

# Age-related macular degeneration

NICE guideline

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## Your responsibility

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

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This guideline replaces TA68.

## Overview

This guideline covers diagnosing and managing age-related macular degeneration (AMD) in adults. It aims to improve the speed at which people are diagnosed and treated to prevent loss of sight.

### *Who is it for?*

- Healthcare professionals in primary and secondary care
- Social care professionals
- Commissioners and providers of ophthalmic and optometric services
- People with age-related macular degeneration, their families and carers

## Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in [your care](#).

[Making decisions using NICE guidelines](#) explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

### 1.1 *Classifying age-related macular degeneration*

1.1.1 Classify age-related macular degeneration (AMD) using table 1.

**Table 1** Age-related macular degeneration classification

AMD classification	Definition
Normal eyes	<ul style="list-style-type: none"> <li>• No signs of age-related macular degeneration (AMD)</li> <li>• Small ('hard') drusen (less than 63 micrometres) only</li> </ul>

<p>Early AMD</p>	<ul style="list-style-type: none"> <li>• Low risk of progression:             <ul style="list-style-type: none"> <li>– medium drusen (63 micrometres or more and less than 125 micrometres) or</li> <li>– pigmentary abnormalities</li> </ul> </li> <li>• Medium risk of progression:             <ul style="list-style-type: none"> <li>– large drusen (125 micrometres or more) or</li> <li>– reticular drusen or</li> <li>– medium drusen with pigmentary abnormalities</li> </ul> </li> <li>• High risk of progression:             <ul style="list-style-type: none"> <li>– large drusen (125 micrometres or more) with pigmentary abnormalities or</li> <li>– reticular drusen with pigmentary abnormalities or</li> <li>– vitelliform lesion without significant visual loss (best-corrected acuity better than 6/18) or</li> <li>– atrophy smaller than 175 micrometres and not involving the fovea</li> </ul> </li> </ul>
<p>Late AMD (indeterminate)</p>	<ul style="list-style-type: none"> <li>• Retinal pigment epithelial (RPE) degeneration and dysfunction (presence of degenerative AMD changes with subretinal or intraretinal fluid in the absence of neovascularisation)</li> <li>• Serous pigment epithelial detachment (PED) without neovascularisation</li> </ul>
<p>Late AMD (wet active)</p>	<ul style="list-style-type: none"> <li>• Classic choroidal neovascularisation (CNV)</li> <li>• Occult (fibrovascular PED and serous PED with neovascularisation)</li> <li>• Mixed (predominantly or minimally classic CNV with occult CNV)</li> <li>• Retinal angiomatous proliferation (RAP)</li> <li>• Polypoidal choroidal vasculopathy (PCV)</li> </ul>

Late AMD (dry)	<ul style="list-style-type: none"> <li>• Geographic atrophy (in the absence of neovascular AMD)</li> <li>• Significant visual loss (6/18 or worse) associated with: <ul style="list-style-type: none"> <li>- dense or confluent drusen or</li> <li>- advanced pigmentary changes and/or atrophy or</li> <li>- vitelliform lesion</li> </ul> </li> </ul>
Late AMD (wet inactive)	<ul style="list-style-type: none"> <li>• Fibrous scar</li> <li>• Sub-foveal atrophy or fibrosis secondary to an RPE tear</li> <li>• Atrophy (absence or thinning of RPE and/or retina)</li> <li>• Cystic degeneration (persistent intraretinal fluid or tubulations unresponsive to treatment)</li> </ul> <p>NB Eyes may still develop or have a recurrence of late AMD (wet active)</p>

1.1.2 Do not refer to late AMD (wet inactive) as 'dry AMD'.

## 1.2 *Information and support*

1.2.1 Provide people with AMD, and their family members or carers (as appropriate), with information that is:

- available on an ongoing basis
- relevant to the stage of the person's condition
- tailored to the person's needs
- delivered in a caring and sensitive fashion.

