

Appendix 1. Evidence summary

Summary of new evidence from 2-year surveillance	Summary of new intelligence from 2-year surveillance	Impact
<p>NG7 – 01. Recommendation 1 Encourage people to make changes in line with existing advice ES 1.17, 1.31, 1.32, 1.33, 1.37, 1.40, 1.50, 2.7, 2.8, 2.10; IDE</p>		
<p>New evidence related to patterns of eating which included meal skipping¹⁻⁷, eating frequency⁸⁻¹⁰, timing of meals¹⁰ as well as weekly¹¹ and seasonal variations in eating were identified.</p> <p>Weekly Patterns</p> <p>A longitudinal study which examined weekend-weekday differences in diet among USA adults (n=11,646) found that weekday diets were healthier than weekend diets which had increased calorie intake and poorer diet quality¹¹. Weekend-weekday differences in diet varied by sex, age, race and/or ethnicity, education, income, and body weight status.</p> <p>Seasonal Patterns</p> <p>A 3 year cohort of healthy USA volunteers (n=103) between the ages of 18 and 75 years found that mean intake of energy, macronutrients, micronutrients, and food groups did not differ between seasons¹².</p> <p>Meal skipping, frequency and timing of meals</p> <p>A cohort study in Norwegian children (n=428) found that the number of children eating 4 main meals per day decreased from 4th grade (47%) to 7th grade (38%) with those who ate regular meals in 4th grade but not in 7th grade having higher odds of being overweight in 7th grade, this was not significant after adjustment for been overweight in</p>	<p>Patterns in eating, specifically grazing and gorging and temporal (seasonal, weekly and over a day) were indicated as a priority area for the focus of the 2 year surveillance review by the topic experts who responded to the questionnaire. These areas were all considered to represent gaps from the original guideline reviews.</p> <p>No specific evidence or further committee feedback was provided by the expert questionnaire that related to this focus area. However, 2 generic reviews were provided^{13,14}. These have been excluded as they did not meet the original guideline criteria of individual modifiable factors and individuals who are weaned.</p> <p>No additional intelligence indicated that this area required updating.</p>	<p>New evidence was identified that may change the recommendation</p> <p>Currently Recommendation 1 proposes that individuals are to be encouraged to identify perceptions, habits or situations that may undermine efforts to maintain a healthy weight or prevent excess weight gain in the long term, and offer practical examples of helpful alternatives should be identified. These may include maintaining healthier physical activity and dietary habits most days (including at weekends) and during holidays (for example, the school summer holiday). In addition, Recommendation 3 also states that everyone is to be encouraged to eat breakfast but not to increase overall daily energy intake.</p> <p>The new evidence relating to temporal differences in diet with regards to weekly or seasonal patterns to do not indicate any requirement to change the current recommendation.</p> <p>Meal skipping was not mentioned within the guideline and regularity of energy intake was considered only in relation to the consumption of breakfast within Recommendation 3.</p> <p>The new evidence supports the consumption of breakfast as a factor in preventing obesity. In</p>

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<p>4th grade¹.</p> <p>A cohort study investigated the associations of irregular intake of energy at meals in relation to cardiometabolic risk factors with either 10 (n=1416) or 17 years (n=1381) follow up². In individuals followed for 17 years (from age 36 years) subjects with a more irregular intake of energy at lunch and between meals had an increased risk of metabolic syndrome and this was associated with an increased waist circumference. In individuals followed for 10 years (from age 43 years) subjects with a more irregular intake at breakfast had an increased risk of metabolic syndrome as well as an increased BMI and waist circumference. In summary, subjects with a more irregular intake of energy, mostly at breakfast and lunch, appeared to have an increased cardiometabolic risk 10 and 17 years later.</p> <p>Eating or skipping breakfast was studied in 5 further cohort studies, the results are summarised in Recommendation 3 below³⁻⁷. Overall the studies indicate that consumption of breakfast is likely to be beneficial in preventing weight gain and skipping breakfast is potentially detrimental in terms of long term metabolic and weight outcomes. This is in line with current guideline recommendations.</p> <p>A longitudinal study which assessed weekday eating frequency with BMI z-score (BMIz) and change in BMIz in schoolchildren aged 9-15 years (n=55) over a 1 year period found that eating frequency increased BMIz by 0.03 units per eating</p>		<p>addition, from the limited time period searched for primary studies (end of guideline search May 2014-May 2016) there is evidence^{2,10} to indicate that regular and frequent eating in adults during the day could potentially be beneficial and result in a reduced risk of metabolic syndrome and lower BMI (prevent weight gain). This area could potentially be considered for updating within NG7.</p>

