The Royal College of Ophthalmologists

New to follow up (N:F) ratios in ophthalmology outpatient services

Paper prepared for the Professional Standards Committee V3.0

Contents:

Overview:
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Age Related Macular Degeneration: Jonathan Gibson, John Sparrow (modelling)
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Summary

Recent emphasis on new patient waiting times and attempts to shift chronic disease management into the community have contributed to pressure being brought to bear on secondary providers to reduce new to follow up ratios to 2.5 or below, with commissioners beginning to use contract limiters and financial penalties to enforce this shift. While this may be reasonable for elective procedure based care, for long term conditions requiring complex management with 'high tech' equipment for monitoring and intervention, this approach is deeply flawed, as care in the community cannot realistically be delivered. If commissioners force limitations on follow up care the consequences of these actions in term of irreversible loss of sight may take years to manifest in certain eye conditions such as glaucoma. Commissioners need to be educated to avoid unintended adverse consequences of forcing down N:F ratios in chronic blinding eye diseases

N:F Overview

In the NHS in recent years a huge emphasis has been placed on new patient visits to hospitals as illustrated by the intense pressure applied to provider units to meet referral time targets. This has resulted in a shift of resources away from follow up visits for monitoring chronic conditions and in certain areas cash strapped purchasers have increasingly viewed follow up visits as unnecessary and wasteful[1]. While this may be reasonable in the context of streamlining for elective procedures such as cataract surgery, for chronic disease management it may be detrimental to care and harmful to individual patients, a problem highlighted by the National Patient Safety Agency Rapid Response Report on Glaucoma follow up[2].

Hospital Episode Statistics (HES) for 2008-09 for England indicate that there were ~5.5M Ophthalmology (130) OPD attendances (=9% of ALL NHS OPD visits), ~1.5M were new and ~4.0M were follow up with a N:F ratio of ~ 1:2.55 overall[3]. Considering the recent overemphasis and prioritization of new appointments and the widespread follow up delays for chronic potentially blinding eye diseases this overall figure is almost certainly too low, yet it is being used by purchasers to place pressure on providers to reduce their ratios, with encouragement from NHS Innovation[1]. Moorfields Eye Hospital, generally considered to provide a good service, had a N:F ratio ~1:3.27 (Q1, 2009)[1].

In recent years there has been a realisation that chronic disease management represents a huge challenge to health services[4]. A fresh agenda has emerged in which management of long term conditions in primary care is being promoted and home care encouraged. The drive to move chronic care into the community has further increased pressure to reduce hospital based follow up and monitoring. Although this approach may be appropriate for many conditions it is unhelpful in conditions where management is complex and dependent on 'high tech' equipment and interventions. Unfortunately commissioners without clinical backgrounds not infrequently either fail to understand, or refuse to accept that this is the case for chronic eye care, and many commissioners are now placing contract limiters on providers in their attempts to reduce the costs of what they see as unnecessary follow up monitoring visits.

In elective cataract surgery and primary eye care, efficiently run services should be expected to have low N:F ratios. On the other hand examples of chronic potentially blinding eye diseases where low N:F ratios indicate poor quality care rather than good care include glaucoma, AMD and diabetic eye care. NICE has issued guidance on treatment of glaucoma and AMD and these statements provide a firm basis for arguing in favour of appropriate disease specific follow up protocols and hence follow up ratios. Unfortunately Hospital Episode Statistics (HES) data are worthless for understanding N:F ratios according to disease category because in 97% of OPD hospital visits disease is unspecified. In the absence of reliable condition specific HES data, a range of approaches including care pathways and survivorship and population data can be used to estimate the N:F ratios appropriate to good care for a range of eye conditions. In the absence of accurate national data, estimates must be based on sampling and condition specific assumptions. Presented here are a series of worked examples covering cataract, glaucoma, hospital based diabetic eye care and AMD services. As additional data become available further refinements and conditions / services will be included in this document.

