Evidence statements from reviews 1 and 2

This document lists the evidence statements that support the recommendations in NICE's draft guideline on 'Vitamin D – implementation of existing guidance to prevent deficiency'. For details of which evidence statements are linked to each recommendation see section 10 of the guidance. Only evidence statements linked to a recommendation are listed in this document.

The evidence statements are short summaries of evidence in a review. Evidence statements 1.X are from evidence review 1. Evidence statements 2.X are from evidence review 2.

Please note that the wording of some evidence statements has been altered slightly from those in the evidence review(s) to make them more consistent with each other and NICE's standard house style.

Evidence statement 1.1

There is moderate evidence from one [+] before-and-after study[1] and weak evidence [-] from another before-and-after study[2] that a programme of universal vitamin D supplementation using Healthy Start vitamins, alongside a public awareness campaign about the importance of vitamin D and Healthy Start vitamins, may increase awareness and implementation of existing guidance on vitamin D among health professionals and others working with at-risk populations of pregnant/breast-feeding women and mothers of young children. One study found that the number of symptomatic cases of vitamin D deficiency in children under five years decreased by 59% in a four-year period.[1] Another study showed that 20% of children aged under four years, received at least one bottle of Healthy Start vitamins compared to less than 1% before the programme started.[2] Both studies indicated that public awareness and health professionals' awareness of the importance of vitamin D and Healthy Start vitamins increased each year that the programme was in operation.[1,2]

[1] Moy *et al.,* 2012

[2] Nicholls and Stocker, 2012

Evidence statement 1.2

There is moderate evidence from one [+] before-and-after study[1] and weak evidence from another [-] before-and-after study[2] that a programme of universal vitamin D supplementation using Healthy Start vitamins increases awareness and implementation of existing guidance on vitamin D among health professionals and others working with at-risk populations of pregnant/breast-feeding women and mothers of young children. A key element of both these programmes has been an emphasis on staff training, where the provision of the free vitamin D supplements has been supported by continuing professional development of health staff including GPs, health visitors, community and hospital midwives, pharmacists, paediatricians and obstetricians about the importance of vitamin D.

[1] Moy *et al*., 2012
[2] Nicholls and Stocker, 2012

Evidence statement 1.3

There is weak evidence from one [-] survey of 13 trusts in North West England that health visitors and midwives are more likely to discuss vitamin D with women in those Trusts that have training policies in place, although exact numbers are not reported. However, only 6 of the 13 organisations surveyed offered training relating to vitamin D supplementation in prenatal and postnatal women to health visitors and midwives.[1]

[1] Jagatia *et al,.* 2011

Evidence statement 1.4

There is moderate evidence from one [+] before-and-after study[1] and weak evidence from another [-] before-and-after study[2] that a programme of universal vitamin D supplementation using Healthy Start vitamins, alongside a public awareness campaign about the importance of vitamin D and Healthy Start vitamins, increases awareness and uptake of existing guidance on vitamin D among pregnant/breast-feeding women and mothers of young children. One study showed a year on year increase in the proportion of pregnant and lactating women and young children receiving vitamin D supplements over a period of 4 years. Uptake rates of Healthy Start vitamins in 2010/11 were 22% and 14%, and in 2012/13 were 23% and 20% for women and children, respectively.[3] In another study 20% of children aged under 4 years received at least one bottle of Healthy Start vitamins at the end of the second year of the programme compared to 1% before the programme began.[2] Both studies demonstrated yearly increases in public awareness of the importance of vitamin D and Healthy Start vitamins since the programmes began.[1, 2]

[1] Moy *et al*., 2012

[2] Nicholls and Stocker, 2012

[3] McGee and Shaw, 2013 (Update of vitamin uptake numbers from earlier study by Moy et al., 2012)