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<p>occasion in the initial 6 months of follow up but this association was not apparent at 1 year⁸.</p> <p>A small short term cohort study of individuals (n=59) over 7 days which assessed activity wrist and caloric intake demonstrated that the timing of meals was associated with overall energy intake but not with BMI⁹. In multivariate analyses eating more frequently, later timing of the last meal, and a shorter duration between last meal and sleep onset predicted higher total caloric intake.</p> <p>A longitudinal investigation in individuals aged 40 to 59 years from the USA and UK (n=2696) which included 4 instances of 24-hour dietary recall and BMI measurements conducted between 1996 and 1999 was identified¹⁰. The study demonstrated that compared to participants with fewer than 4 eating occasions in 24 hours, those with 6 or more eating occasions in 24 hours had lower mean BMI, total energy intake, dietary energy density, and higher Nutrient Rich Food Index 9.3 (34.3 versus 28.1). In multiple regression analyses, higher evening intake relative to morning intake was directly associated with BMI.</p>		
<p>NG7 – 02. Recommendation 2 Encourage physical activity habits to avoid low energy expenditure ES 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.11, 1.12, 1.15</p>		
<p>The content of this recommendation was not prioritised for a search for new evidence at this surveillance time point.</p>	<p>Topic experts highlighted the publication of an updated systematic review which examined the effectiveness and economic efficiency of behavioral interventions aimed at reducing recreational (i.e., neither school- nor work-related) sedentary screen time, as measured by screen time, physical activity, diet, and weight-related</p>	<p>New evidence was identified, that does not have an impact on the recommendation.</p> <p>The new evidence which indicates that reducing screen time improves weigh related outcomes supports the current guideline recommendations to encourage people to be more physically active and</p>

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	<p>outcomes¹⁵. The review included 49 studies with most studies targeted children aged ≤13 years. As children's composite screen time (TV viewing plus other forms of recreational sedentary screen time) decreased 26.4 (interquartile interval= -74.4, -12.0) minutes/day, obesity prevalence decreased 2.3 (interquartile interval= -4.5, -1.2) percentage points compared to a comparison group.</p> <p>Initial intelligence gathering identified the recently published Quality Standard: Obesity in children and young people: prevention and lifestyle weight management programmes (July 2015) QS94. This contains 1 Quality statement 8 (placeholder): Reducing sedentary behaviour that is relevant to NG7.</p> <p>No additional intelligence indicated that this area required updating.</p>	<p>to reduce sedentary behaviour. The evidence specifically supports the advice within the recommendation for people to reduce TV viewing and other screen time.</p>
<p>NG7 – 03. Recommendation 3 Encourage dietary habits that reduce the risk of excess energy intake</p> <p>ES 1.17, 1.18, 1.19, 1.20, 1.22, 1.23, 1.24, 1.25, 1.26, 1.27, 1.28, 1.29, 1.30, 1.33, 1.34, 1.35, 1.36, 1.37, 1.38, 1.39, 1.40, 1.41, 1.42, 1.43, 1.44, 1.45, 1.48, 1.49, 1.50; IDE</p>		
<p>Portion size</p> <p>A Cochrane review, with 72 included RCTs, which assessed the effect of the size of portion, package, individual unit or item of tableware on the amounts of food, alcohol or tobacco selected and/or consumed by participants was identified¹⁶. In total 35 studies manipulated portion size, 10 studies package size and 15 studies tableware size or shape. Only 3 studies focused on tobacco and none on alcohol. A meta-analysis of 86</p>	<p>Portion size, meal planning and patterns of eating (consumption of breakfast) were suggested as a priority area for the focus of the 2 year surveillance review by the topic experts who responded to the questionnaire. These areas were all considered to represent gaps from the original guideline reviews.</p> <p>Initial intelligence gathering highlighted the Cochrane review that was utilised for the evidence search for portion size. This is summarised under the new evidence section in column 1¹⁶.</p>	<p>New evidence was identified that may change the recommendation</p> <p>Recommendation 3 states that individuals are to be encouraged to follow a dietary pattern that is mainly based on vegetables, fruits, beans and pulses, wholegrains and fish. In addition, everyone should be encouraged to:</p> <ul style="list-style-type: none"> choosing smaller portions or avoiding additional servings of energy dense foods.

