaneous supraorbital nerve stimulation) c. Transcutaneous magnetic stimulation <p>Comparison: placebo or usual care, other devices, pharmacological treatment</p> <p>Outcomes: 30% or 50% reduction in number of headache days per cycle, reduction in number of migraine episodes, days or headache days, reduction in migraine disability assessment questionnaire (MIDAS, HIT6) scores, adverse effects, QALYs, ICER</p> <p>Consider comorbidities: chronic pain, fibromyalgia, depression, prepregnancy, pregnancy, menopause, contraception, cardiovascular risk, hypertension, stroke/cerebrovascular risk.</p>
5	<p>5. What strategies are effective in the management of adults with medication overuse headache?</p> <ul style="list-style-type: none"> a. Stopping b. Stopping and prevention c. Prevention d. Adjunctive therapy: steroids, naproxen e. Greater occipital nerve (GON) blocks f. Combinations of triptans, analgesics, NSAIDS, opioids <p>Comparison: other strategies</p> <p>Outcomes: 30% or 50% reduction in number of headache days per cycle, reduction in number of migraine episodes, days or headache days, reduction in migraine disability assessment questionnaire (MIDAS, HIT6) scores, adverse effects, QALYs, ICER</p> <p>Consider comorbidities: chronic pain, fibromyalgia, depression, prepregnancy, pregnancy, menopause, contraception, cardiovascular risk, hypertension, stroke/cerebrovascular risk.</p>

Annex 2

Diagnostic criteria

International Classification of Headache Disorders, 3rd edition (beta version)⁵

1 Migraine

1.1 Migraine without aura

Description:

Recurrent headache disorder manifesting in attacks lasting 4–72 hours. Typical characteristics of the headache are unilateral location, pulsating quality, moderate or severe intensity, aggravation by routine physical activity and association with nausea and/or photophobia and phonophobia.

Diagnostic criteria:

- A. At least five attacks fulfilling criteria B–D
- B. Headache attacks lasting 4–72 hr (untreated or unsuccessfully treated)
- C. Headache has at least two of the following four characteristics:
 - 1. unilateral location
 - 2. pulsating quality
 - 3. moderate or severe pain intensity
 - 4. aggravation by or causing avoidance of routine physical activity (eg walking or climbing stairs)
- D. During headache at least one of the following:
 - 1. nausea and/or vomiting
 - 2. photophobia and phonophobia
- E. Not better accounted for by another ICHD-3 diagnosis.

1.2 Migraine with aura

Description:

Recurrent attacks, lasting minutes, of unilateral fully-reversible visual, sensory or other central nervous system symptoms that usually develop gradually and are usually followed by headache and associated migraine symptoms.

Diagnostic criteria:

- A. At least two attacks fulfilling criteria B and C
- B. One or more of the following fully reversible aura symptoms:
 - 1. visual
 - 2. sensory
 - 3. speech and/or language
 - 4. motor
 - 5. brainstem
 - 6. retinal
- C. At least two of the following four characteristics:
 - 1. at least one aura symptom spreads gradually over ≥5 min, and/or two or more symptoms occur in succession
 - 2. each individual aura symptom lasts 5–60 min
 - 3. at least one aura symptom is unilateral
 - 4. the aura is accompanied, or followed within 60 min, by headache
- D. Not better accounted for by another ICHD-3 diagnosis, and transient ischaemic attack has been excluded.

1.3 Chronic migraine

Description: Headache occurring on 15 or more days per month for more than 3 months, which has the features of migraine headache on at least 8 days per month.

Diagnostic criteria:

A. Headache (tension-type-like and/or migraine-like) on 15 days per month for >3 months and fulfilling criteria B and C

B. Occurring in a patient who has had at least five attacks fulfilling criteria B-D for 1.1 Migraine without aura and/or criteria B and C for 1.2 Migraine with aura

C. On 8 days per month for >3 months, fulfilling any of the following:

1. criteria C and D for 1.1 Migraine without aura

2. criteria B and C for 1.2 Migraine with aura

3. believed by the patient to be migraine at onset and relieved by a triptan or ergot derivative

D. Not better accounted for by another ICHD-3 diagnosis.

1.4.1 Status migrainosus

Description: A debilitating migraine attack lasting for more than 72 hours.