Evidence statement 1.5

There is weak evidence from one [-] cost study[1] that the costs of providing free universal vitamin D supplementation for pregnant women, women whose child is less than 12 months old, and children under four years old are less than the costs of treating all cases of vitamin D deficiency in children in Birmingham (Heart of Birmingham (HoB), Birmingham East and North (BEN), and Birmingham South PCTs). The costs of providing Healthy Start vitamins to 100% of the target group in the three PCT areas were estimated to be £659,952 per year. Assuming 10% uptake for both women and children in BEN and South PCTs plus 25% uptake in

HoB PCT (HoB has been providing free universal Healthy Start vitamins for four years), the costs for the year 2011-12 were estimated to be £102,984. Assuming 25% take up for both women and children in all three PCTs in subsequent years the total costs were estimated to be £164,988. The costs of treating 33 cases of vitamin D deficiency in 2009-2010 were estimated to be £165,000 (£5,000 x 33 cases). The study was not a formal economic evaluation and included only the costs of vitamin supplements plus delivery charges when estimating the costs of the intervention.

[1] McGee 2010

Evidence statement 1.6

There is weak evidence from one [-] mixed methods study[1] that a programme of universal vitamin D supplementation using Healthy Start vitamins increases uptake among mothers and children. National data showed that uptake of the vitamins was higher in areas with universal schemes (3.97% for children and 7.72% for women) than in areas with targeted schemes (1.46% for children and 2.56% for women). Data were supported by in-depth interviews with service users and providers.

[1] Moonan *et al*., 2012

Evidence statement 1.7

There is weak evidence [-] from one[1] cost study that the average cost of primary prevention compares favourably with the cost of treating vitamin D deficiency in children of Asian origin. The estimated cost was £2,507 to treat one case of vitamin D deficiency. The cost of providing vitamin D supplementation to the total Asian population was estimated to be £10,300 per year or £25,750 per year according to the COMA and DH guidelines, respectively. Providing supplementation to the entire population of 500 children of Asian origin was estimated to avoid 4.27 cases of vitamin D deficiency, therefore saving £10,706 per year. The study was not a formal

economic evaluation and included only the costs of vitamin supplements when estimating the costs of supplementation.

[1]Zipitis *et al*., 2006

Evidence statement 1.8

There is weak evidence from 16 studies (six [-] surveys of at-risk groups [1, 2, 3, 4, 5, 6], seven [-] surveys of health care professionals or providers [7, 8, 9, 10, 11, 12, 13], and three [-] surveys of both at-risk groups and health care professionals [14, 15, 16]) that generally there is a lack of knowledge about the importance of vitamin D in bone health and the consequences of vitamin D deficiency, a lack of awareness of Healthy Start schemes, and lack of awareness of NICE guidelines and Department of Health guidelines about vitamin D supplements for at-risk groups. Most studies report that less than 50% of health care professionals advise pregnant and breast feeding women about taking vitamin D supplements or giving them to their children.

Fifteen studies explicitly focused on two at-risk groups a) pregnant and breastfeeding women and b) infants and children under five years, and certain of these studies focused on women and children from at-risk ethnic minority groups. No studies were identified that explicitly focused on c) people aged 65 years and over. One study explicitly focused on d) people who have low or no exposure to the sun, and e) people who have dark skin.[1]

[1] Alemu and Varnam, 2012

[2] Austin *et al.,* 2012

[3] Chandaria *et al.,* 2011

[4] Leven *et al.,* 2012

[5] Lucas-Herald *et al.,* 2012

[6] Sharma *et al.,* 2011

[7] Cleghorn, 2006

[8] Garton, 2008

[9] Jagatia *et al.,* 2011

[10] Jain *et al.,* 2011

[11] Ling *et al*., 2011

[12] Lockyer *et al*., 2011

[13] Sharma *et al.*, 2009

[14] Feeding for life Foundation, 2012

[15] Roberts, 2012

[16] Zipitis *et al.,* 2011

Evidence statement 1.9

There is strong evidence [++] from one[1] qualitative study, weak evidence [-] from one[2] qualitative study and weak evidence [-] from one[3] survey that there are key reasons for poor uptake of Healthy Start vitamin supplements. Parents find it difficult to access Healthy Start vitamins, health professionals do not promote the scheme, families that are eligible for Healthy Start are unaware of the scheme, and mothers are not motivated to take the vitamins or to give them to their children. Things that may help to increase the uptake of Healthy Start vitamins are universal supplementation, central ordering of vitamins and increasing the number of distribution centres.