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<p>independent comparisons from 58 studies (n=6603) found a small to moderate effect of portion, package, individual unit or tableware size on consumption of food by both adults and children providing evidence that exposure to larger sizes increased quantities of food consumed . The size of the effect suggests that, if sustained reductions in exposure to larger-sized food portions, packages and tableware could be achieved across the whole diet, this could reduce average daily energy consumed from food by between 144 and 228 kcal among UK children and adults.</p> <p>Eating Pattern Breakfast consumption Eating or skipping breakfast and its association with obesity was investigated in 5 cohort studies in children³⁻⁷.</p> <p>A cohort study of 2-5 year old Australian children (n=8982) which investigated associations between skipping breakfast, the child's BMI and the mother's BMI found that overall skipping breakfast was associated with higher BMI in both children and mothers³. In addition girls at 4-5 years were significantly more likely to skip breakfast compared with boys (57% versus 43%).</p> <p>In the Dutch GECKO Drenthe birth cohort there was no association between breakfast skipping and been objectively measured as overweight at the age of 2 (n=1488) and 5 (n=1366) years⁴. An explanation for this finding might be that skipping breakfast is not (yet) an issue in these children as</p>	<p>Topic expert feedback highlighted that Public Health England has now released its new EatWell plate and whilst this did not impact on NG7s recommendations the links within the guideline should be assessed. The hyperlinks within NG7 are to the more generic NHS Choices webpages and as such do not require refreshing.</p> <p>Additionally, 3 studies addressing the consumption of dairy products and their association with weight management and diabetes prevention were highlighted by a committee member¹⁷⁻¹⁹. This dietary variable was not amongst the original individual modifiable factors that the guideline considered and hence is outside the scope of the current surveillance review. This factor will be reconsidered at the 4 year point.</p>	<ul style="list-style-type: none"> • Eat breakfast but do not increase overall daily energy intake. Breakfast choices should reflect existing healthy eating <p>With regards to portion size a recent Cochrane systematic review (September 2015) was utilised as the evidence source for the surveillance review. This new evidence supports the recommendation for smaller portion sizes but additionally provides evidence on package, individual unit or tableware size on consumption of food by both adults and children. Currently NG7 does not provide guidance on these factors as a means of preventing excess weight gain. NG7 could potentially be updated to reflect these measures.</p> <p>Eating or skipping breakfast was studied in 5 cohort studies³⁻⁷. Overall the studies indicate that consumption of breakfast is likely to be beneficial in preventing weight gain and skipping breakfast is potentially detrimental in terms of long term metabolic and weight outcomes. This is in line with current guideline recommendations.</p> <p>No studies were identified in the search period (May 2014-May2016) relating to meal planning. Hence at this time this area remains a gap and should be reconsidered at the next surveillance time point.</p>