Be aware of the obligation to provide accessible information as detailed in the NHS [Accessible Information Standard](#). For more guidance on providing information to people and discussing their preferences with them, see the NICE guideline on [patient experience in adult NHS services](#).

1.2.2 Provide opportunities to discuss AMD with the person. Topics to cover should include:

- what AMD is and how common it is
- types of AMD
- causes of AMD
- stopping smoking and other lifestyle advice
- how AMD may progress and possible complications
- the possibility of developing visual hallucinations associated with retinal dysfunction (Charles Bonnet syndrome)
- vision standards for driving
- tests and investigations
- treatment options, including possible benefits and risks
- who to contact for practical and emotional support
- where the person's appointments will take place
- which healthcare professionals will be responsible for the person's care
- expected wait times for consultations, investigations and treatments
- the benefits and entitlements available through certification and registration when sight impaired or severely sight impaired
- when, where and how to seek help with vision changes (see [section 1.7](#))
- signposting to other sources of information and support.

1.2.3 Provide information in accessible formats for people with AMD to take away at their first appointment, and then whenever they ask for it (see recommendation 1.2.1). The information should cover the following:

- information about AMD and treatment pathways, including likely timescales
- key contact details – for example, who to contact if appointments need to be altered



- advice about what to do and where to go if vision deteriorates
- available support (including transport and parking permits)
- links to local and national support groups.

1.2.4 Allow enough time to discuss the person's concerns and questions about their diagnosis, treatment and prospects for their vision. Assess the person's priorities when making management decisions.

1.2.5 Promote peer support for people with AMD, particularly for people who are beginning intravitreal injections, who may be reassured by discussion with someone who has previously had the same treatment.

### 1.3 *Risk factors*

1.3.1 If you suspect AMD, recognise that the following risk factors make it more likely that the person has AMD:

- older age
- presence of AMD in the other eye
- family history of AMD
- smoking
- hypertension
- BMI of 30 kg/m<sup>2</sup> or higher
- diet low in omega 3 and 6, vitamins, carotenoid and minerals
- diet high in fat
- lack of exercise.

### 1.4 *Diagnosis and referral*

1.4.1 Offer fundus examination as part of the ocular examination to people presenting with changes in vision (including micropsia and metamorphopsia) or visual disturbances.

## Early AMD

- 1.4.2 Confirm a diagnosis of early AMD using slit-lamp biomicroscopic fundus examination alone.
- 1.4.3 Do not refer people with asymptomatic early AMD to hospital eye services for further diagnostic tests.

## Late AMD (dry)

- 1.4.4 Confirm a diagnosis of late AMD (dry) using slit-lamp biomicroscopic fundus examination.
- 1.4.5 Refer people with late AMD (dry) to hospital eye services only:
- for certification of sight impairment or
  - if this is how people access low-vision services in the local pathway (see recommendation 1.6.5) or
  - if they develop new visual symptoms that may suggest late AMD (wet active) or
  - if it would help them to participate in research into new treatments for late AMD (dry).

## Late AMD (wet active)

- 1.4.6 Make an urgent referral for people with suspected late AMD (wet active) to a macula service, whether or not they report any visual impairment. The referral should normally be made within 1 working day but does not need emergency referral.
- 1.4.7 Offer optical coherence tomography (OCT) to people with suspected late AMD (wet active).
- 1.4.8 Do not offer fundus fluorescein angiography (FFA) to people with suspected late AMD (wet active) if clinical examination and OCT exclude neovascularisation.
- 1.4.9 Offer FFA to people with suspected late AMD (wet active) to confirm the diagnosis if OCT does not exclude neovascular disease.

- 1.4.10 For eyes with confirmed late AMD (wet active) for which antiangiogenic treatment is recommended (see section 1.5), offer treatment as soon as possible (within 14 days of referral to the macular service).

## Referral pathway

- 1.4.11 Commissioners and providers should agree a clear local pathway for people with AMD, which should cover:
- referral from primary to secondary care, with direct referral preferred
  - discharge from secondary to primary care, covering ongoing management and re-referral when necessary.