The College is committed by its Charter to '*maintain proper standards in the practice of ophthalmology for the benefit of the public.*' The College recognises the need for productivity and efficiency but patient safety and the patient experience should not be jeopardised by efforts to cut costs through blanket new to follow up (N:F) ratios which may have unintended consequences.

Overview References:
1. NHS institute for Innovation and Improvement. Better Care, Better Value Indicators. NHS indicators: Definitions.
   http://www.productivity.nhs.uk/Def_ManagingNewToFollowOutpatientAppointments.aspx
2. National Patient Safety Agency (2009) Rapid Response Report. Preventing delay to follow up for patients with Glaucoma. http://www.nrls.npsa.nhs.uk/resources/?entryid45=61908&p=2
3. Hospital Episode Statistics online. Main Specialty 2009-2010.
   http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=894
4. Improving Chronic Disease Management (2004), DH.
   http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4075214

New to follow up (N:F) ratios for elective cataract surgery

To be read in conjunction with the 2010 College Cataract Surgery Guidelines.

Cataract surgery is the most frequent undertaken surgical intervention in the UK with ~330,000 procedures having been undertaken in 2009-2010[3]. 98-100% day case cataract surgical rates are now being achieved in most NHS ophthalmic surgical facilities.

New patient to follow up ratios in cataract care

New patient appointment (referral) and follow up ratios for investigation and treatment of uncomplicated cataract are variable. College members have been active in improving access to cataract care and modernisation of patient pathways via, for example, 'Action on Cataracts'. Best practice tariffs (BPT) in England introduced by the Dept of Health within 'Payment by Results' (PbR) seek to improve productivity and reduce so called 'unneeded' follow up by only rewarding certain N: F ratios in certain clinical areas which include the cataract pathway.

Bespoke cataract referral from primary care

'Referral refinement' by direct referral of cataract patients from the high street optometrist using bespoke referral proformas is occurring. This saves a patient visit to the general practitioner, leads to shorter waiting times, more accurate patient referrals and increases the conversion rates to surgery. This is the preferred pathway for cataract referral. However as optometrists have a duty to draw any pathology to the attention of general practitioners changes to optometric practice at national level will be required if there is a wish centrally to reduce optometric referrals.

Visual acuity referral or surgical 'thresholds' for cataract surgery are being increasingly considered by some commissioners. In general the College does not support such crude blanket restrictions and is of the view that patients should be assessed on their clinical merits. Furthermore there is compelling evidence that cataract surgery is cost effective for the vast majority of patients.

Pre-Operative Assessment

 In 2010 the DH stated in PbR guidance "We have since received advice that payment for pre-operative assessments (POA) should continue to be a matter for local agreement in 2011-12. There is not currently a definition of what constitutes a pre-operative assessment, and therefore a national approach to counting and reimbursement is not currently appropriate or feasible." The College recognises that with refined referrals the number of OPD visits prior to cataract surgery may be reduced to one if biometry and POA are undertaken at the consultant visit or two if biometry and POA are undertaken on another date. The College is also of the opinion that it is good practice to seek patient consent for surgery at the POA visit rather than on the day of admission. Where bilateral cataracts are present the date for the second eye surgery in sequence can also, on occasion, be agreed at the pre-operative visit, thus reducing a further referral and addition pre-operative visit. Equally it can be appropriate to reassess at the one month post-operative visit the patient's desire and residual symptoms to justify surgery to the second eye.

Cataract Post-operative Review

The 2010 Royal College of Ophthalmologists Cataract Surgery Guidelines suggest discharge from the hospital eye service on the day of surgery by an appropriately trained member of staff, with handover of postoperative written instructions, medications, appointments and emergency contact details given to the patient, with a final review at a later date.

There is increasing evidence from the experience of '*Action on Cataract'* and from limited trials that 1st post-operative day review may not be needed for uncomplicated cataract surgical patients without co-morbidities such as glaucoma, uveitis, retinopathy etc.

The timing of the follow up or final Outpatient Department (OPD) is not specified and consequently there are wide variations. In practice in 2011 postoperative review is often deferred until 2-6 weeks in routine cases, if adequate patient counselling is given, and importantly if there is provision of good access to urgent ophthalmic review.