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<p>only 3% skipped breakfast. A second 2 year prospective Dutch cohort of 4 year old children (n=5913) found that breakfast skipping was associated with a higher percent fat mass at age 6 years but there was no association with BMI or weight status⁵. Furthermore, no associations were found between lunch and dinner skipping at age 4 years and body fat at age 6 years.</p> <p>A 2 year prospective USA cohort of preadolescents identified numerous patterns (frequency and setting) relating to eating breakfast⁶. The results revealed that there was an increased odds of overweight/obesity among frequent skippers of breakfast compared with double breakfast eaters. There was no evidence that the provision of a second breakfast at school increased risk of excessive weight gain.</p> <p>A Swedish population-based cohort with a 27-year follow-up in adolescents (n=889) found that the odds for having metabolic syndrome at age 43 years were higher for those with poor breakfast habits at age 16 years compared with breakfast eaters⁷. Additionally, poor breakfast habits at age 16 years were associated with central obesity and high fasting glucose at age 43 years.</p>		
<p>NG7 – 04. Recommendation 4 Further advice for parents and carers of children and young people ES 1.3, 1.5, 1.11, 1.13, 1.15, 1.48, 1.51; IDE</p>		
<p>Limited evidence, 2 cohort studies, was found that addressed family meal settings.</p>	<p>Meal setting specifically family meals and distractions was suggested as a priority area for the focus of the 2 year surveillance review by the</p>	<p>New evidence was identified, that does not have an impact on the recommendation.</p>

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<p>A 10 year cohort study found that having family meals as an adolescent (n=2117) protects against becoming overweight or obese 10 years later as a young adult²⁰.</p> <p>A sub-study of the PRO GREENS project, looking at children aged 10-12 years from 9 European countries (n=6,316), assessed the association of eating family breakfast and dinner, and having a TV on during dinner, with being overweight²¹. The study concluded the associations between family meals and TV viewing during dinner with overweight were few and showed significance only in Northern Europe.</p>	<p>topic experts who responded to the questionnaire. This area was considered to represent a gap in the original guideline reviews.</p> <p>A committee expert provided a reference for a meta-analysis of 25 prospective cohort studies including 56,584 children and adolescents with an average 3.4-year follow-up²² which investigated sleeping habitats in relation to obesity prevention. The study reported that children with the shortest sleep duration (10.0 hours) were 76% more likely to be overweight/obese (odds ratio [OR]: 1.76; 95% confidence interval [CI]: 1.39, 2.23) compared to those with the longest sleep duration (12.2 hours). This effect had a dose response with every 1 hour/day increment in sleep duration, the risk of overweight/obesity reducing by 21%.</p>	<p>Recommendation 4 provides further advice for parents and carers of young on the prevention of obesity and parents, carers and everyone in regular contact with children and young people are to be encouraged:</p> <ul style="list-style-type: none"> • to eat meals with children and young people • help children and encourage young people to get enough sleep <p>The new evidence identified by both the searches and from the experts supports the recommendation.</p>
<p>NG7 – 05. Recommendation 5 Encourage adults to limit the amount of alcohol they drink ES 1.21; IDE</p>		
<p>The content of this recommendation was not prioritised for a search for new evidence at this surveillance time point.</p>	<p>No committee feedback was provided by the expert questionnaire that related to this area. No additional intelligence indicated that this area required updating.</p>	<p>No new evidence was identified, no changes</p>
<p>NG7 – 06. Recommendation 6 Encourage self-monitoring ES 1.52, 2.8; IDE</p>		
<p>Nine studies including 2 systematic reviews^{23,24}, 6 RCTs²⁵⁻³⁰ and 1 cohort study³¹ that have addressed the effectiveness of self-weighing for both obesity prevention (n=3) or for weight loss (n=6) were identified.</p>	<p>Frequency and tools for self-monitoring body weight was indicated as priority an area for the focus of the 2 year surveillance review due to it been a gap in the original guideline reviews.</p> <p>No additional references or committee feedback</p>	<p>New evidence was identified that may change the recommendation</p> <p>Recommendation 6 suggests the encouragement of habits that may help people to monitor their weight or associated behaviours. For adults the</p>