## 1.5 Pharmacological management of AMD

### Antiangiogenic therapies

- 1.5.1 Offer intravitreal anti-vascular endothelial growth factor (VEGF) treatment<sup>[1]</sup> for late AMD (wet active) for eyes with visual acuity within the range specified in recommendation 1.5.6.
- 1.5.2 Be aware that no clinically significant differences in effectiveness and safety between the different anti-VEGF treatments<sup>[2]</sup> have been seen in the trials considered by the guideline committee.
- 1.5.3 In eyes with visual acuity of 6/96 or worse, consider anti-VEGF treatment for late AMD (wet active) only if a benefit in the person's overall visual function is expected (for example, if the affected eye is the person's better-seeing eye).
- 1.5.4 Be aware that anti-VEGF treatment for eyes with late AMD (wet active) and visual acuity better than 6/12 is clinically effective and may be cost effective depending on the regimen used<sup>[1],[2]</sup>.
- 1.5.5 Ensure intraocular injections are given by suitably trained healthcare professionals, for example:
- medical specialists, such as ophthalmologists

- nurse practitioners, optometrists and technicians with experience in giving intraocular injections.

If the injection is delivered by someone who is not medically qualified, ensure that cover is in place to manage any ophthalmological or medical complications.

1.5.6 Ranibizumab, within its marketing authorisation, is recommended as an option for the treatment of wet age-related macular degeneration if:

- all of the following circumstances apply in the eye to be treated:
  - the best-corrected visual acuity is between 6/12 and 6/96
  - there is no permanent structural damage to the central fovea
  - the lesion size is less than or equal to 12 disc areas in greatest linear dimension
  - there is evidence of recent presumed disease progression (blood vessel growth, as indicated by fluorescein angiography, or recent visual acuity changes)

and

- the manufacturer provides ranibizumab with the discount agreed in the patient access scheme (as revised in 2012). [This recommendation is from [ranibizumab and pegaptanib for the treatment of age-related macular degeneration](#) (NICE technology appraisal guidance 155).]

1.5.7 Pegaptanib is not recommended for the treatment of wet age-related macular degeneration. [This recommendation is from [ranibizumab and pegaptanib for the treatment of age-related macular degeneration](#) (NICE technology appraisal guidance 155).]

1.5.8 People who are currently receiving pegaptanib for any lesion type should have the option to continue therapy until they and their clinicians consider it appropriate to stop. [This recommendation is from [ranibizumab and pegaptanib for the treatment of age-related macular degeneration](#) (NICE technology appraisal guidance 155).]

1.5.9 Aflibercept solution for injection is recommended as an option for treating wet age-related macular degeneration only if:

- it is used in accordance with the recommendations for ranibizumab in [NICE technology appraisal guidance 155](#) [re-issued in May 2012 (see recommendation 1.5.6)] and
- the manufacturer provides aflibercept solution for injection with the discount agreed in the patient access scheme. [This recommendation is adapted from [aflibercept solution for injection for treating wet age-related macular degeneration](#) (NICE technology appraisal guidance 294).]

1.5.10 People currently receiving aflibercept solution for injection whose disease does not meet the criteria in recommendation 1.5.9 should be able to continue treatment until they and their clinician consider it appropriate to stop. [This recommendation is from [aflibercept solution for injection for treating wet age-related macular degeneration](#) (NICE technology appraisal guidance 294).]

1.5.11 Do not offer photodynamic therapy alone for late AMD (wet active).

### Adjunctive therapies

1.5.12 Do not offer photodynamic therapy as an adjunct to anti-VEGF as first-line treatment for late AMD (wet active).

1.5.13 Only offer photodynamic therapy as an adjunct to anti-VEGF as second-line treatment for late AMD (wet active) in the context of a randomised controlled trial.