In general terms cataract surgery is uncomplicated in about 90% of cases. However it is not acceptable for patients merely to be told to go to their local accident and emergency department or to contact their GP if they have a problem. If operative or postoperative complications occur, the provider unit should either manage them, or arrange direct referral to another specialist, keeping the general practitioner informed. The commissioning agency must ensure that there is a funded agreement in place with a suitably equipped NHS facility with adequate capacity for dealing with any early or late post-operative complications which cannot be managed by the provider. This may be especially pertinent in a 'plural market' care setting.

The *PbR* best practice tariff for cataract care includes payment for a post-operative review visit to secondary care providers. The College is of the view that this post operative examination visit is needed for patient advice and feedback and to allow accurate capture of visual acuity and refractive outcomes, ideally electronically. Such information is required for clinical audit, governance, quality assurance and revalidation. It is also vital that trainee ophthalmologists examine their post operative cataract patients. In some centres some post operative cataract patients are discharged to primary care and often to an accredited community optometrist for routine post-operative review and refraction. When this takes place arrangements for clinical data capture in the community are also needed and which must be shared with the operating team at the secondary care provider.

In relation to co-morbidity the Dept of Health stated in the PbR guidance "only a small proportion of patients are likely to require multiple follow-up attendances, including where patients have other ophthalmic conditions, e.g. glaucoma, or where there have been surgical complications. Follow-up attendances for these patients should not be considered as part of the best practice pathway and they should no longer be coded as on the same Patient Pathway ID. Commissioners and providers may wish to agree through contracts the notification and approval processes for patients moving onto an additional pathway as a safeguard against any incorrect coding." For further detail see PbR Guidance

Cataract Pathway Conclusions

A 3-4 step/visit cataract surgical pathway from receipt of referral to discharge for uncomplicated first eye cataract patients without co-morbidities and 5-6 visits for sequential second eye cataract extraction is achievable. Safety net infrastructure and facilities for clinical audit should be in place to facilitate best practice.

Cataract Surgery: Key Points & Examples

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PRACTICE POINT
Pre-operation

Most cataract patients without co-morbidity can be assessed within one or two pre-operative visits and that new patient examination and assessment in properly staffed ophthalmic units with direct referral from primary care optometrists can be undertaken in most locations at a single enhanced pre-operative visit.

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PRACTICE POINT
Post-operation

Most cataract referrals without co-morbidity or peri-operative complications can be assessed within two post-operative visits. Ophthalmic units with shared care links with primary and urgent care services can usually undertake post-operative care within a single post-operative visit for patients without co-morbidity. However it is important to have access to more frequent post operative review for patients with intra operative complications and co-morbidities and in departments involved in surgical training. Capture of clinical data is needed at the post-operative review visit to facilitate clinical audit and advance quality.

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Cataract Example 1

Service configuration:
- 80% conversion rate (=20% false positive cataract referrals)
- Initial visit and pre-op assessment together
- One post op visit for 85% of patients (allows for ~10% with 2+ post op visits)

Single eye surgery - N:F = 1:0.92

Sequential bilateral surgery - N:F = 1:1.84

Cataract Example 2

Service configuration:
- 80% conversion rate (=20% false positive cataract referrals)
- Initial visit and pre-op assessment separate
- One post op visit for 80% of patients (allows for ~15% with 2+ post op visits)

