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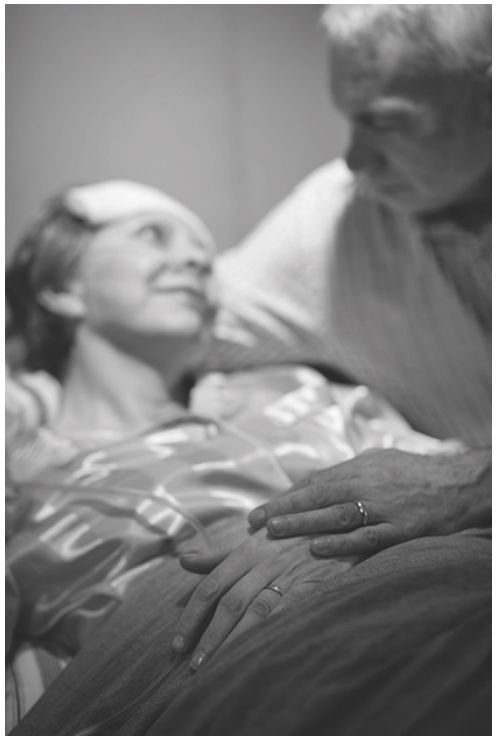
Healthcare intelligence

Department of Health & Social Care

REVIEW OF THE NHS-FUNDED NURSING CARE RATE IN ENGLAND



FINAL REPORT
Prepared for the Department of Health and Social Care
by LaingBuisson
26 April 2019

ABOUT US

Healthcare Intelligence

LaingBuisson has been serving clients for over 30 years with insights, data and analysis of market structures, policy and strategy across healthcare and social care. We are the chosen provider of independent sector healthcare market data to the UK Government's Office for National Statistics and work globally with providers, commissioners, payors, manufacturers, investors, regulators and advisors. We help our clients to understand their markets, make informed decisions and deliver better outcomes by providing market intelligence, consulting and data solutions.

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1. EXECUTIVE SUMMARY

1.1 Background

The Department for Health and Social Care (DHSC) commissioned LaingBuisson in November 2018 to undertake a study of the rate of NHS-funded Nursing Care (FNC) in England.

The purpose of the study was to:

a) Identify the total amount of nursing time required to meet FNC eligible residents' nursing needs

b) Identify the total cost of providing the nursing element of care to FNC eligible residents

c) Identify a single national weekly per-person rate that would cover the average costs of providing the FNC service

d) Calculate any variation in costs (by considering, for example, the level of care needed, regional cost differences and the size and specialism of the nursing home)

LaingBuisson carried out the work between November 2018 and February 2019. This report summarises the outputs of the work and presents the key findings to be considered in setting a weekly fee rate with effect from 1 April 2019.

To facilitate comparison, as far as possible this report follows the format adopted by Mazars' report on its assessment of NHS FNC carried out in 2015/16[1].

1.2 Key findings and recommendations

1. Using our report, DHSC has set a national FNC rate of £165.56 per week for the year commencing 1 April 2019

2. The number is derived from our FNC calculation of £173.32 per week in 2018/19, Table 1, after adjustments for inflation, an expectation of a 3.1% efficiency gain and a cap on allowable agency nurse hours of 10% of total nurse hours

3. The figure of £173.32 is a weighted average, weighted according to the share of English nursing home bed capacity operated by each category of provider – large corporates; medium sized groups; and small groups combined with independent homes. The weighting represents a

[1] *Review of the NHS-funded Nursing Care Rate in England*, Final Report May 2016, Mazars

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correction for a substantial over-representation of large corporate providers in the cost collection survey respondent sample. Further commentary on the rationale is presented in Section 4.4.2

4. The weighting is necessary because we found that large corporate providers were spending substantially more in 2018/19 on providing registered nursing staff (per nursing resident) than medium sized groups or small groups and independents which make up the bulk of English nursing home capacity. The difference we found was highly significant ($p < 0.01$, see Section 4.4.2, Figure 1). This is the reverse of Mazars' finding in their 2015/16 report, that large corporates spent about £10 per resident per week less than other provider categories

5. We looked at variations in registered nursing staff costs among all other categories of home which were over or under-represented in the respondent sample, but none required a similar weighting (see Section 4.5)

6. The calculations presented in Table 1 are based on responses to two complementary surveys we carried out in the period November 2018 to February 2019:

   a) A 'Cost Collection Survey' which collected data on registered nurse staffing costs incurred by 639 nursing homes in England. After filtering out invalid responses and extreme outliers, the remaining 623 usable responses represents 15% of the 4,332 nursing homes in England in November 2018, when the survey commenced

   b) A 'Nurse Activity Survey' designed to establish what proportion of registered nurse time is allocated to nursing care of FNC eligible residents, as opposed to time spent on non-FNC eligible residents and on non-nursing tasks. This survey achieved valid responses from 74 nursing homes, representing a response rate of 1.7%

   In Section 5.3, we describe two possible ways of combining the two surveys to calculate FNC. Method B is preferred in light of the limited response to the nurse activity survey. In essence, Method B calculates registered nurse costs per nursing resident (whether FNC eligible or not) from the 623 cost collection responses and then applies an adjustment factor from the 74 valid responses to the nurse activity survey to arrive at FNC-qualifying registered nurse costs per FNC-eligible nursing resident

7. Sensitivity analysis is presented in Section 6, looking at the impact of weighting to avoid systematic bias relating to under and over-representation of some categories of nursing home in the respondent sample, the method of application of the nurse activity adjustment factor and the approach to outliers

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Table 1 FNC-qualifying registered nurse costs per FNC-eligible resident per week 2018/19, England by operator scale (Method B[2])

	Validated records No.	On-shift employed registered nurses £ pw	On-shift agency registered nurses £ pw	Employed registered managers £ pw	Other supernumerary registered nurse costs £ pw	Total registered nurse costs £ pw	Total nursing home bed capacity ENGLAND	Bed capacity weighting factor
Large corporate (>=40 nursing homes)	478	£153.81	£48.74	£5.99	Small	£208.54	55,468	26%
Medium group (10-39 nursing homes)	58	£141.20	£26.77	£5.99	Small	£173.96	42,634	20%
Small group or independent (<10 nursing homes)	87	£112.06	£38.46	£5.99	Small	£156.51	117,781	55%
All operator scales (unweighted)	623	£147.60	£45.49	£5.99	Small	£199.08	215,883	100%
All (weighted by total English bed capacity for each operator scale)	623	£128.54	£38.80	£5.99	Small	£173.32		

DHSC adjustments: a) Cap on agency usage at 10% of nursing hours[1]	-£3.91	
a) 3.1% efficiency gain requirement	-£5.25	
a) 0.85% uplift for 3 months' pay inflation	+£1.40	
ADJUSTED FNC RATE FROM APRIL 1 2019	**£165.56**	

Note Extreme outliers on one or more of the cost components have been excluded using the Tukey method, see Appendix A, Section A1.4

1 The agency usage cap adjustment is calculated as follows: Total FNC nurse hours per FNC resident per week = 7.134 (5.76 employed and 1.37 agency); Agency is capped at 10% of total hours meaning that 0.7134 hours will be allowable at the agency rate of £28.23 per hour and the remaining 6.421 hours will be allowable at the average employed on-shift rate of £22.32 (including on-costs); Adjusted agency nurse cost per week = £20.14; Adjusted on-shift employed nurse cost per week = £143.29 per week.

