function underpins all NHS purchaser and provider activity" and that this requires "an assessment of the health needs of any given population to inform decision-making on aims and priorities so as to achieve appropriate and effective services leading to improved health and value for money."[6] The most recent guidance from the former NHS Management Executive exhorts health authorities to purchase procedures specifically in relation to their effectiveness in conditions for which clearcut clinical guidelines are merited.[7] Of course, patients on waiting lists have had their needs assessed by individual clinicians. Yet most health authorities—and to an even greater extent general practice fundholders—do not consider the needs of people on waiting lists as requiring further assessment. They are happy to accept the waiting list as reflecting an aggregate of unquestioned clinical decisions, which may be influenced by factors such as the visibility of waiting lists and the perverse incentives built into the NHS market rather than by evidence of effectiveness. The driving force behind this acceptance is the patient's charter.

The assumption that waiting lists reflect need (that is, ability to benefit) may be tested by considering the indications for various procedures. Increasingly, systematic reviews and techniques for identifying consensus have been used to set criteria of appropriateness for clinical procedures. There seems, however, to have been little interest in using this work to tackle waiting lists. The appropriateness of some procedures may be questioned regardless of the clinical indications (for example, dilatation and curettage in women under 40[8]), but for most procedures for which there is a waiting list, the situation is far more complex. The intended procedure, the precise indication for that procedure (the condition and its severity), and any comorbidity must be assessed. These factors could be used to generate an appropriateness rating.[9]

For example, in coronary artery bypass grafting the procedure has been judged inappropriate in patients with single vessel disease, moderate or severe myocardial ischaemia, and mild left ventricular dysfunction.[10] Yet such patients continue to be operated on. Furthermore, a recent study of a waiting list for tonsillectomy showed that nearly one third of patients had waited more than one year.[11] The natural course of recurrent throat infection, the main indication for tonsillectomy, may be one of improvement[12]; a prospective study to determine the morbidity caused by a delay in tonsil surgery found that a fifth of patients grew out of their condition and were spared surgery.[13] This raises the possibility that, in certain circumstances, need may fall with longer waits.

Maximum waiting periods for procedures of accepted effectiveness have some appeal, although surgery may be inappropriate when judged against local guidelines or when resources are constrained.[14] Existing criteria for appropriateness may require refinement,[15] but they offer a reasonable tool, possibly with local modification, for examining waiting lists. The next stage is for commissioners to agree with general practitioners and providers the criteria for appropriateness for entry to and clearance from a waiting list. Such an approach should be widely debated in local community settings. Furthermore, the criteria for appropriateness should be linked with a commitment to audit. This would allow the standards given in the patient's charter to be achieved on the basis of need rather than political whim. For all those concerned with appropriateness, the time spent on waiting lists allows an opportunity to assess the costs and benefits of intended treatment.

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Fish oils and cardiovascular disease

Beneficial effects on lipids and the haemostatic system

Oily fish contains large quantities of the long chain n-3 (ω-3) polyunsaturated fatty acids (eicosapentaenoic acid (C20:5) and docosahexaenoic acid (C22:6)). Low rates of coronary heart disease in various populations with high intakes of fish suggested health preserving effects of these fatty acids. For example, mortality from coronary heart disease was found to be low among Greenland Inuits who ate large amounts of fish and whale meat (400-500 g/day, 14 g n-3 fatty acids/day)[1] and in Japanese fish eaters.[2] In the Netherlands 30 g of fish daily was associated with 50% fewer deaths from coronary heart disease.[3] In the multiple risk factor intervention trial cardiovascular mortality was inversely proportional to the intake of n-3 fatty acids over the 10·5 years of follow up.[4] Not all investigators, however, have confirmed these findings.[5,6]

Suggested mechanisms for this cardioprotective effect focused first on serum lipids.[7] In healthy subjects increased consumption of long chain n-3 fatty acids is associated with falls in serum concentrations of triglycerides and very low density lipoprotein[8,9]; cholesterol concentration is unchanged except at high doses (24 g/day), when concentrations of both low density lipoprotein cholesterol and apoprotein B fall. Postprandial lipoprotein concentrations also fall.[10] Concentrations of high density lipoprotein cholesterol (principally high density liproprotein-2 cholesterol) increase with moderate supplementation with fish oil. In the various dyslipidaemias serum triglyceride concentrations tend to fall.