Single eye surgery - N:F = 1:1.76

Sequential bilateral surgery - N:F = 1:2.72

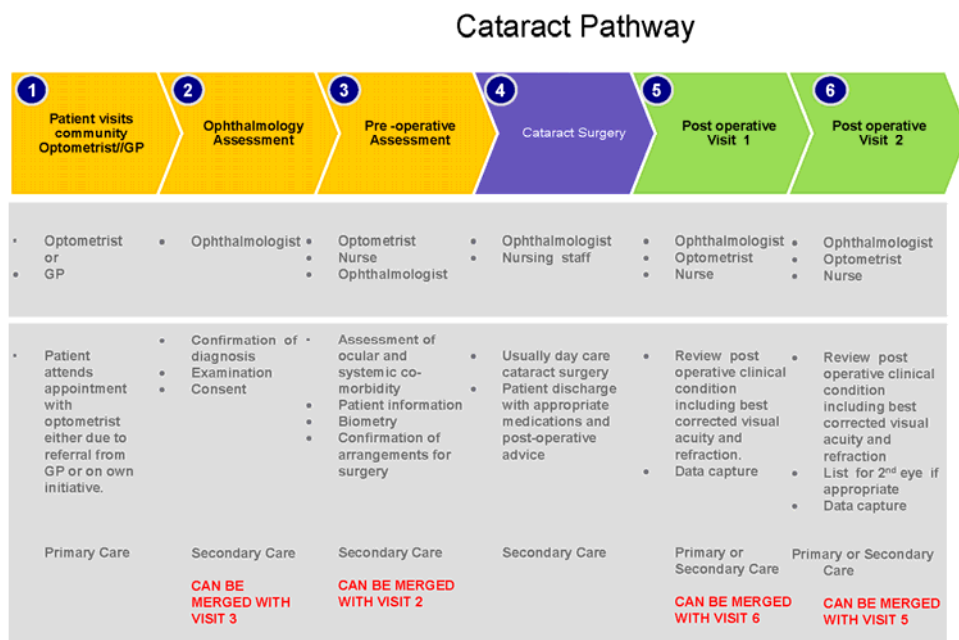### Cataract Example 3

Service configuration:
- 60% conversion rate (=40% false positive cataract referrals)
- Initial visit and pre-op assessment separate
- One post op visit for 80% of patients (allows for ~15% with 2+ post op visits)

Single eye surgery - N:F = 1:1.32

Sequential bilateral surgery - N:F = 1:2.04

Cataract Appendix

Cataract pathway (Based in part on Table 15 in *PbR* Cataracts pathway) [2] LINK

Cataract Pathway

❶ Patient visits community Optometrist/GP	❷ Ophthalmology Assessment	❸ Pre-operative Assessment	❹ Cataract Surgery	❺ Post operative Visit 1	❻ Post operative Visit 2
· Optometrist or · GP	· Ophthalmologist	· Optometrist · Nurse · Ophthalmologist	· Ophthalmologist · Nursing staff	· Ophthalmologist · Optometrist · Nurse	· Ophthalmologist · Optometrist · Nurse
· Patient attends appointment with optometrist either due to referral from GP or on own initiative.	· Confirmation of diagnosis · Examination · Consent	· Assessment of ocular and systemic co-morbidity · Patient information · Biometry · Confirmation of arrangements for surgery	· Usually day care cataract surgery · Patient discharge with appropriate medications and post-operative advice	· Review post operative clinical condition including best corrected visual acuity and refraction. · Data capture	· Review post operative clinical condition including best corrected visual acuity and refraction · List for 2nd eye if appropriate · Data capture
Primary Care	Secondary Care **CAN BE MERGED WITH VISIT 3**	Secondary Care **CAN BE MERGED WITH VISIT 2**	Secondary Care	Primary or Secondary Care **CAN BE MERGED WITH VISIT 6**	Primary or Secondary Care **CAN BE MERGED WITH VISIT 5**

A schematic overview of the College's pathway for routine cataract surgery in patients without co-morbidity and without intraoperative complications.

New to follow up (N:F) ratios for Glaucoma related conditions

Introduction

In April 2009 NICE published Clinical Guideline GC85 entitled:
Glaucoma: Diagnosis and management of chronic open angle glaucoma and ocular hypertension
(http://guidance.nice.org.uk/CG85/) which makes recommendations for long term monitoring of
chronic open angle glaucoma (COAG) and ocular hypertension (OHT). COAG is estimated to affect
480,000 people in England and OHT / Suspected COAG an estimated 750,000 – 1.2M. There are
currently an estimated 1-2M OPD visits annually in the English hospital eye service for glaucoma
related conditions. On the basis of the epidemiology, the need for long term monitoring and certain
evidence based assumptions, model estimates have been made for new patient and follow up
capacity requirements to deliver services to people with glaucoma related conditions (COAG &
Suspected COAG & OHT).