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<p>Weighing for prevention of obesity</p> <p>A RCT with 1 year follow up in college students (n=167), found that the daily use of Wi-Fi scales and graphic e-mail feedback, which enabled the caloric titration methodology (CTM) was effective in preventing age-related weight gain compared to the ad hoc use of Wi-Fi scales²⁵.</p> <p>A RCT in individuals (n=599) aged 18 to 35 years with a body mass index (BMI) of 21.0 to 30.0 which assessed 2 self-regulation interventions compared to control to prevent weight gain in young adults over a mean follow-up of 3 years was identified²⁶. Both interventions focused on frequent self-weighing to cue behaviour changes; with small changes being reducing calorie intake (100 calories and increasing activity 100 calories) or large changes which also included the initial loss of losing 2.3 to 4.5 kg to buffer against expected weight gain. Self-regulation with large or small changes both reduced weight gain compared to control, but the large-changes intervention was more effective.</p> <p>A longitudinal cohort study in adolescents and young adults (n=1868) that assessed variables at 3 times over 10 years indicated that there were positive correlations between self-weighing and weight concern for both genders³¹. Self-weighing was significantly inversely related to self-esteem and body satisfaction, increases in weight concern and depression in female and in weight concern in male participants. These findings suggest that self-weighing may not be an innocuous behaviour for young people, particularly women.</p>	<p>was provided by the expert questionnaire that related to this area. No additional intelligence indicated that this area required updating.</p>	<p>guideline gave the example of checking their weight regularly, for example weighing themselves once a week and cross refers to Recommendation 7 in behaviour change: individual approaches.</p> <p>Recommendation 7 in behaviour change: individual approaches did not specify how frequently self-monitoring should be practised and the evidence base for this guideline focused on weight loss with regards to monitoring. Hence for this surveillance review studies that also focused on weighing as a means of maintaining weight loss as a standalone intervention were also included for completeness.</p> <p>The new evidence supports the use of weighing as a means of monitoring and preventing weight gain. However, the majority of the evidence identified for the surveillance review has shown that daily monitoring with self-regulation (diet and exercise) not weekly as indicated in the guideline is effective. This area should therefore be considered for potential update.</p>

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<p>Weighing for weight loss</p> <p>A systematic review and meta-analysis of RCTs on the effectiveness of self-weighing for weight loss that included self-weighing as an isolated intervention (n=1) or as a component within an intervention (n=19) was identified²³. There was no evidence that self-weighing as a single strategy was effective but the addition of self-weighing to behavioural weight loss programmes resulted in increased weight loss compared to controls.</p> <p>A systematic review, which included 17 studies, which investigated associations between self-weighing and weight change as well as the psychological outcomes was identified²⁴. The analysis revealed that regular self-weighing was associated with more weight loss and not with adverse psychological outcomes (e.g., depression, anxiety). Findings demonstrated that the effect sizes of association between self-weighing and weight change varied across studies and also that the reported frequency of self-weighing varied across studies.</p> <p>A RCT in obese adults (n=183) found that daily weighing and recording the weight as a standalone intervention did result in weight lost - 0.5 kg (95% CI -1.3 to 0.3 kg) but this was not significantly different to the control group²⁷.</p> <p>A 2 year RCT in overweight individuals (n=162) assessed weight loss and weight loss maintenance using daily self-weighing and CTM compared to control²⁸. In year 1, weight change was compared between groups, and in year 2, the</p>		