1.5.14 Do not offer intravitreal corticosteroids as an adjunct to anti-VEGF for late AMD (wet active).

### Switching and stopping antiangiogenic treatment for late AMD (wet)

1.5.15 Consider switching anti-VEGF treatment for people with late AMD (wet active) if there are practical reasons for doing so (for example, if a different medicine can be given in a regimen the person prefers), but be aware that clinical benefits are likely to be limited.

1.5.16 Consider observation without giving anti-VEGF treatment if the disease appears stable (in this event, see section 1.7 for recommendations on [monitoring and self-monitoring](#)).

- 1.5.17 Consider stopping anti-VEGF treatment if the eye develops severe, progressive loss of visual acuity despite treatment as recommended in 1.5.1–1.5.11.
- 1.5.18 Stop anti-VEGF treatment if the eye develops late AMD (wet inactive) with no prospect of functional improvement.
- 1.5.19 Ensure that patients are actively involved in all decisions about the stopping or switching of treatment (see section 1.2 on [information and support](#)).

## 1.6 *Non-pharmacological management of AMD*

### Strategies to slow the progression of AMD

- 1.6.1 Do not offer thermal laser therapy (for example, argon, diode) for treating drusen in people with early AMD.

### Supporting people with AMD and visual impairment

- 1.6.2 Be aware that people with AMD are at an increased risk of depression. Identify and manage the depression according to the NICE guideline on [depression in adults with a chronic physical health problem](#).
- 1.6.3 Be aware that many people with AMD have other significant comorbidities. For guidance on optimising care for adults with multiple long-term conditions, see the NICE guideline on [multimorbidity](#).
- 1.6.4 Offer certification of visual impairment to all people with AMD as soon as they become eligible, even if they are still receiving active treatment.
- 1.6.5 Consider referring people with AMD causing visual impairment to low-vision services.
- 1.6.6 Consider a group-based rehabilitation programme in addition to a low-vision service to promote independent living for people with AMD.
- 1.6.7 Consider eccentric viewing training for people with central vision loss in both eyes.

## 1.7 *Monitoring AMD*

- 1.7.1 Do not routinely monitor people with early AMD or late AMD (dry) through hospital eye services.
- 1.7.2 Advise people with late AMD (dry), or people with AMD who have been discharged from hospital eye services to:
- self-monitor their AMD
  - consult their eye-care professional as soon as possible if their vision changes (see recommendation 1.7.5)
  - continue to attend routine sight-tests with their community optometrist.
- 1.7.3 For people being monitored for late AMD (wet inactive), review both eyes at their monitoring appointments.

### Self-monitoring

- 1.7.4 Discuss self-monitoring with people with AMD, and explain the strategies available.
- 1.7.5 Advise people with AMD to report any new symptoms or changes in the following to their eye-care professional as soon as possible:
- blurred or grey patch in their vision
  - straight lines appearing distorted
  - objects appearing smaller than normal.
- 1.7.6 Encourage and support people with AMD who may lack confidence to self-monitor their symptoms.
- 1.7.7 If people are not able to self-manage their AMD, discuss AMD monitoring techniques with their family members or carers (as appropriate).

## Monitoring for late AMD (wet active)

- 1.7.8 Offer people with late AMD (wet active) ongoing monitoring with OCT for both eyes.
- 1.7.9 Offer fundus examination or colour photography if OCT appearances are stable, but:
- there is a decline in visual acuity or
  - the person reports a decline in visual function.
- 1.7.10 Consider FFA to identify unrecognised neovascularisation if OCT appearances are stable, but:
- there is a decline in visual acuity or
  - the person reports a decline in visual function.
- 1.7.11 If OCT results suggest macular abnormalities but the abnormalities are not responding to treatment, think about:
- using alternative imaging
  - alternative diagnoses.

## *Terms used in this guideline*

### Low vision

People with low vision have visual impairments that cause restriction in their everyday lives and that cannot be corrected by surgery, medicine, or glasses or contact lenses. This definition includes, but is not limited to, those who are registered as sight impaired or severely sight impaired. It can include blurred vision, blind spots or tunnel vision. A **low-vision service** provides a range of services for people with low vision to enable them to make use of their eyesight to achieve maximum potential.