Method

Modelling has been undertaken to estimate population requirements for secondary care OPD services
for glaucoma related conditions based on the population of England. Evidence based assumptions
derived from population statistics, epidemiology, service configuration, clinical appropriateness and
clinician behaviour (service data from Bristol Eye Hospital) have been used as inputs for care
pathway models with the model outputs being new and follow up OPD capacity needs for England,
and N:F ratios for various clinical scenarios.

Evidence Based Assumptions

- **Both**
    - Population England = 50M; 48% >40 years
    - 60% Case Ascertainment
    - 2 visits to establish Diagnosis & Treatment (Dx & Rx)
    - New: 50% true +ve referrals (i.e. 50% false +ve referrals)
- **COAG**
    - Life expectancy from diagnosis ~16 yrs
    - Prevalence 2% of >40 years
    - F/u: 2.5 visits / year (Based on local service according to requested time by clinician.
      Includes early post operative cases requiring frequent visits)
- **OHT & Suspects**
    - Life expectancy from diagnosis ~20 yrs but expected that on average within ~10 yrs
      one of 3 outcomes will have arisen: 1. Conversion to COAG; 2. OHT treated for a
      period and no longer eligible with discharge back to 1ery care; 3. Confirmed as no
      glaucoma and discharged to 1ery care. Duration of formal (2ery care) monitoring
      therefore taken as 10 years
    - Prevalence 4% of >40 years
    - F/u: 1.3 visits / year

Estimated Annual Capacity Required for England

- **COAG**
    - New visits ~ 36,000
    - Follow up visits ~ 738,000
    - **N:F = 1:21**
- **OHT & Suspects**
    - New visits ~ 60,000
    - Follow up visits ~ 420,000
    - **N:F = 1:7**
- **COAG & OHT & Suspects** (ALL)
    - New visits ~ 96,000
    - Follow up visits ~ 1,158,000
    - **N:F = 1:12**
    - Total visits ~1,254,000

Sensitivity of COAG model outputs to variations in input assumptions
In order to understand the stability of the estimates produced by the modelling procedure the input assumptions have been varied to demonstrate how the model outputs change in response to varying the assumptions upon which the model is constructed.

- Population size, condition prevalence and proportion case ascertainment: changing these assumptions affects overall capacity proportionally but N:F is unaffected.
- Number of initial visits for Dx & to initiate Rx: changing this has only a marginal effect on both overall capacity and N:F.
- Varying False +ve referral rate has major impact (ratio) on N:F and small effect on overall capacity, e.g. for COAG estimate, if
    - False +ve's 50% then N:F=1:21; Total capacity (N+F) 774,000 visits (comparator)
    - False +ve's 25% then N:F=1:31; Total capacity 762,000 visits
    - False +ve's 0% then N:F=1:41; Total capacity 756,000 visits
- Longer life expectancy from diagnosis increases number of follow up lifetime visits required (and vv) with small to moderate overall impact on both N:F and overall capacity.
- Varying number of visits per year significantly impacts both N:F and overall capacity. e.g. for COAG estimate, if
    - No. F/u's per year = 1.5 then N:F=1:13; Total capacity 486,000 visits
    - No. F/u's per year = 2.5 then N:F=1:21; Total capacity 774,000 visits (comparator)
    - No. F/u's per year = 3.5 then N:F=1:29; Total capacity 1,062,000 visits

This exercise, together with the sensitivity analysis demonstrate that for chronic conditions such as glaucoma related diseases which require lifelong monitoring the application of a N:F ratio of the order of 1:2.5 is inappropriate. For a chronic condition such a ratio would be a powerful indicator of service failure not good quality. In addition, in terms of capacity and efficiency the N:F ratio can provide a fundamentally flawed and contradictory assessment. This is well illustrated in the above sensitivity analysis, where a reduction of the false +ve referral rate from 50% to 0% (reasonably perceived as 'good') results in a *doubling* of the N:F ratio (wrongly perceived as 'bad'). In this example, along with these parameter shifts there is an associated small *reduction* of ~2.5% in the overall required capacity which could reasonably be interpreted as an improvement in secondary care service efficiency.