[2] See Section 5.3 for a description of Method A and Method B for calculating FNC-qualifying costs per FNC-eligible resident

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2. INTRODUCTION

2.1 Legal and Policy Context

This section builds on the commentary in Section 2.2 of Mazars' report on their study of FNC costs in 2015/16.

The Department of Health and Social Care's National Framework for NHS continuing healthcare (NHS CHC) and NHS-funded nursing care (NHS FNC)[3], which was updated in March 2018 and came into effect from 1 October 2018, sets out the processes to be followed to assess eligibility for continuing healthcare for individuals who need ongoing care and support. NHS CHC is a package of care arranged and funded solely by the NHS where the individual has been found to have a 'primary health need' as defined by the eligibility criteria in the National Framework. If an individual is not assessed as eligible for NHS CHC, they may be assessed for NHS FNC which is a contribution to funding paid by Clinical Commissioning Groups directly to a care home for care provided by registered nurses employed by the home.

NHS-funded nursing care was first introduced in England by the Health and Social Care Act 2001[4]. Since its introduction, the NHS has funded a contribution towards the costs of nursing care, known as NHS-funded nursing care (NHS FNC) at nationally set standard rates for those individuals who are assessed as eligible for NHS FNC.

Initially three rates were set for NHS FNC to reflect three 'bands' of nursing care, low, medium and high. In 2007, with the introduction of the single National Framework for determining NHS FNC eligibility, the payment system was simplified to a single standard rate and a higher legacy rate for those individuals who were assessed as 'high' under the previous bandings. The number of residents in receipt of the legacy rate is now very low as it is only applied to residents who moved into a nursing home before 1 October 2007. Information and statistics on NHS continuing healthcare and NHS FNC is now published quarterly by NHS England[5].

NHS FNC rates were increased annually to track movements in the pay of NHS nurses, but the basis for setting NHS FNC rates was not extensively reviewed until Mazars was commissioned to carry out an independent study in 2015.

Following the Mazars review[6], the rate of NHS FNC was increased to £156.25 for the year commencing 1 April 2016 (previous year: £112.00). Mazars was subsequently commissioned to recalculate the Agency element of the NHS FNC rate and, following their second report, the NHS FNC rate was reduced to £155.05 in the year from 1 April 2017. Financial year 2018/19 saw an inflationary adjustment to £158.16 and in November 2018 LaingBuisson was commissioned to undertake a further review of NHS FNC in the light of the Welsh judgement (see below) on the definition of nursing care for the purposes of NHS FNC.

[3] DH National Framework for NHS continuing healthcare and NHS-funded nursing care, October 2018 (revised) https://www.gov.uk/government/publications/national-framework-for-nhs-continuing-healthcare-and-nhs-funded-nursing-care
[4] Health and Social Care Act 2001 49 (2) http://www.legislation.gov.uk/ukpga/2001/15/contents
[5] https://www.england.nhs.uk/statistics/statistical-work-areas/nhs-chc-fnc/
[6] *Review of the NHS-funded Nursing Care Rate in England*, Final Report May 2016, Mazars

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2.1.1 *Definition of NHS-funded Nursing Care*

The definition of registered nursing care is prescribed by legislation, policy guidance and legal decisions, as described below. The cost collection and nurse activity surveys were designed to take into account these definitions.

The Care Act 2014 Section 22(8)[7]

According to the Care Act *"a reference to the provision of nursing care by a registered nurse is a reference to the provision by a registered nurse of a service involving:*

> *(a) the provision of care, or*
>
> *(b) the planning, supervision or delegation of the provision of care, other than any services which, having regard to their nature and the circumstances in which they are provided, do not need to be provided by a registered nurse."*

National Health Service Commissioning Board and Clinical Commissioning Groups (Responsibilities and Standing Rules) Regulations 2012[8]

According to these regulations, 'nursing care' means nursing care by a registered nurse and *'nursing care by a registered nurse'* has the same meaning as in [section 22(8) of the Care Act 2014].

NHS-funded Nursing Care Practice Guide 2018 (came into force 1 October 2018)[9]

"The registered nurse input is defined in the following terms:

'services provided by a registered nurse and involving either the provision of care or the planning, supervision or delegation of the provision of care, other than any services which, having regard to their nature and the circumstances in which they are provided, do not need to be provided by a registered nurse'."

[7] http://www.legislation.gov.uk/ukpga/2014/23/section/22/enacted
[8] The National Health Service Commissioning Board and Clinical Commissioning Groups (Responsibilities and Standing Rules) Regulations 2012, http://www.legislation.gov.uk/uksi/2012/2996/contents/made (n.b. this is the original version of the regulations and therefore does not reflect the updated reference to the Care Act 2014)
[9] NHS-funded Nursing Care Practice Guidance https://www.gov.uk/government/publications/nhs-funded-nursing-care-practice

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Supreme Court judgment on the FNC rate in Wales

Local Health Boards in Wales commissioned a review of the rate of FNC in Wales. The report was published in July 2013[10]. In August 2017, the Supreme Court ruled against the Welsh Local Health Boards on how they had set the FNC rate in Wales. The administration and operation of the Welsh FNC rate is separate from the FNC rate in England, but the legislation governing FNC is very similar in Wales and England so the Supreme Court judgment is of relevance in the English Context. The Supreme Court judgment provided an interpretation of the definition of what constitutes 'nursing care by a registered nurse', meaning that the FNC rate should pay for the costs of everything within that definition[11]. It includes:

A. Direct and indirect time on nursing care, i.e. care which can only be provided by a registered nurse

B. Paid breaks

C. Time receiving supervision

D. Stand-by time

E. Time spent on providing, planning, supervising or delegating the provision of other types of care which in all the circumstances ought to be provided by a registered nurse because they are ancillary to or closely connected with or part and parcel of the nursing care which [the nurse] has to provide