[1] Jessiman *et al.,* 2013
[2] Stocker and Nicholls, 2012
[3] NHS England, 2013

Evidence statement 1.10

There is moderate evidence [+] from one[1] qualitative study of members of the Somali community in Bristol and health care professionals working with them, that an identified important health need is access to evidence-based information about vitamin D deficiency, especially for women.

[1] Ingram and Potter, 2009.

Evidence statement 1.11

There is moderate evidence [+] from one[1] before and after study that vitamin D supplements can be distributed locally in such a way as to ensure their availability for the following at-risk groups: a) pregnant and breastfeeding women, and b) infants

and young children aged under 5 years. In Birmingham, the vitamin D public health campaign and scheme are overseen by a steering group that has worked to identify obstacles and practical issues to ensure vitamin D supplements are available. The scheme has established one ordering and distribution point for vitamins and increased the number of issuing sites throughout the city. Pharmacies and children's centres contribute significantly to issuing vitamin D supplements (issuing 20% and 29.7% of total vitamins respectively).[2]

[1] Moy *et al*., 2012

[2] McGee and Shaw 2013 (an update of the public health campaign reported by Moy et al 2012)

Evidence statement 1.12

There is weak evidence [-] from one[1] survey of eleven Healthy Start schemes (chosen as examples of good practice for the Healthy Start website) that a large range of vitamin issuing sites are used to ensure availability for the following at-risk groups: a) pregnant and breastfeeding women, and b) infants and young children aged under 5 years. These include: children's centres; child health clinics; antenatal clinics; health centres/GP surgeries; and community pharmacies. The supply of vitamins was ensured mainly by using one central point to order vitamins and to monitor vitamin use at the issuing points.

[1] NHS England, 2013

2.1 Evidence statement: Mailed dissemination for guideline implementation

There is mixed evidence from four reviews on the effectiveness of mailed dissemination for improving guideline uptake.[1,2,3,4.] There is some evidence from two reviews that mailed dissemination is effective[2,3] and evidence from one review that mailed dissemination if ineffective.[1.] One review reported inconclusive results.[4]

[1] Brusamento *et al.,* 2012
[2] Grimshaw *et al.,* 2004
[3] Medves *et al.,* 2010
[4] Prior *et al.,* 2008

2.2 Evidence statement: Computerised decision systems for guideline implementation

There is strong evidence from one overview of systematic reviews[1] and two systematic reviews[2,3] that computerised decision systems are effective in increasing guideline uptake. However, there is evidence from one review that computerised decision systems are ineffective compared with usual care or paper based systems.[4]

[1] Prior *et al.,* 2008
[2] Okelo *et al.,* 2013
[3] Brusamento *et al.,* 2012
[4] Heselmans *et al.,* 2009

2.3 Evidence statement: Educational meetings for guideline implementation

There is mixed evidence from four systematic reviews[1,2,3,4] on the effectiveness of educational meetings for increasing guideline uptake. Two reviews reported improvements in guideline uptake following educational meetings; one review found that the inclusion of nurse case management to educational workshops to promote

guideline uptake resulted in improvements in patient outcomes[1], while the other review reported the majority of included studies (74%) reported positive findings[4]. Two reviews did not find evidence of effectiveness on professional practice outcomes.[2,3.]

[1] Lineker and Husted, 2010
[2] van der Wees *et al.,* 2008
[3] Grimshaw *et al.,* 2004
[4] Medves *et al.,* 2010

2.4 Evidence statement: Continuing education for guideline implementation

There is mixed evidence from one overview of systematic reviews[1] and two systematic reviews[2,3] on the effectiveness of continuing education for increasing guideline uptake. All included overviews and systematic reviews reported mixed findings with both effective and ineffective results. All reviews were of poor quality and the components of continuing education were poorly described.