Diabetic retinopathy: new to follow-up (N:F) ratios for Hospital Eye Service care

Introduction:

Over the last few years there have been significant changes in the assessment of patients with diabetic retinopathy. With the advent of systematic digital photographic screening programmes throughout the UK, patients with no retinopathy or background retinopathy in the absence of maculopathy remain within the screening programme.

Patients with M1, R2, and R3 in either eye, according to NSC definitions are referred to the hospital eye service. Some screening programmes are dealing with early referable maculopathy cases within the screening programme, but for most services these are referred to the hospital for subsequent monitoring. The estimates presented in this section are based on the latter situation. This piece of work is also based on the current 'referable retinopathy' criteria from the ENSP (http://www.retinalscreening.nhs.uk/pages/). With the advent of high resolution colour images in addition to OCT, there is also the potential to follow-up some of these patients photographically with OCT as well.

Method & service configuration:

The Bristol Eye Hospital (BEH) catchment area contains ~26,000 people with diabetes. Medisoft Electronic Patient Record (EPR) data were analysed in detail for those patients with diabetic retinopathy follow-up in the hospital eye service at BEH. In this service EPR has been used for greater than 3 years, and there has been an established diabetic retinopathy screening programme for several years. People with ungradeable images with no other ocular pathology are followed up in separate 'ungradeables clinics' as part of the screening programme. Patients with very stable previously treated retinopathy are discharged back to the screening programme.   Same day laser treatment is undertaken in the BEH unit so that there are effectively no additional visits for laser.

The table illustrates % breakdown derived from a 1 year sample of patients attending the DR service at BEH. Overall 2766 patients attended for 9403 visits, with 758 new visits and 8645 follow ups.

New to Follow up (N:F) ratio = 1:11.4 for DR Service

Variables to take into consideration if extrapolating to other units

1. If a screening programme had not yet assessed all patients with DR for the first time there would be a higher rate of referrals from the 'first pass effect'.

2. Areas with a higher prevalence of diabetes/retinopathy may have somewhat different proportions of types of retinopathy. If overall good control in population, perhaps fewer patients will progress to PDR or maculopathy even though they may have R2 or early M1 requiring referral. This would give a somewhat lower follow-up to new ratio, and conversely if higher proportions of patients needing laser treatment, the follow-up to new ratio would be higher. This level of Medisoft data collection is not yet available from other units with a significantly different patient base using it for at least 1-2 years for all patients with DR.

3. The above calculation takes into account laser treatments being undertaken on the day of the follow-up visits which is what happens in the BEH unit. If laser is undertaken separately, there may be slightly fewer follow-up slots, but separate laser procedures listed with the total of both being the same.

4. Some units never discharge a patient back to screening, for instance previously treated proliferative disease in both eyes, well treated and stable for 2-3 years with R1 P1 on grading . If that is the case, this may slightly reduce the follow-up to new ratio as these patients would only need to be seen infrequently in the eye clinic

Table. Clinical features for patients attending the DR clinics at BEH. For each patient the grade of retinopathy in either eye at the last visit which requires the most frequent follow-up is taken as the grade overall.