2.2 Scope of work

The aim of the study described in this report was to determine the reasonable costs of providing the nursing element of care in a registered nursing home for FNC eligible residents. Reasonable costs are those which should allow care homes to provide sufficient numbers of suitably qualified, competent, skilled and experienced persons to provide FNC. Accordingly, the study considered:

a) **The amount of nursing time required to meet FNC eligible residents' nursing needs.** According to the definition of 'nursing care by a registered nurse' provided by the Supreme Court judgment on the Welsh FNC rate we were tasked with determining how much time nurses are required to spend in each category of tasks A) - E) set out in Section 2.1.1, above. We were also asked to determine how much time registered nurses spend on other categories of tasks outside of the legal definition of FNC, which is not be included in the calculation of the FNC rate, including tasks such as: administration of the care home; nursing care for NHS Continuing Healthcare eligible residents; and social care tasks that do not fall within the definition of category E) within the Supreme Court definition of nursing care. Additionally, it was specified that we should discount the cost of employing nursing associates or senior carers, as well as consumables/continence products and capital expenditure, as they are not included within the legal definition of FNC

[10] http://www.wales.nhs.uk/siteplus/866/opendoc/225186
[11] https://www.supremecourt.uk/cases/uksc-2016-0054.html

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b) **The total cost of providing the nursing element of care to FNC eligible residents**, to be identified through an examination of provider's financial records how much it is costing to employ registered nurses

c) **Identification of a single national weekly per-person rate that would cover the average costs of providing nursing care to FNC eligible residents** through a combination of the analysis under a) and b) and recommendation of a national, per-person, per-week, FNC rate that would meet those average costs

d) **Calculation of any variation in costs (by considering for example the level of care needed, regional cost differences and the size and specialism of the nursing home**). In considering the average rate, we were asked to adopt an effective statistical approach to allow for any variations among respondents in both the time and costs required to meet nursing needs - including, but not limited to, regional differences, as well as the size and type of nursing home

2.3 Approach

The detailed methodology underpinning our work is described in Section 5 and Appendix 1.

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3. ASSESSMENT OF REASONABLE FNC COSTS

3.1 Overview

For the purposes of designing the surveys and using the results to arrive at our view of the 'reasonable' cost of NHS FNC, we have taken into account the legal and policy framework as well as feedback from the sector on current operating models. We have also taken advice from DHSC on interpretation of the legal framework, including the impact of the Welsh case appeal judgement.

3.2 Costs which count towards FNC

The reasonable costs which count towards NHS FNC are limited to gross pay and on-costs for employed registered nurses in addition to the cost of agency supplied registered nursing staff, the latter including non-recoverable input VAT since nursing home services are VAT exempt, but only insofar as registered nurses are performing tasks which qualify for FNC for FNC-eligible nursing home residents, see Section 3.4.

Registered nurse pay, on-costs and agency expenses count towards NHS FNC not only for 'on-shift' nurses but also for managers and other supernumerary staff, as long as they are registered nurses and as long as they are performing tasks which qualify for NHS FNC for FNC-eligible residents. Time spent on management does not count for FNC. Time spent by supernumeraries on 'dipping in' to nursing tasks normally provided by on-shift' staff does count for FNC, see Section 3.4.

The notes to the cost collection survey instructed respondents to include the following elements of gross pay and on-costs in their cost returns:

- Gross pay, including any additional allowances, bonuses, incentives, 'golden hellos' and other introduction payments, overtime, holiday, sickness and maternity pay, backfill for holidays, sickness/absence and training, relocation, redundancy and compromise agreement payments, as well as any under or over payments applied in the period
- On-costs, including Employers National Insurance and Employers Pension contributions and any other relevant payroll on-costs relating to registered nurses

Time spent by employed or agency registered nurses receiving training is included in our assessment of 'reasonable costs' in view of the requirement of Regulation 18 of the Health and Social Care Act 2008 (Regulated Activities) Regulations 201413 which states:

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"Staff must receive the support, training, professional development, supervision and appraisals that are necessary for them to carry out their role and responsibilities. They should be supported to obtain further qualifications and provide evidence, where required, to the appropriate regulator to show that they meet the professional standards needed to continue to practise."

Non-pay training costs do not count towards FNC, see Section 3.3.

3.3 Costs which do not qualify for FNC

We were advised by the DHSC that, as the law stands, costs which do not count towards FNC include:

- Non-pay training costs, i.e. payments to external (or internal) providers of training services, though time spent by employed and agency registered nursing staff on receiving training does count, see 3.2 above, as directed in the notes to the cost collection survey
- Nursing equipment as well as consumables such as continence products, swabs, needles, dressings, gloves and aprons
- Professional nurse registration fees, even if paid by the employer
- Recruitment expenses

3.4 Nurse time which counts towards FNC

We consider, as did Mazars in its 2015/16 study, that the most reasonable approach to determining the proportion of registered nurse costs that count towards FNC is to pro-rate costs according to the proportion of registered nurses' time that is spent on FNC qualifying tasks for FNC eligible nursing home residents.

There remains a degree of uncertainty, however, due to the fact that self-reporting of time and task by nurses depends on nurses' professional but subjective interpretation of the guidance they are given.

In the nurse activity survey, which is described in more detail in Appendix 1 Section A1.2, nurses were asked to record what they were doing at specified points of time according to a mutually exclusive and exhaustive list of activities comprising: direct nursing care, indirect nursing care, collateral nursing activities and the remainder – being tasks which do not need to be performed by a registered nurse.

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In the case of direct and indirect nursing, they were also asked to record whether the activity was being carried out for FNC eligible residents, or non-eligible residents, or both.

In consultation with DHSC and nursing home representatives, guidance notes were drafted on the meaning of these terms and were incorporated in the nurse activity survey, Box 1.

Box 1 Guidance notes incorporated in the nurse activity survey

What is Direct Nursing Care?
Direct Care is the physical provision of care to a resident which you need to undertake as part of your role as a registered nurse. It includes care that a carer or senior carer could perform but, by you doing it, it will assist you in your role as a registered nurse to ensure the provision of appropriate nursing care now and in the future. This will form a significant part of your role since almost everything with or for a resident involves gathering information in order provide the best possible nursing care today and in the future. To put it another way, the Supreme Court judgement given by Lady Hale in 2017 said that 'nursing care' means NOT ONLY any care that can only be provided by a registered nurse BUT ALSO other types of care, including social and personal care, which could possibly be provided by a senior carer or care assistant but which 'in all the circumstances ought to be provided by a registered nurse because the care is ancillary to, or closely connected with, or part and parcel of the nursing care which a registered nurse has to provide' … 'as part of an overall, holistic, person-centred plan for each resident who needs some nursing care'.

What is Indirect Nursing Care?
Indirect Care includes planning, supervision, delegating nursing care, liaising with other health professionals, ordering and checking medications, liaison with resident and other representatives.

Collateral nursing activities
This will include break times, stand-by time, handover time or time spent receiving supervision etc, as long as it is time you are paid for. Stand-by may make up quite a large proportion of overall time, especially on night shifts.