[1] Prior *et al.,* 2008
[2] Chaillet *et al.,* 2006
[3] Brusamento *et al.,* 2012

2.5 Evidence statement: Educational outreach visits for guideline implementation

There is strong evidence from one overview of systematic reviews[1] and two systematic reviews[2,3] about the effectiveness of educational outreach visits for increasing guideline uptake. An overview of systematic reviews reported positive findings for practice visits by educators, the provision of promotional material, and subsequent reminders or educational follow-up.[1] One review shows that educational outreach visits delivered by pharmacists reduced inappropriate prescribing[2] and the other review reported that healthcare visits from outside an organisation were beneficial in providing education to healthcare professionals.[3]

[1] Prior *et al.,* 2008
[2] Lineker and Husted, 2010
[3] Medves *et al.,* 2010

2.6 Evidence statement: Audit and feedback for guideline implementation

There is moderate evidence from one overview of systematic reviews[1] and moderate evidence from six systematic reviews[2,3,4,5,6,7] about the effectiveness of audit and feedback for increasing guideline uptake. An overview of systematic reviews reported moderate evidence of effectiveness of audit and feedback; eight of 18 included systematic reviews reported positive findings, while ten reported unclear findings. Four reviews reported moderate evidence that audit and feedback were effective[2,4,6,7] with the majority of included studies reporting positive findings. Two reviews (identifying one RCT each) reported no evidence that audit and feedback were effective.[3,5.]

[1] Prior *et al.,* 2008
[2] Chaillet *et al.,* 2006
[3] Lineker and Husted, 2010
[4] Okelo *et al.,* 2013
[5] Brusamento *et al.,* 2012
[6] Grimshaw *et al.,* 2004
[7] Medves *et al.,* 2010

2.7 Evidence statement: Opinion leaders for guideline implementation

There is mixed evidence from one overview of systematic reviews[1] and two systematic reviews[2,3] on the effectiveness of opinion leaders for increasing guideline uptake. All included overviews and systematic reviews reported mixed findings with both effective and ineffective results. All reviews were of poor quality.

[1] Prior *et al.,* 2008

[2] Chaillet *et al.,* 2006

[3] Medves *et al.,* 2010

2.8 Evidence statement: Patient mediated strategies for guideline implementation

There is mixed evidence from one overview of systematic reviews[1] and two systematic reviews[2,3] on the effectiveness of patient mediated strategies for increasing guideline uptake where patient-mediated strategies were defined as new clinical information (not previously available) which was collected directly from patients and given to the provider. An overview of systematic reviews reported mixed findings with five included reviews reporting positive findings and four reviews reporting inconclusive findings.[1] In this overview of reviews, patient-mediated strategies were defined as interventions designed to influence practitioner behaviour via information provided to patients. Two reviews reported that the majority of their included studies showed benefits in employing patient mediated strategies for guideline uptake; however all included reviews were of poor quality and in most cases the components of the patient mediated strategies were not reported.[2,3.]

[1] Prior *et al.,* 2008
[2] Grimshaw *et al.,* 2004
[3] Medves *et al.,* 2010

2.9 Evidence statement: Reminders for guideline implementation

There is moderate evidence from one overview of systematic reviews[1] and three systematic reviews[2,3,4] on the effectiveness of reminders for increasing guideline uptake. An overview of systematic reviews reported that 75% of included reviews showed positive findings.[1.] Three further systematic reviews support this finding.[2,3,4.] Reminders were provided verbally, on paper or on a computer screen.

[1] Prior *et al.,* 2008
[2] Chaillet *et al.,* 2006
[3] Grimshaw *et al.,* 2004
[4] Medves *et al.,* 2010

2.10 Evidence statement: Multifaceted interventions for guideline implementation

There is moderate evidence from two overviews of systematic reviews[1,2] and six systematic reviews[3,4,5,6,7,8] on the effectiveness of multifaceted interventions for increasing guideline uptake. The overviews reported that a combined total of 18 of the 22 included studies showed that multifaceted and intensive strategies were more effective than single interventions[1,2.]