Grade retinopathy in worst eye	Appropriate follow-up period	% of patients overall with DR under HES	% of total appointments for DR
Severe or very severe NPDR (as R2) with no maculopathy (M0)	3-4 monthly	3%	3.1%
Mild/Moderate NPDR (as R2) without maculopathy (M0)	6 monthly	11.9%	7%
Mild or moderate NPDR (as R2) with M1 but no CSMO	4 monthly	8.2%	7.3%
R2 with CSMO	3-4 monthly	10.1%	10.5%
R1 with CSMO in either eye	3-4 monthly	8.8%	9%
R1 with M1 but no CSMO in either eye	4-6 monthly	17.7%	13%
R1, MO patients under follow-up at BEH**	6 monthly	24%	14%
Active PDR (103 of these also have CSMO in either eye)	See below for breakdown*	16%	36% includes laser treatments
Total		**100%**	**100%**
*Advanced DED either eye	2 monthly*	2.5%*	4.5%*
*Non HRC PDR in either eye as worst grade	2 monthly*	9.2%*	16%*
*HRC PDR either eye	1 monthly while active*	4.3%*	15%*

**May need to attend for a variety of reasons e.g. other pathology also requiring follow-up such as vein occlusion which would make discharge back to screening inappropriate or treated retinopathy regressed to R1, but not yet stable for long enough to discharge back to screening. 6 monthly follow-up on average would be expected for these patients.

New to follow up (N:F) ratios for Age Related Macular Degeneration AMD

This has been considered in 3 ways.
1. Theoretically from NICE figures
2. Modelling based on service and epidemiological data
3. From clinic data at Birmingham & Midland Eye Centre

1. Theoretically

Data from the current NICE AMD guidelines have been used, which include planned service projections based on 26,000 new patients with wet AMD/ year in UK.ref 1,2. For wet AMD the guidance, suggests an initial visit for assessment which would include an OCT examination and Fluorescein Angiography. In many units this would require 2 visits to confirm diagnosis. Prevalence studies suggest that for AMD there are currently 172,000 people (95% CI 106,000 to 279,000) with geographic atrophy in the UK, and 245,000 (95% CI 163,000 to 364,000) with neovascular AMD. (ref 3)

Wet AMD clinics in NHS

Assumptions taken from NICE Guidance

26,000 new cases of wet AMD per year for 60 million population = 450/million population served. For a unit serving 1 million population = 450 new cases a year.

Diagnosis/Fast track referral with FFA/OCT requires 1-2 visits to establish diagnosis – assume 1.5 visits = 675 visits.

Assume a three year cycle of treatment and follow up after which patients are discharged (this may be optimistic).

Injection clinics 7 in first year/5 second year/3 third year = 5/year on average = 2250 visits/year for injections.

Assessment clinic 12 visits for year 1, 10 visits for year 2, 8 for year 3 = 10/year on average = 4500/year.

Total new visits / year for wet AMD for population 1 million	= 450
Follow up visits Diagnostic confirmation (675-450)	= 225
Assessment FU year 1 (450x12)	=5,400
Assessment FU year 2 (450x12) + (450 x10)	=9,900
Assessment FU year 3 (450x12) + (450x10) + (450x8)	=13,500
Injection clinic year 1 (7x450)	
Injection clinic year 2 (5x450) + (7x450)	
Injection clinic year 3 (3x450) + (5x450) + (7x450)	=6,750

For false +ve referral rate = 0
New to follow up ratio for *Wet* AMD = 450/(225+13500+6750) = 1 : 46

For false +ve referral rate = 0.5
New to follow up ratio for *Wet* AMD = (450*2)/(225+13500+6750) = 1 : 23

For dry AMD service

At present because of the absence of any recognised treatment there are , to my knowledge, no defined dry AMD services offered in the UK. Therefore estimates of the numbers of dry AMD cases that would seek referral have been obtained from reviews of population studies (ref 4). It is therefore assumed that although the prevalence of centre involving Geographic Atrophy (GA) has been shown in population studies to be is less than Wet AMD, the overall referral rate will be similar to wet AMD.