Tasks which do NOT need to be performed by a registered nurse
This includes general management. So, if you are a manager or other supernumerary staff member whose main role is management, most if not all of your activities will come under this heading. Only if you 'dip in' to undertake on-shift nursing tasks will you select another of the activity options. If you are an 'on-shift' nurse, it is unlikely you will select this option very often or at all, unless you are doing something which simply isn't part of your role as a registered nurse or is not closely related and is not ancillary to nursing tasks. This is still care provision but which someone other than a registered nurse could provide without your supervision or involvement and is not related to something you would need to understand or know about as part of your role as a registered nurse.

To minimise the burden on respondents to the nurse activity survey, we did not ask questions which would have no bearing on the calculated FNC rate. For this reason, we are unable to present as detailed a division of time between different activities as that offered by Mazars in their 2016 report.

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4. SURVEY APPROACH AND SAMPLE RELIABILITY

Two surveys were conducted in the period November 2018–January 2019 with a view to collecting the necessary data to determine the costs borne by nursing homes in providing FNC-qualifying registered nursing care to FNC-eligible nursing home residents.

- The cost collection survey, designed to establish the cost to nursing home operators of supplying registered nursing staff for their residents
- The nurse activity survey, designed to establish the share of registered nursing staff costs that is used to deliver FNC-qualifying nursing care to FNC-eligible residents

4.1 Intensive follow-up sample

We sought participation in both surveys from the entire universe of English nursing homes, using three approaches to the target audience:

- Managers of all 4,332 English nursing homes for whom we had email addresses were emailed, inviting participation
- Chief Executives of all groups which operate nursing homes in England were emailed, also inviting participation at either a group or individual home level
- We engaged with nursing home representative groups at senior level to promote participation

In this sense these were universal rather than sample surveys.

In parallel with the universal survey, a 10% sample (stratified into 18 segments by nine regions and two broad primary client types) was selected for more intensive follow-up. The intention was to be able to use the results from the intensive follow-up sample in preference to the universal survey, if the intensive follow-up were to generate a substantially higher response rate. In the event, the intensive follow-up achieved a response rate of 86, or 20% of the sample. This was higher than the universal response rate of 15%, but the responses were still dominated by nursing homes operated by large corporate providers. Consequently, there was no case for using the results from the intensively followed up sample in preference to the much larger number of results from the universal survey.

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4.2 Cost collection survey

Data was collected from individual nursing homes using a home specific web form linked directly to a secure LaingBuisson database.

Nursing home groups were given (and took) the option of making a central return by populating an equivalent spreadsheet with one line per home, the data subsequently being uploaded into the secure LaingBuisson database.

The questions posed in the cost collection survey are listed in Appendix 2.

4.3 Nurse activity survey

For the purposes of establishing the share of registered nurse time absorbed by FNC-qualifying activities for FNC-eligible residents, we sought to improve on the 'timecard' method. We did so based on our experience from carrying out a similar study in Wales, where collecting accurate information from 'timecards' or 'diaries' proved challenging[12].

As an alternative, we developed an on-line tool which would alert participating nurses by mobile phone at random times during their shifts, asking them to select the option from a brief menu that best described the activity they were engaged on at the time of the alert. The six activity options are set out Appendix 2. Subject to efficient implementation, the two methods, random time sampling and timecard completion for an entire shift, can be expected to generate an equivalent time distribution of activities.

There was, however, resistance to a pure mobile phone-based survey and the nurse analysis survey was relaunched in a hybrid form, allowing respondents to gather data using paper-based systems if that was their preference, though still using the method of recording activities at sampled times rather than recording the entire activities of a shift in a timecard.

In the event, the nurse activity survey achieved a level of only 74 valid responses.

4.4 Statistical tests for the FNC results

We consider here three questions:

[12] Problems included non-contemporaneous recording of activities by nurses, loss of paper records, etc.

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- Confidence limits for calculated mean registered nurse costs (employed and agency combined) per nursing resident, derived from the cost calculation survey, which is the main driver of FNC
- The validity of the weighting undertaken to adjust for the over-representation of nursing homes operated by large corporates
- Confidence limits for the calculated mean adjustment factor, derived from the nurse activity survey, to translate nurse costs per nursing resident to FNC-qualifying costs per FNC-eligible resident

4.4.1 *Confidence limits for mean registered nurse costs per nursing resident calculated from the cost collection survey*

Registered nurse cost per nursing resident (including those in receipt of CHC and FNC) is the principal driver of FNC costs, though raw results need to be adjusted to take account of non-FNC nurse costs.

We have used the following formula to calculate the 95% confidence limits of registered nurse costs per nursing resident (though it should be noted that the numbers are only valid for the particular profile of respondents we obtained, skewed as it was to large corporate operators).

$$\bar{x} = Z * \sigma / \text{sqrt}(n)$$

Where $\bar{x}$ is the mean of the home by home distribution of values, **Z** is 1.96 (being the Z value for 95% confidence) σ is the standard deviation and **sqrt(n)** is the square root of the 616 valid responses with information on registered nursing costs per nursing resident.

The result is £244.69 ± £7.55, meaning that we can be 95% confident that the true mean nurse cost per nursing resident (for the particular ownership profile) is within 3.1% of the calculated value.

These numbers are derived exclusively from the cost collection survey and differ from the FNC costs in Table 1 for two reasons. First, they are not adjusted for non-FNC nurse activity (from the nurse activity survey) and second, the calculated mean values are unweighted by operator scale and are significantly higher than the weighted mean (aggregate) values used in the calculation of FNC in Table 1.

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4.4.2 *Validity of the weighting undertaken to adjust for the over-representation of large corporate nursing homes*

Using the same formulae as in Section 4.4.1, we calculated the mean, standard error and 95% confidence limits for registered nurse cost per nursing resident for each of the three operator scales (large corporate, medium sized group and small group / independent).

Large corporate (>=40 nursing homes)	**£257.05 ± £8.64**
Medium group (10-39 nursing homes)	**£212.15 ± £22.91**
Small group or independent (<10 nursing homes)	**£196.67 ± £16.30**

The results are illustrated in Figure 1.

The key finding is that the 95% confidence limit of the large corporate operator mean value does not overlap with the confidence limits for the medium and smaller group operator mean values. Nor do 99% confidence limits overlap, meaning that the probability of differences being a result of sampling error is less than 1%.

This confirms that it is rational to weight the FNC results to adjust for the over-representation of large corporates.

The substantial variation in nurse costs by operator scale which we found, with costs reported by large corporates being much higher than those reported by medium sized and smaller providers, was not found by Mazars in its 2015/16 study. Rather, Mazars found that large corporates' nurse costs were a little lower than other categories of provider, by about £10 per FNC-eligible resident per week (see Table 7 of the Mazars report). For that reason, Mazars found no reason to adjust their FNC calculation for over-representation of large corporates in their respondent sample.