### Hospital eye services

Services set in secondary care providing diagnosis or treatment of the eye or vision-related conditions.



<sup>[1]</sup> At the time of publication (January 2018), bevacizumab did not have a UK marketing authorisation for, and is considered by the Medicines and Healthcare products Regulatory Agency (MHRA) to be an unlicensed medication in, this indication. The prescriber should follow relevant professional guidance, taking full responsibility for the prescribing decision. Informed consent would need to be obtained and documented. See the General Medical Council's [Prescribing guidance: prescribing unlicensed medicines](#), and the MHRA's guidance on the [Supply of unlicensed medicinal products \(specials\)](#), for further information. The guideline may inform any decision on the use of bevacizumab outside its UK marketing authorisation but does not amount to an approval of or a recommendation for such use.

<sup>[2]</sup> Given the guideline committee's view that there is equivalent clinical effectiveness and safety of different anti-VEGF agents (aflibercept, bevacizumab and ranibizumab), comparable regimens will be more cost effective if the agent has lower net acquisition, administration and monitoring costs.

## Putting this guideline into practice

NICE has produced [tools and resources](#) to help you put this guideline into practice.

Putting recommendations into practice can take time. How long may vary from guideline to guideline, and depends on how much change in practice or services is needed. Implementing change is most effective when aligned with local priorities.

Changes recommended for clinical practice that can be done quickly – like changes in prescribing practice – should be shared quickly. This is because healthcare professionals should use guidelines to guide their work – as is required by professional regulating bodies such as the General Medical and Nursing and Midwifery Councils.

Changes should be implemented as soon as possible, unless there is a good reason for not doing so (for example, if it would be better value for money if a package of recommendations were all implemented at once).

Different organisations may need different approaches to implementation, depending on their size and function. Sometimes individual practitioners may be able to respond to recommendations to improve their practice more quickly than large organisations.

Here are some pointers to help organisations put NICE guidelines into practice:

- 1. Raise awareness** through routine communication channels, such as email or newsletters, regular meetings, internal staff briefings and other communications with all relevant partner organisations. Identify things staff can include in their own practice straight away.
- 2. Identify a lead** with an interest in the topic to champion the guideline and motivate others to support its use and make service changes, and to find out any significant issues locally.
- 3. Carry out a baseline assessment** against the recommendations to find out whether there are gaps in current service provision.
- 4. Think about what data you need to measure improvement** and plan how you will collect it. You may want to work with other health and social care organisations and specialist groups to compare current practice with the recommendations. This may also help identify local issues that will slow or prevent implementation.

5. **Develop an action plan**, with the steps needed to put the guideline into practice, and make sure it is ready as soon as possible. Big, complex changes may take longer to implement, but some may be quick and easy to do. An action plan will help in both cases.

6. For **very big changes** include milestones and a business case, which will set out additional costs, savings and possible areas for disinvestment. A small project group could develop the action plan. The group might include the guideline champion, a senior organisational sponsor, staff involved in the associated services, finance and information professionals.

7. **Implement the action plan** with oversight from the lead and the project group. Big projects may also need project management support.

8. **Review and monitor** how well the guideline is being implemented through the project group. Share progress with those involved in making improvements, as well as relevant boards and local partners.

NICE provides a comprehensive programme of support and resources to maximise uptake and use of evidence and guidance. See our [into practice](#) pages for more information.

Also see Leng G, Moore V, Abraham S, editors (2014) [Achieving high quality care – practical experience from NICE](#). Chichester: Wiley.

## Context

Age-related macular degeneration (AMD) is the term given to ageing changes without any other obvious cause that occurs in the central area of the retina (macula), sometimes with new blood vessel formation (wet AMD). It is the most common form of macular degeneration.