Assumptions
Numbers of dry AMD with Geographic Atrophy referred = 450/million/year
New patient attends for diagnosis which includes OCT and FFA if indicated. 1-2 visits to establish diagnosis – assume 1.5 visits = 450 new and 225 for diagnostic confirmation
50% discharged from follow up at initial visit = 225 cases
50% referred to low vision clinic/ other service   = 225 in low vision clinic or other clinics

For false +ve referral rate = 0
New to follow up ratio for *Dry* AMD = 450/(225+225) = 1 : 1

For false +ve referral rate = 0.5
New to follow up ratio for *Dry* AMD = (450*2)/(225+225) = 1 : 0.5

For combined wet and dry AMD service

For false +ve referral rate = 0
New to follow up ratio for combined *Wet & Dry* AMD = {450+450}/{(225+13500+6750)+450} = 1 : 23

For false +ve referral rate = 0.5
New to follow up ratio for combined *Wet & Dry* AMD = {(450+450)*2}/{(225+13500+6750)+450} = 1 : 12

Comment on service arrangements
Although figures above have included those for the theoretical situation where false +ve rates =0 this is not realistic. Also calculated are figures for a false +ve rate of 0.5, a reasonably realistic estimate of what might exist in an NHS service environment. The above calculations have been presented for a service where assessment and injections for wet AMD are given at separate visits, the so called two stop model.

In terms of the logistics of running a wet AMD service, the two stop model is readily manageable as it works efficiently in terms of resources and planning - i.e. the unit can book 12 or so cases for injection per session knowing that this will be fully utilised. The other advantages of the two stop model is that it allows the development of virtual assessment clinics using trained, non-medical staff, thus freeing up consultant time to assess more patients.

The "one stop model", has the big advantage to the patient of having the assessment and injection done at the same visit and this avoids the "slippage" in appointments between injection and assessment. This is particularly beneficial for patients who have to travel long distances to get treatment. However it can be challenging to run efficiently, given the unpredictability of how many injections will be needed at a given session, and may lead to longer clinic waits for patients.

In practice, most units in the UK have developed services that meet their patients' needs, either one or two stop, to fit in with the resources allocated to them and the requirements of their patients.

For completeness the N:F ratios for a service with a 0.5 false +ve rate and one stop assessment + injection has been calculated:

One stop, False +ve 0.5:

New to follow up ratio for *Wet* AMD = (450*2)/(225+13500) = 1 : 15

New to follow up ratio for *Dry* AMD = (450*2)/(225+225) = 1 : 0.5 (no change)

New to follow up ratio for combined *Wet & Dry* AMD = {(450+450)*2}/{(225+13500)+450} = 1 : 8

2. Modelling based on service and epidemiological data.

The above figures align very closely with calculations from the epidemiological model and these are therefore not presented separately.

3. Birmingham and Midland Eye Centre (BMEC).

This provides a two stop AMD service for approximately 750,000 – 1,000,000 population. It has 3 fast track clinics with up about 20 new patients with wet AMD per week, and six review clinics per week with about 180-240 patients (210 average) attending. Approximately 100 patients from the FU clinic return for injection per week. The fast track referral pathway has a false positive referral rate of 0.5.

Per week therefore there are 10 new wet AMD cases, and (210+100) Fu = N:F 1:31

Accounting for the 0.5 false +ve rate there are 20 new and (210+100) Fu = N:F 1:16

Potential solutions to high volumes of follow up patients at BMEC - we are currently considering:
1. Virtual clinics run by technicians/nurses with ophthalmologist review of borderline cases.
2. LEARN project – electronic tele-ophthalmology pilot project for wet AMD (RCOphth Congress 2011 Poster)
3. Community based review
4. Self monitoring by patient

AMD References

1. Fletcher A, Donoghue M, Owen C. Low Vision Services for People with Age-Related Macular Degeneration in the UK: A Review of Service Need and Provision. Macular Disease Society Report, June 2001.

2. NICE: HTA Ranibizumab and Pegaptanib for the treatment of AMD. Final Scope. 25 April 2006. www.nice.org.uk

3. C G Owen, A E Fletcher, M Donoghue, A R Rudnicka How big is the burden of visual loss caused by age related macular degeneration in the United Kingdom? Br J Ophthalmol 2003;87:312-317 doi:10.1136/bjo.87.3.312

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For future inclusion: Primary Care