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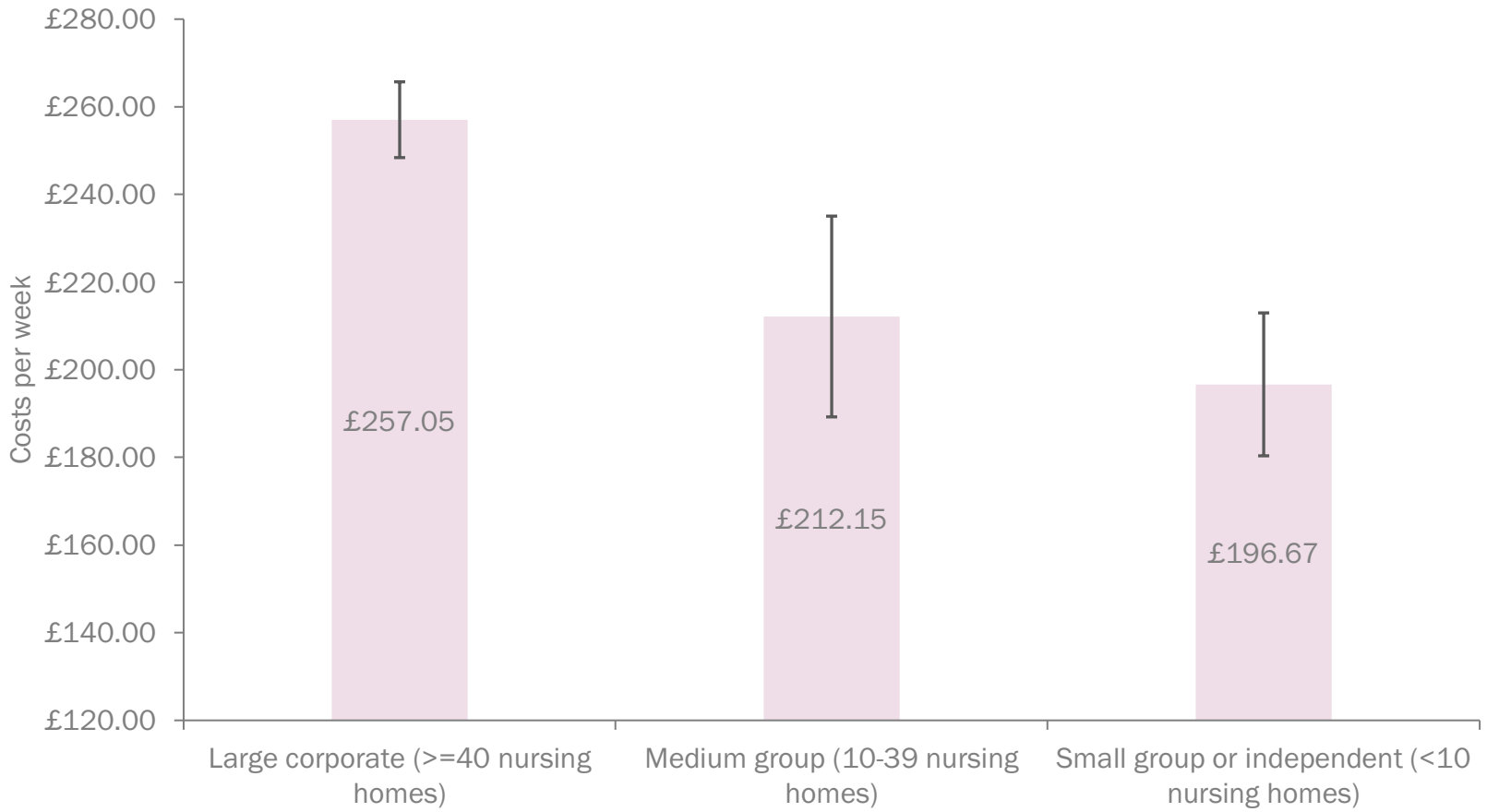
Figure 1 Mean and 95% confidence limits for unadjusted and unweighted[1] on-shift registered nurse costs (employed and agency) per nursing resident per week



Note **1** The mean registered nurse costs per nursing resident displayed in this Figure are derived exclusively from the cost collection survey and differ from the FNC costs in Table 1 for two reasons. First, they are not adjusted for non-FNC nurse activity (from the nurse activity survey) and second, the calculated mean values displayed here are unweighted for enterprise scale and are significantly higher than the weighted mean (aggregate) values used in the calculation of FNC in Table 1.

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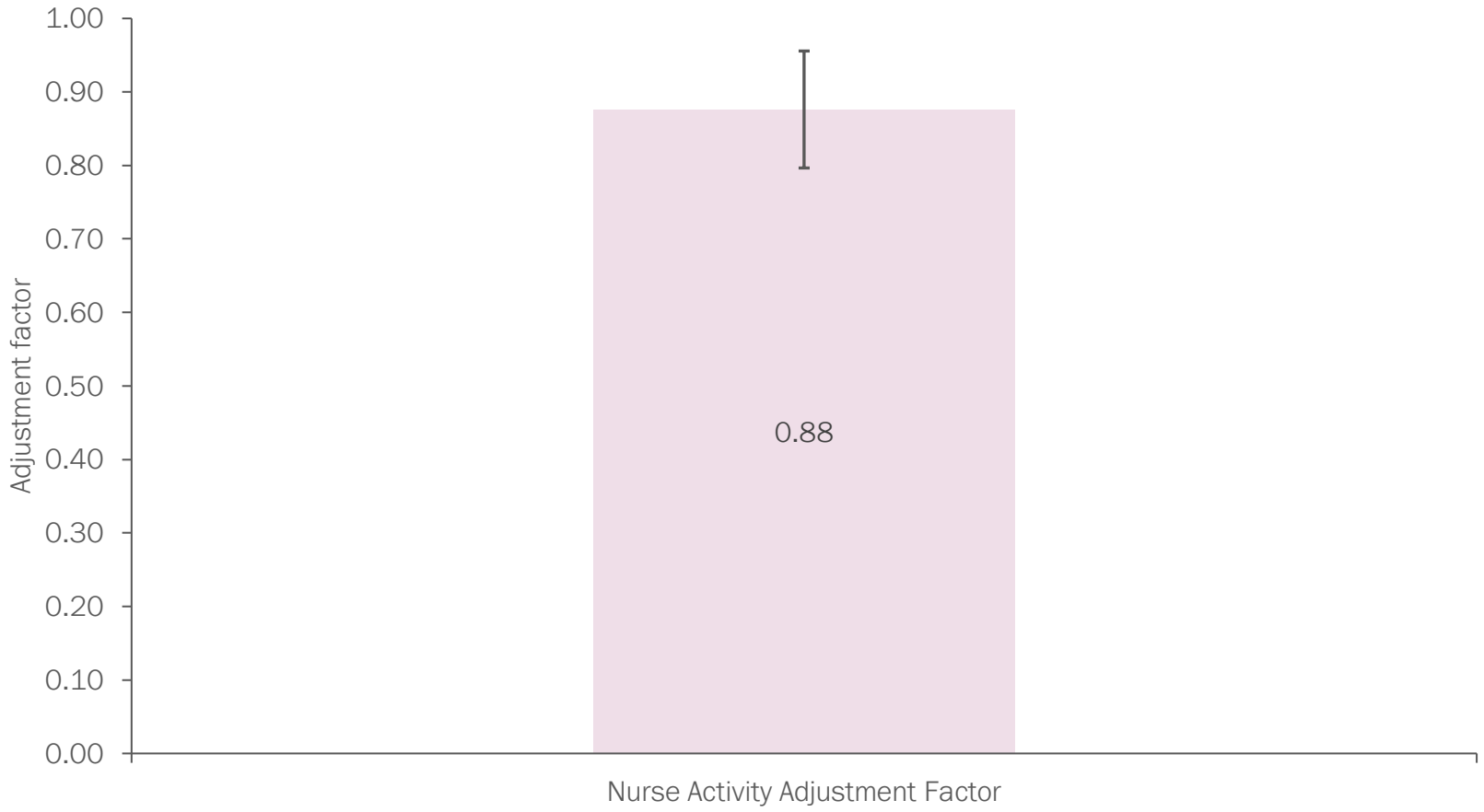
4.4.3 *Confidence limits for the mean adjustment factor calculated from the nurse activity analysis*