AMD is a painless condition that generally leads to the gradual impairment of vision, but it can sometimes cause a rapid reduction in vision. It predominantly affects the central vision, which is used for reading and recognising faces. Normal macular ageing changes are a common incidental finding on a routine visit to the optometrist, but AMD may also be detected this way before it is symptomatic, or people may present with difficulty in performing daily activities such as driving, reading and recognising faces.

Various ways of classifying AMD have been proposed. This guideline considers the best approach and recommends that a distinction is drawn between 'early' and 'late' disease. Within 'late' disease, distinction should be drawn between disease that is 'wet active' (neovascular lesions that may benefit from treatment), 'wet inactive' (neovascular disease with irreversible structural damage) and 'dry' (non-neovascular disease, including geographic atrophy). An additional category – late AMD (indeterminate) – is introduced to reflect rarer subtypes. For more details, see the [classification table](#) in recommendation 1.1.1.

The consequences of this condition for vision can be severe. AMD is the most common cause of visual impairment in the developed world, and the Royal National Institute of Blind People (RNIB) reports that AMD is the most common cause of certification for vision impairment. In an Australian cohort study of people with early stage AMD, the risk of progression to intermediate or advanced AMD within 5 years was 17%. However, early AMD is not always significantly progressive because 83% did not progress and AMD lesions appeared to have improved and regressed in 8% of people.

The prevalence of late AMD in the UK among people aged 50 years or over is 2.4% (from a meta-analysis applied to UK 2007–09 population data). This increases to 4.8% in people aged 65 years or over, and 12.2% in people aged 80 years or over. The same study found the prevalence of geographic atrophy to be 1.3 to 6.7%, and the prevalence of neovascular AMD to be 1.2 to 6.3%. Estimates indicate that around 39,800 people develop neovascular AMD in the UK each year; given a total UK population of 60 million, this equates to 663 new cases per million per year.

There has been a significant increase in hospital activity in England for episodes with a primary diagnosis of AMD, from less than 10,000 episodes in the years 2005/06 to over 75,000 episodes in the years 2013/14. The most common primary procedure administered in hospital to people with a

primary diagnosis of macular degeneration involves intravitreal injection. The cost of aflibercept and ranibizumab, medicines for the treatment of late AMD (wet active), is significant. In 2015/16, ranibizumab was second and aflibercept was fourth in the list of medicines with positive NICE technology appraisals on which the NHS spent most money. Between them, they accounted for a total of around £450 million expended (although some of these costs relate to use for other licensed indications).

### *More information*

You can also see this guideline in the NICE Pathway on [age-related macular degeneration](#).

To find out what NICE has said on topics related to this guideline, see our web page on [eye conditions](#).

See also the guideline committee's discussion and the evidence reviews (in the [full guideline](#)), and information about [how the guideline was developed](#), including details of the committee.

## Recommendations for research

The guideline committee has made the following recommendations for research. The committee's full set of research recommendations is detailed in the [full guideline](#).

### *1 Strategies to slow the progression of age-related macular degeneration (AMD)*

What is the effectiveness of antioxidant and zinc supplements on AMD disease progression for people with early AMD at high risk of progression in the context of a randomised controlled trial?

#### Why this is important

Age-related eye disease study (AREDS 2001) examined the effect of antioxidant supplementation on AMD progression using the AREDS formulation, which included beta carotene, vitamin E, vitamin C and zinc. Although the study showed some beneficial effects of the combined antioxidant supplementation in a subgroup of participants, the effects of each of the formula components on AMD progression were unclear. Additionally, 1 of the ingredients (beta carotene) in the AREDS 2001 formulation is associated with a possible risk of lung cancer among smokers. The AREDS research group introduced a new formulation that excluded beta carotene in the AREDS2 study, but the effect of AREDS2 formulation on AMD disease progression is unknown because of a complicated study design involving secondary randomisation and no placebo control. Therefore, a well-conducted randomised trial would provide an evidence base for the benefits and risks of individual components of the antioxidant supplements, and provide the ability to establish the treatment effect of antioxidant supplementation (the AREDS2 formula) on AMD progression by comparing AREDS2 formula with no treatment (for instance normal diet).