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<p>control group started using the CTM while the intervention group continued using the CTM for maintenance. CTM resulted in significant difference in weight loss compared to control with the intervention being more effective in men. These results were supported by the second year of the trial.</p> <p>Two reports from a 6-month RCT comparing daily self-weighing with weekly emailed support and feedback to control in overweight men and women (n=91) for self-regulation of diet and exercise behaviours were identified^{29,30}. Daily weighers lost significantly more weight compared with those weighing less than daily. For psychological outcomes weighing resulted did not result in in depressive symptoms, anorectic cognitions, disinhibition, susceptibility to hunger, and binge eating. However the intervention group reporting lower body dissatisfaction and greater dietary restraint compared to controls.</p>		

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NG7 – 07. Recommendation 7 Clearly communicate the benefits of maintaining a healthy weight ES 2.2, 2.3, 2.4, 2.5, 2.9, 2.10; IDE		
The content of this recommendation was not prioritised for a search for new evidence at this surveillance time point.	No committee feedback was provided by the expert questionnaire that related to this area. No additional intelligence indicated that this area required updating.	No new evidence was identified, no changes
NG7 – 08. Recommendation 8 Clearly communicate the benefits of gradual improvements to physical activity and dietary habit ES 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10; IDE		
The content of this recommendation was not prioritised for a search for new evidence at this surveillance time point.	No committee feedback was provided by the expert questionnaire that related to this area. No additional intelligence indicated that this area required updating.	No new evidence was identified, no changes
NG7 – 09. Recommendation 9 Tailor messages for specific group ES 2.2, 2.3, 2.4, 2.5, 2.8, 2.10, 2.11; IDE		
The content of this recommendation was not prioritised for a search for new evidence at this surveillance time point.	No committee feedback was provided by the expert questionnaire that related to this area. No additional intelligence indicated that this area required updating.	No new evidence was identified, no changes
NG7 – 10. Recommendation 10 Ensure activities are integrated with the local strategic approach to obesity ES 2.6, 2.7, 2.10, 2.11; IDE		
The content of this recommendation was not prioritised for a search for new evidence at this surveillance time point.	No committee feedback was provided by the expert questionnaire that related to this area. No additional intelligence indicated that this area required updating.	No new evidence was identified, no changes

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Research recommendations		
RR – 01 What is the effect on weight outcomes of a collection of individually modifiable dietary habits, physical activity and other lifestyle behaviours?		
The content of this recommendation was not prioritised for a search for new evidence at this surveillance time point.	No committee feedback was provided by the expert questionnaire that related to this area. No additional intelligence indicated that this area required updating.	No new evidence was identified, no changes
RR – 02 What are effective and acceptable messages, routes and sources of communicating information about individually modifiable behaviours and weight outcomes for a range of population groups?		
The content of this recommendation was not prioritised for a search for new evidence at this surveillance time point.	No committee feedback was provided by the expert questionnaire that related to this area. No additional intelligence indicated that this area required updating.	No new evidence was identified, no changes
RR – 03 What are the optimal frequency and tools for self-monitoring body weight and associated behaviours in populations with a healthy weight?		
See Recommendation 6	See Recommendation 6	See Recommendation 6

On-going research

Ongoing research was identified through experts and the initial intelligence gathering (NIHR research in progress). If this was within the scope for NG7 it has been included:

- [Healthy Lifestyles Programme to prevent childhood obesity](#). National Institute for Research (NIHR) funded cluster randomised controlled trial with economic and process evaluation involving a multi-component four phase school based programme to deliver a general healthy lifestyle message encouraging a healthy energy balance Trial end date: Oct 2016, publication date May 2017.

- [The effectiveness and value for money of a programme to prevent primary school age children becoming overweight and obese](#) Health Technology Assessment Programme funded open-label cluster randomised controlled trial to compare the effectiveness of a theory based intervention package, to prevent obesity in children aged 6-7 with usual care. Trial end date: Aug 2015.
- [BiB 1000: Development and evaluation of interventions for the prevention of childhood obesity in a multi-ethnic population: the Born in Bradford NHS Research Programme.](#) NIHR programme to study the patterns and aetiology of childhood obesity in a multi-ethnic population, to develop a tailored prevention interventions.