Figure 2 Mean and 95% confidence limits for the nurse activity survey factor[1] necessary to adjust nurse costs per nursing resident per week (from the cost collection survey) to FNC-qualifying costs per FNC-eligible resident per week



Note **1** The adjustment factor is defined as [Share of nurse time spent on FNC-eligible residents] ÷ [FNC-eligible residents as a share of total nursing residents], each being derived from the nurse activity survey, The logic is contained within the Method B formula for calculating FNC, set out in Section 6.3.2

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Using the same formulae as in Section 4.4.1, we calculated the mean, standard error and 95% confidence limits for the adjustment factor, derived from the nurse activity survey, used to translate registered nurse costs per nursing resident to FNC-qualifying costs per FNC-eligible resident, Figure 2.

The result was a calculated adjustment factor mean of 0.88 ± 0.08, meaning that we can be 95% confident that the true mean adjustment factor is within 9% of the calculated value.

4.5 Sample representativeness and weighting methodology

A summary comparison of the respondent sample profile and the profile of all English nursing homes is presented in Table 2.

The respondent sample was close to being representative of English nursing homes in relation to the following variables:

- Region (though the North was under-represented to a small extent in the sample and Greater London was over-represented);
- Provider sector
- CQC rating

The respondent sample was unrepresentative of English nursing homes in relation to the following variables:

- Operator scale, with large corporate owned homes being over-represented
- Size of homes, where homes with less than 30 beds were under-represented and homes with more than 50 beds were over-represented
- Primary client type, where homes for younger adults were under-represented
- Property type, where purpose-built nursing homes were over-represented

For each of these variables, we considered the need to weight the FNC calculation in Table 1 in order to eliminate any systematic bias resulting from under and over-representation. We did so by looking at how weighting of the raw results to correct for over or under-represented variables would impact on the calculated national FNC rate.

In summary, operator scale was the only variable where weighting for over and under-representation had a substantial impact the calculated national FNC rate. Consequently, we adopted weighting by operator scale as a key aspect of the FNC calculation, as presented in Table 1, in order to eliminate the strong bias towards higher costs caused by over-representation on large corporate operated homes.

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The evidence for the other over and under-represented variables, where we considered weighting was not necessary, is presented in the remainder of this Section, Tables 3 to 9. It should be noted that these Tables represent exploratory analysis which was completed in order to assess whether weighting the sample could give a more representative result, and if so what the most appropriate weighting method was. Given weighting by both operator scale and additional categories was necessary to complete this exploratory analysis, the nurse activity adjustment factor needed to be held constant due to the small or zero nurse activity sample in each category. This double weighting also results in a small number of cost collection survey observations being given a large weight to produce some of the figures. However, both of these limitations are justifiable given this was necessary exploratory analysis needed to explore the weighting methodology chosen, and not analysis that calculated the final rate.

Table 2 Profile of nursing homes in the respondent sample and in the universe of English nursing homes

	Respondent sample %	Universe of English nursing homes %	Respondent sample No.	Universe of English nursing homes No.
Operator scale				
Large corporate (>=40 nursing homes)	77%	21%	478	905
Medium group (10-39 nursing homes)	9%	18%	58	784
Small group or independent (<10 nursing homes)	14%	61%	87	2,643
All operator categories	100%	100%	623	4,332
Region				
North	26%	30%	161	1,295
Midlands and East	30%	30%	188	1,279
South	32%	32%	201	1,401
Greater London	12%	8%	73	357
	100%	100%	623	4,332
Size of home (registered beds)				
<30 beds	3%	19%	20	840
30-50 beds	38%	38%	236	1,638

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>50 beds	59%	43%	367	1,854
All sizes	100%	100%	623	4,332
Primary client type				
Old age (65+)	75%	64%	469	2,756
Dementia	23%	21%	145	918
Younger adults (18-64)	1%	15%	9	658
All primary client types	100%	100%	623	4,332
Provider sector				
For-profit	88%	86%	549	3,730
Not-for-profit	12%	14%	74	602
All sectors	100%	100%	623	4,332
Property type				
Purpose built	66%	48%	410	2,066
Not purpose built	34%	50%	213	2,155
Purpose built status unknown	0%	3%	-	111
All	100%	100%	623	4,332
CQC overall rating				
Good of Outstanding	74%	70%	459	3,016
Requires Improvement or Inadequate	24%	25%	150	1,095
No published rating	2%	5%	14	221
	100%	100%	623	4,332

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4.5.1 *Region*

We found some regional differences in FNC costs, presented in Table 3, though the North/South gradient was less marked than that found in the Mazars report. In 2018/19, according to the data we collected, costs in the North and the Midlands/East were 3.8% and 4.3% respectively below the England average, the South was higher (+4.6%) than average and Greater London was substantially higher (+10.4%). In all cases, regional costs were calculated after weighting to adjust for over-representation of large corporates in the respondent sample.

Staffing intensity (registered nurse hours per nursing resident) was the main driver of Greater London's higher costs in 2018/19. Surprisingly, Greater London pay rates and agency prices did not differ greatly from England averages. Staffing intensity was also a driver of lower costs reported by respondents from the North and Midlands/East, close behind the impact of lower pay rates and agency prices. While lower pay rates and agency prices were expected in the North and Midlands compared with the South, a North/South gradient in nurse staffing intensity was not expected, and needs to be better understood in any future consideration of the appropriateness of regional FNC rates.