Diagnostic criteria:

A. A headache attack fulfilling criteria B and C

B. Occurring in a patient with 1.1 Migraine without aura and/or 1.2 Migraine with aura, and typical of previous attacks except for its duration and severity

C. Both of the following characteristics: 1. unrelenting for >72 hours, 2. pain and/or associated symptoms are debilitating

D. Not better accounted for by another ICHD-3 diagnosis.

8.2 Medication-overuse headache

Description: Headache occurring on 15 or more days per month developing as a consequence of regular overuse of acute or symptomatic headache medication (on 10 or more, or 15 or more days per month, depending on the medication) for more than 3 months. It usually, but not invariably, resolves after the overuse is stopped.

General comment: In the criteria set out below for the various subtypes, the specified numbers of days of medication use considered to constitute overuse are based on expert opinion rather than on formal evidence.

Diagnostic criteria:

A. Headache occurring on 15 days per month in a patient with a pre-existing headache disorder

B. Regular overuse for >3 months of one or more drugs that can be taken for acute and/or symptomatic treatment of headache:

1. Triptans, ergots, opioids, combination analgesics or multiple drug classes - regular intake of one or more triptans, in any formulation, on 10 days per month for >3 months

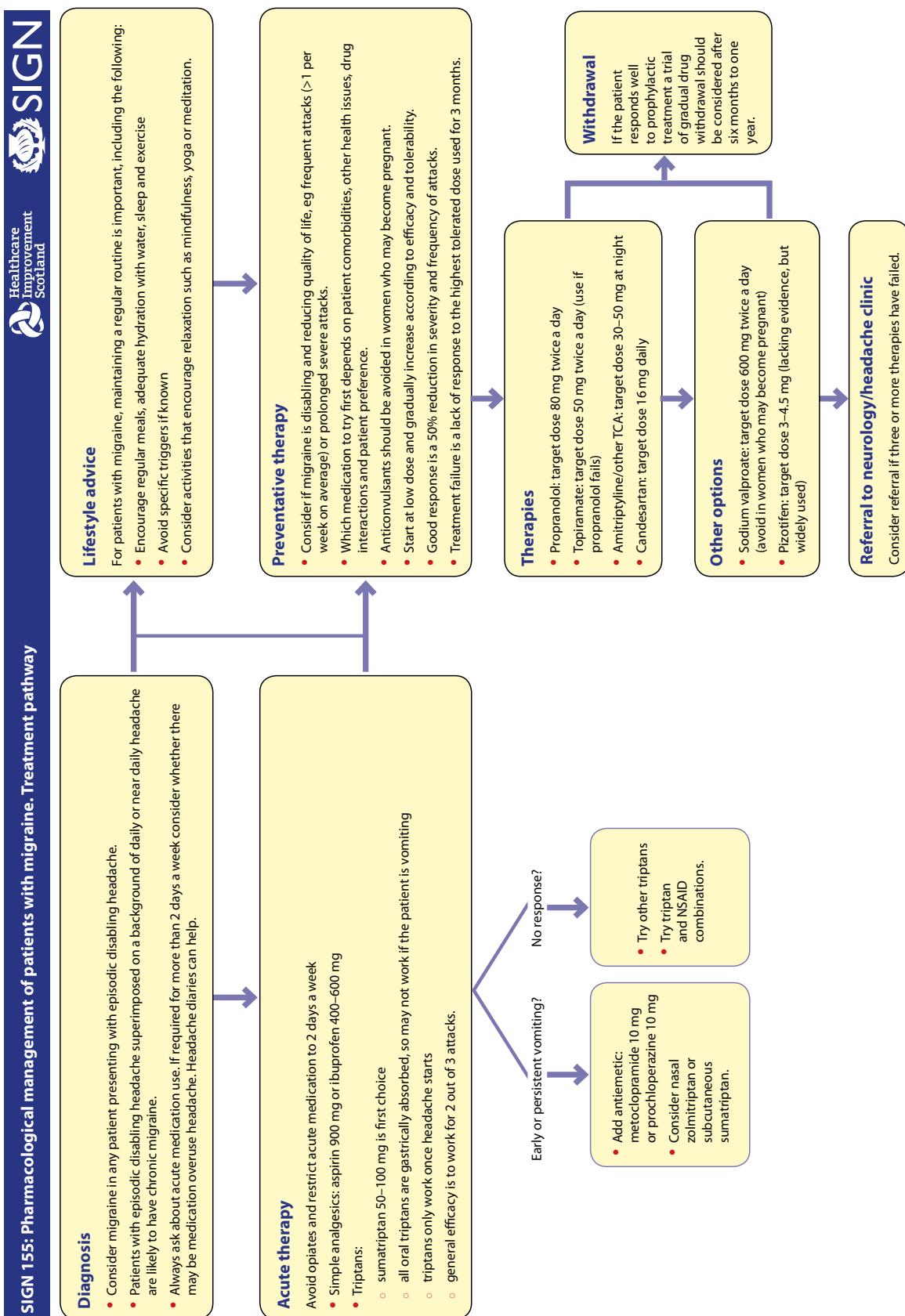
2. Simple analgesics - regular intake of one or more triptans, in any formulation, on 15 days per month for >3 months