There is mixed evidence from six systematic reviews about the effectiveness of multifaceted interventions; each primary study within the reviews used a different number and type of intervention components so it is not possible to report which components are most effective in combination. Four systematic reviews reported improvements in guideline uptake using multifaceted interventions[3,4,5,6]; one review reported mixed findings[7] and one review reported ineffective findings.[8]

[1] Prior *et al.,* 2008
[2] Francke *et al.,* 2008
[3] Chaillet *et al.,* 2006
[4] Okelo *et al.,* 2013
[5] Simpson *et al.,* 2005
[6] van der Wees *et al.,* 2008
[7] Brusamento *et al.,* 2012
[8] Grimshaw *et al.,* 2004

2.11 Evidence statement: Organisational change for guideline implementation

There is limited evidence from one overview of systematic reviews[1] and two systematic reviews[2,3] regarding the effectiveness of organisational change. No review suggested that organisational change was an effective intervention to increase guideline uptake.

[1] Prior *et al.,* 2008
[2] Okelo *et al.,* 2013
[3] Medves *et al.,* 2010

2.12 Evidence statement: Characteristics of guidelines thought to influence implementation

There is limited evidence from one overview of systematic reviews[1] and three systematic reviews[2,3,4] regarding characteristics of guidelines thought to influence implementation. Complexity, user unfriendliness, limited accessibility, trialability[*], discordance between guidelines, and lack of local ownership were suggested as barriers to implementation.[5,3,2] An overview of systematic reviews also reported that guidelines that do not require specific resources have a greater chance of implementation.[1]

[1] Francke *et al.,* 2008
[2] Gurses *et al.,* 2010
[3] Simpson *et al.,* 2005
[4] Cochrane *et al.,* 2007
[5] Okelo *et al.,* 2013

**Trialability was defined in terms of a question: Can the clinician test or try this guideline with relative ease? (Gurses 2010)

2.13 Evidence statement: Characteristics of professionals thought to influence implementation

There is limited evidence from one overview of systematic reviews[1] and three systematic reviews[2,3,4] regarding characteristics of professionals thought to influence implementation. Lack of physician awareness of, or agreement with guidelines,

conservative attitude, and greater experience of treating community acquired pneumonia and legal concerns were thought to be barriers to implementation.[2,3,4,1.]

[1] Francke *et al.,* 2008
[2] Simpson *et al.,* 2005
[3] Gurses *et al.,* 2010
[4] Cochrane *et al.,* 2007

2.14 Evidence statement: Characteristics of patients thought to influence implementation

There is limited evidence from one overview of systematic reviews[1] and two systematic reviews[2,3] regarding characteristics of patients thought to influence implementation. Overall, patient attitudes, knowledge, or behaviours (such as adherence) were all thought to influence implementation. These reviews also suggested that co-morbidities reduced the chance that guidelines are followed.[2,3,1.]

[1] Francke *et al.,* 2008
[2] Simpson *et al.,* 2005
[3] Cochrane *et al.,* 2007

2.15 Evidence statement: Characteristics of the environment thought to influence implementation

There is limited evidence from one overview of systematic reviews[1] and one systematic review[2,] regarding characteristics of the environment thought to influence implementation. The overview of systematic reviews suggested that lack of support from peers or superiors as well as insufficient staff and time were the main barriers to implementation[1], while the additional systematic review suggested that limited time, personnel and resources devoted to support guideline adherence and high workload were barriers.[2]

[1] Francke *et al.,* 2008

[2] Simpson *et al.,* 2005

2.16 Evidence statement: Barriers to implementation

There is limited evidence from two systematic reviews[1,2] regarding barriers to implementation. One review suggested that system characteristics such as the physical environment and organizational characteristics were barriers to implementation.[1]. The other review reported that lack of knowledge, awareness or skill, personal efficacy and lack of resources were barriers to implementation.[2]

[1] Gurses *et al.,* 2010

[2] Cochrane *et al.,* 2007