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Table 3 FNC-qualifying registered nurse costs per FNC-eligible resident per week, England 2018/19 weighted average costs[1] by REGION

	Validated records No.	On-shift employed registered nurses £ pw	On-shift agency registered nurses £ pw	Employed registered managers £ pw	Other Costs £ pw	Total Costs £ pw	Divergence from England
North	161	£113.36	£43.06	£5.99	Small	£162.41	-3.8%
Midlands and East	188	£118.93	£36.72	£5.99	Small	£161.64	-4.3%
South	201	£135.07	£35.55	£5.99	Small	£176.60	4.6%
Greater London[2]	73	£141.82	£38.67	£5.99	Small	£186.47	10.4%
Total a) All regions (weighted by both regional and operator scale bed capacity)	623	£124.49	£38.43	£5.99	Small	£168.90	0.0%
Total b) All regions (weighted by operator scale bed capacity only, as per Table 1)	623	£128.54	£38.79	£5.99	Small	£173.32	

Note: The nurse activity adjustment factor has been held constant at an all England level to avoid division by zero errors in small geography/enterprise scale segments.

1 To adjust for over-representation of large corporates, the costs reported by survey respondents have been calculated separately for each operator scale (large corporate, medium and small, as per Table 1) and weighted according to the proportion of total English nursing home bed capacity operated by providers in that operator scale. **2** Because there were only two valid responses in London for each of the operator scales: 'Medium Group' and 'Small Group or Independent', values for the South East were substituted for those two operator scales in Greater London.

Table 3 includes a comparison between FNC costs calculated a) after weighting the results for both under and over-representation of regions and over-representation of large corporates in the respondent sample, and b) after weighting the results for over-representation of large corporates only. The two numbers are sufficiently close for their 95% confidence limits to overlap.

Therefore, additional weighting by region would not have made a significant difference to the FNC calculation in Table 1, and for this reason we concluded that Table 1 should not include any regional weighting.

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4.5.2 *Primary client type*

Variations in FNC costs by primary client type are presented in Table 4. The three primary client types analysed are Older People (65+), Dementia and Younger Adults (18-64), the latter comprising Mental Health, Learning Disabilities and Physical Disabilities. Where CQC registers homes with more than one client type, LaingBuisson undertakes its own research to determine which one is the primary client type.

Table 4 FNC-qualifying registered nurse costs per FNC-eligible resident per week, England 2018/19 weighted average costs[1] by PRIMARY CLIENT

	Validated records	On-shift employed registered nurses	On-shift agency registered nurses	Employed registered managers	Other Costs	Total Costs	Divergence from England
Old age (65+)	469	£130.64	£36.25	£5.99	Small	£172.87	-0.1%
Dementia	145	£123.72	£48.30	£5.99	Small	£178.01	2.9%
Younger adults (18-64)[2]	9	£116.91	£35.71	£5.99	Small	£158.61	NA
Total a) All primary client types (weighted by both client type and operator scale bed capacity)	623	£127.88	£39.18	£5.99	Small	£173.04	0.0%
Total b) All primary client types (weighted by operator scale bed capacity only, as per Table 1)	623	£128.54	£38.79	£5.99	Small	£173.32	

Note: The nurse activity adjustment factor has been held constant at an all England level to avoid division by zero errors in small client type/enterprise scale segments.

1 To adjust for over-representation of large corporates, the costs reported by survey respondents have been calculated separately for each operator scale (large corporate, medium and small, as per Table 1) and weighted according to the proportion of each client type's nursing home bed capacity operated by providers in that operator scale. **2** Insufficient validated records to calculate divergence from England all clients average with reasonable confidence.

FNC costs for Dementia are calculated at 2.9% above the all client type average and FNC costs for Older People (65+) are calculated at 0.1% below the all client type average. There were insufficient data points for younger adults (18-64) to calculate the cost divergence for that primary client group with reasonable confidence. No direct comparisons can be made with the findings of Mazars' 2016 report, since Mazars' client types were different. Table 4 includes a comparison between FNC costs calculated a) after weighting the results for both under and over-representation of primary client

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types and over-representation of large corporates in the respondent sample, and b) after weighting the results for over-representation of large corporates only. The two numbers are very close. Therefore, additional weighting by primary client type would not have made a significant difference to the FNC calculation in Table 1, and for this reason we concluded that Table 1 should not include any primary client type weighting.

4.5.3 *Home size*

Variations in FNC costs by size of home (number of registered beds) are presented in Table 5.

Table 5 FNC-qualifying registered nurse costs per FNC-eligible resident per week, England 2018/19 weighted average costs[1] by HOME SIZE (beds)

Registered beds	Validated records	On-shift employed registered nurses	On-shift agency registered nurses	Employed registered managers	Other Costs	Total Costs	Divergence from England
<30 beds	20	£140.42	£23.70	£5.99	Small	£170.10	-1.5%
30-50 beds	236	£126.38	£38.89	£5.99	Small	£171.26	-0.8%
>50 beds	367	£128.24	£39.52	£5.99	Small	£173.74	0.6%
Total a) All home sizes (weighted by both home size and operator scale bed capacity)		£128.56	£38.19	£5.99	Small	£172.73	0.0%
Total b) All home sizes (weighted by operator scale bed capacity only, as per Table 1)	623	£128.54	£38.79	£5.99	Small	£173.32	

Note: The nurse activity adjustment factor has been held constant at an all England level to avoid division by zero errors in small home size/enterprise scale segments.

1 To adjust for over-representation of large corporates, the costs reported by survey respondents have been calculated separately for each operator scale (large corporate, medium and small, as per Table 1) and weighted according to the proportion of each bed band's nursing home bed capacity operated by providers in that operator scale.

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Using this as a proxy for scale, we found only weak evidence of economies of scale in the cost of nursing staff. This contrasts with Mazars' 2016 report, which found a strong inverse relationship between cost per resident and registered bed numbers, see Table 6 of their report. We did, however, find stronger evidence of economies of scale when we used numbers of nursing residents as a (better[13]) proxy for scale, see Table 6.

Table 5 includes a comparison between FNC costs calculated a) after weighting the results for both under and over-representation of home size and over-representation of large corporates in the respondent sample, and b) after weighting the results for over-representation of large corporates only. The two numbers are very close. Therefore, additional weighting by home size would not have made a significant difference to the FNC calculation in Table 1, and for this reason we concluded that Table 1 should not include any home size weighting.