C. Not better accounted for by another ICHD-3 diagnosis.

Annex 3

Treatment pathway

This pathway is drawn from evidence identified in the guideline, the British National Formulary¹⁷ and the clinical experience of the guideline development group.



Annex 4

Valproate patient card and checklist^{112,113}

Key Facts – Valproate▼ and Pregnancy

Name:

Date:

- Valproate is an effective medicine used to treat epilepsy and bipolar disorder.
- Valproate can seriously harm an unborn child when taken during pregnancy and should not be taken by women and girls unless nothing else works.
- When taking valproate always use reliable contraception so you do not have an unplanned pregnancy.

▼ This medicine is subject to additional monitoring. This will allow quick identification of new safety information. You can help by reporting any side effects you may get. See www.mhra.gov.uk/yellowcard for how to report side effects.

What you must do

- Speak to your doctor if you are thinking about having a baby, and do not stop using contraception until you have done so.
- Tell your doctor at once if you think you may be pregnant or know you are pregnant.
- Never stop taking valproate unless your doctor tells you to as your condition may become worse.



Keep this card safe so you always know what to do.

Treatment with valproate for female patients: Checklist for patients and prescribers

A. Checklist for Prescribers

Name of Patient /carer		
I confirm that the above named patient does not respond adequately or tolerate other treatments or medical treatments and requires valproate		

I have discussed with the above named Patient/carer:

The overall risks of an approximately 10% chance of birth defects and up to 30-40% chance of a wide range of early developmental problems that can lead to significant learning difficulties in children exposed to treatment with valproate during pregnancy.	<input type="checkbox"/>
Individual risk can be minimised by use of the lowest possible effective dose	<input type="checkbox"/>
The need for contraception (if child bearing age)	<input type="checkbox"/>
The need for regular review of the need for treatment	<input type="checkbox"/>
The need for urgent review if the patient is planning a pregnancy	<input type="checkbox"/>
I have given the patient/carer a copy of the patient information booklet	<input type="checkbox"/>

Name of Prescriber _____ **Date** _____

B. Patient /Carer Checklist

I understand		
Why treatment with valproate rather than another medicine is considered necessary for me	<input type="checkbox"/>	
The risks of an approximately 10% chance of birth defects and up to 30-40% chance of a wide range of early developmental problems that can lead to significant learning difficulties in children exposed to treatment with valproate during pregnancy.	<input type="checkbox"/>	
That I am advised to use contraception if not planning a pregnancy	<input type="checkbox"/>	
That my treatment should be reviewed regularly	<input type="checkbox"/>	
That I should request an urgent review if planning a pregnancy PRIOR to attempting to conceive	<input type="checkbox"/>	

Name of Patient/ Carer _____ **Date** _____

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