Although no consistent changes have been observed in lipoprotein (a) concentrations,[11] low density lipoprotein cholesterol concentrations may increase in diabetic subjects receiving fish oil.[12 13] These effects on lipids did not seem adequately to explain the cardioprotective effect of fish oil; the effect on the haemostatic system has also been examined.

N-3 polyunsaturated fatty acids are rapidly incorporated into platelets, where they compete with arachidonic acid for the 2-acyl position of membrane phospholipid and as substrate for the cyclo-oxygenase enzyme complex that modulates the production of prothrombotic eicosanoids.[14] Inuits have a lower platelet count, less platelet aggregation, and a longer bleeding time than Danish controls[15]; urinary concentrations of prostacyclin metabolites are higher and of thromboxane metabolites lower than those in controls.[16] Similar effects have been found after an increased dietary intake of fish or fish oil supplements.[17] The reported effects of dietary fish oil on coagulation and fibrinolysis vary.[18] No consistent effects on the prothrombin time, clotting factors, or anticoagulant proteins have been reported. The fibrinogen concentration fell in some[19 20] but not all studies.[21] Red cell deformability and blood viscosity are increased even at a low dose,[22 23] but fish oil may inhibit fibrinolysis in normal subjects and patients with cardiac ischaemia.[18 24 25]

Experimentally, n-3 polyunsaturated fatty acids reduce adhesion and migration of monocytes, which is important in atherogenesis. Concentrations of interleukin-1, tumour necrosis factor, platelet activating factor, and platelet derived growth factor fall, as does the production of free radicals and endothelial production of fibroblast growth factor. Dietary n-3 polyunsaturated fatty acids enhance production of endothelial derived relaxing factor, which is reduced in atherosclerotic vessels.[5 6] Improved endothelial function is suggested by the observation that vasodilatation in response to acetylcholine intra-arterially was restored in coronary arteries of patients who had received heart transplants and took fish oil supplements for three weeks, whereas vasoconstriction still occurred in control subjects.[26] Supplementation with fish oil inhibits atherogenesis in animals.[5 6]

In a study of 2033 male survivors of myocardial infarction fatty fish (300 g/week, or 0·35g n-3 polyunsaturated fatty acids daily) reduced overall mortality by 29% and mortality from coronary heart disease by a third. A reduced intake of saturated fat with a proportional increased intake of polyunsaturated fat and a high fibre diet were ineffective.[27] Benefits occurred early in the trial, suggesting non-atherosclerotic mechanism(s). Fibrinogen concentration and plasma viscosity were unchanged.[28] An antiarrhythmic effect, which is observed is animals, is possible.[29]

Meta-analyses of trials of supplementation with fish oil to prevent restenosis after coronary angioplasty have suggested a small benefit of fish oil (odds ratio 0·71, 95% confidence interval 0·54 to 0·94).[30 31] Paradoxically, a study of restenosis that used a high dose of n-3 fatty acids produced a negative result.[32] High doses may be detrimental through enhanced peroxidation of lipids; perhaps antioxidants such as vitamin E should also be given.[31]

A meta-analysis of placebo controlled trials in 1356 subjects has shown modest falls of blood pressure with n-3 polyunsaturated fatty acids[33]; systolic blood pressure fell by 3·4 mm Hg and diastolic pressure fell by 2·0 mm Hg. A further meta-analysis gave comparable results.[34] Most of the individual trials used amounts of fish oil that patients may find hard to sustain (six to 10 capsules or two 100 g helpings of fish). Only two trials lasted longer than three months.[34]

Fish oil therefore affects lipid and lipoprotein metabolism and interactions between platelets and the vessel wall. Therapeutic possibilities exist after myocardial infarction, in restenosis after angioplasty, and in hypertension. Despite fish oil's effect on the platelet count and aggregation the trials do not provide convincing evidence of increased bleeding; although deaths from cerebrovascular disease are more common among Inuits, they are less common in Japanese people who eat fish than in other Japanese people.[5] More studies are needed in diseases related to atherosclerosis.

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