### *2 Organisational models for AMD diagnosis and management*

What is the long-term effectiveness, in terms of patient-relevant outcomes including visual acuity and quality of life, of different models of care that aim to reduce time from initial presentation to referral, diagnosis and treatment?

#### Why this is important

There is robust evidence showing that visual loss is linked with delays to diagnosis and/or treatment. However, there is a lack of evidence evaluating the impact of any particular model of care/services in reducing any of the time intervals throughout the referral and treatment process, or the subsequent influence of different models of care on peoples' visual acuity and quality of life. A well-conducted trial would, therefore, provide the evidence base to assess the long-term

effectiveness of different organisational models on referral, diagnosis and treatment for people with late AMD (wet active).

### *3 Stopping rules for antiangiogenic treatment for late AMD (wet)*

When should anti-vascular endothelial growth factor (VEGF) treatment be suspended or stopped in people with late AMD (wet)?

#### **Why this is important**

Anti-VEGF treatment is associated with inconvenience, risk of adverse events and – especially when aflibercept or ranibizumab is used – substantial costs. People typically receive anti-VEGF for extended periods, and it is unclear whether it is always beneficial. After successful treatment, the disease can become sufficiently dormant that treatment could be safely suspended. After ineffective treatment, there may be no benefit in continuing to treat eyes with advanced damage. The committee agreed that this gap in evidence could be addressed by a 2-stage research strategy. Observational research (for example, using registries recording administration of anti-VEGF and relevant outcomes) should be undertaken to establish the point at which the benefits of continuing treatment are unclear. This would involve eyes in which disease has responded well to treatment, and eyes in which pathological appearances or visual acuity suggest that disease is not responding to antiangiogenic treatment. This research should then be used to establish a protocol for suspending or stopping treatment. The protocol would be assessed in a non-inferiority randomised controlled trial (RCT) in which participants would be randomised to protocol-dependent stopping rules or usual care (continued treatment at clinician discretion). The committee agreed that the first step would be necessary to fulfil the ethical requirements of an RCT, as no consensus currently exists about the point(s) at which it may be safe to stop treatment.

### *4 Frequency of monitoring*

What is the long-term cost effectiveness, in terms of patient-relevant outcomes including best-corrected visual acuity and quality of life, of different review frequencies/strategies for people at risk of progression to late AMD (wet active)?

#### **Why this is important**

There is currently no evidence on the different frequencies for monitoring people with AMD. This means that it is not possible to identify an optimum monitoring strategy for people at different stages of AMD, leading to uncertainty in how to correctly manage treatment for individuals or how to configure eye care services to support patients. A study of the needs of people at risk of

progression to late AMD (wet active) to identify the optimum review arrangements would remove this uncertainty. Trials would need to measure visual outcomes and health service resource use to measure the trade-offs between the optimal management of people at risk of disease progression in relation to the use of resource.

## *5 Self-monitoring strategies*

Does earlier detection of the incidence of late AMD (wet active) by self-monitoring in people diagnosed with early AMD, indeterminate AMD or late AMD (dry) lead to earlier treatment and better long-term outcomes?

### **Why this is important**

A review of the evidence demonstrated that self-monitoring interventions result in earlier diagnosis for people with late AMD (wet active). However, the evidence failed to demonstrate that earlier diagnosis would result in improvements in long-term outcomes such as visual acuity, and also failed to capture potential negative effects of self-monitoring (including the potential for increased anxiety). A study could be carried out to follow up a cohort of people diagnosed with early, indeterminate or late AMD (dry) to the time when the diagnosis of late AMD (wet active) is established. Comparisons would include time to diagnosis of late AMD (wet active), time to treatment, long-term visual acuity and participants' quality of life. This would help to establish the association between early detection and early treatment plus good long-term vision outcome. It would also help any such positive effects to be weighed against the potential for harm.

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### *Accreditation*