Table 6 FNC-qualifying registered nurse costs per FNC-eligible resident per week, England 2018/19 weighted average costs[1] by NUMBER OF NURSING RESIDENTS

Nursing residents	Validated records	On-shift employed registered nurses	On-shift agency registered nurses	Employed registered managers	Other Costs	Total Costs	Divergence from England
<10	6	£320.03	£57.89	£5.99	Small	£387.52	124%
10-19	111	£199.36	£59.82	£5.99	Small	£231.48	34%
20-29	192	£156.66	£53.41	£5.99	Small	£184.07	6%
30-39	139	£107.88	£33.63	£5.99	Small	£147.50	-15%
40-49	70	£111.38	£37.14	£5.99	Small	£154.50	-11%
>=50	105	£129.72	£41.95	£5.99	Small	£177.66	3%
All bands	623	£128.54	£38.79	£5.99	Small	£173.32	0%

Note: The nurse activity adjustment factor has been held constant at an all England level to avoid division by zero errors in small nursing resident/enterprise scale segments.

1 To adjust for over-representation of large corporates, the costs reported by survey respondents have been calculated separately for each operator scale (large corporate, medium and small, as per Table 1) and weighted according to the proportion of each nursing resident band's nursing home bed capacity operated by providers in that operator scale.

[13] Registered beds can be a poor proxy for scale since beds in nursing homes may also be occupied by people receiving residential care only and it is possible for a large home to accommodate a small (and uneconomic) number of nursing residents requiring the presence of nursing staff

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When we measured scale as the number of nursing care residents, Table 6, we did observe the expected fall in nursing costs per nursing resident as the number of nursing residents rose[14]. The inverse relationship applies across the range from <10 to 30-39 residents, though it reverses in the highest bands of 40-49 and >=50 nursing residents. We are unable to offer an explanation of why economies of scale should run out, and indeed reverse, past 40 beds. We simply note it as an observation.

The issue of whether or not to weight Table 1 results for over or under-representation of numbers of nursing residents in the respondent sample is academic since we have no data on the distribution of nursing residents in the universe of English nursing homes.

4.5.4 *Property type*

Variations in FNC costs by property type (purpose built or not purpose built) are presented in Table 7. Costs are on average higher for purpose-built nursing homes, by almost £20 per week, after adjusting for over-representation of large corporate owned homes, suggesting no general efficiency gain (in the deployment of nurses at least) from the provision of nursing care in purpose-built property.

Table 7 includes a comparison between FNC costs calculated a) after weighting the results for both under and over-representation of property type and over-representation of large corporates in the respondent sample, and b) after weighting the results for over-representation of large corporates only. The two numbers are very close. Therefore, additional weighting by property type would not have made a significant difference to the FNC calculation in Table 1, and for this reason we concluded that Table 1 should not include any property type weighting

[14] CQC registration requires 24-hour cover by a registered nurse in a nursing home to meet the requirements of Regulation 18 of the Health and Social Care Act 2008 (Regulated Activities) Regulations 2014: *"The intention of this regulation is to make sure that providers deploy enough suitably qualified, competent and experienced staff to enable them to meet all other regulatory requirements described in this part of the Health and Social Care Act 2008 (Regulated Activities) Regulations 2014. To meet the regulation, providers must provide sufficient numbers of suitably qualified, competent, skilled and experienced staff to meet the needs of the people using the service at all times and the other regulatory requirements set out in this part of the above regulations."* Consequently, we would expect to observe diminishing costs per resident, at least over a part of the range until scale economies run out

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Table 7 FNC-qualifying registered nurse costs per FNC-eligible resident per week, England 2018/19 weighted average costs[1] by PROPERTY TYPE (purpose-built or not)

	Validated records	On-shift employed registered nurses	On-shift agency registered nurses	Employed registered managers	Other Costs	Total Costs	Divergence from England
Purpose built	410	£135.59	£39.77	£5.99	Small	£181.34	4.8%
Not purpose built	213	£118.99	£37.31	£5.99	Small	£162.29	-6.3%
Total a) All property types (weighted by both property type and operator scale bed capacity)	623	£128.42	£38.71	£5.99	Small	£173.11	0.0%
Total b) All property types (weighted by operator scale bed capacity only, as per Table 1)	623	£128.54	£38.79	£5.99	Small	£173.32	

Note: The nurse activity adjustment factor has been held constant at an all England level to avoid division by zero errors in small property type/enterprise scale segments.

1 To adjust for over-representation of large corporates, the costs reported by survey respondents have been calculated separately for each operator scale (large corporate, medium and small, as per Table 1) and weighted according to the proportion of each property type's nursing home bed capacity operated by providers in that operator scale.

Table 7 includes a comparison between FNC costs calculated a) after weighting the results for both under and over-representation of property type and over-representation of large corporates in the respondent sample, and b) after weighting the results for over-representation of large corporates only.

The two numbers are very close. Therefore, additional weighting by property type would not have made a significant difference to the FNC calculation in Table 1, and for this reason we concluded that Table 1 should not include any property type weighting.

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4.5.5 *Provider sector*

Table 8 FNC-qualifying registered nurse costs per FNC-eligible resident per week, England 2018/19 weighted average costs[1] by PROVIDER SECTOR (for-profit or not-for-profit)

	Validated records	On-shift employed registered nurses	On-shift agency registered nurses	Employed registered managers	Other Costs	Total Costs	Divergence from England
For-profit	549	£129.46	£37.67	£5.99	Small	£173.12	-0.1%
Not-for-profit	74	£126.09	£41.96	£5.99	Small	£174.04	0.5%
Total a) All property types (weighted by both property type and operator scale bed capacity)	74	£129.05	£38.19	£5.99	Small	£173.23	0.0%
Total b) All property types (weighted by operator scale bed capacity only, as per Table 1)	623	£128.54	£38.79	£5.99	Small	£173.32	

Note: The nurse activity adjustment factor has been held constant at an all England level to avoid division by zero errors in small provider sector/enterprise scale segments.

1 To adjust for over-representation of large corporates, the costs reported by survey respondents have been calculated separately for each operator scale (large corporate, medium and small, as per Table 1) and weighted according to the proportion of each provider sector's nursing home bed capacity operated by providers in that operator scale.

FNC costs by provider sector (for-profit or not-for-profit) are presented in Table 8. Total costs are very similar for the two.

Table 8 includes a comparison between FNC costs calculated a) after weighting the results for both under and over-representation of provider sector and over-representation of large corporates in the respondent sample, and b) after weighting the results for over-representation of large corporates only. The two numbers are almost identical. Therefore, additional weighting by provider sector would not have made a significant difference to the FNC calculation in Table 1, and for this reason we concluded that Table 1 should not include any provider sector weighting.

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4.5.6 *CQC rating*

Variations in FNC costs by CQC rating are presented in Table 9. Costs in nursing homes with a Good or Outstanding rating are a little more than £10 per week lower than in homes with a Requires improvement or Inadequate rating.

Table 9 FNC-qualifying registered nurse costs per FNC-eligible resident per week, England 2018/19 weighted average costs[1] by CQC RATING (most recent at March 2019)

Overall rating	Validated records	On-shift employed registered nurses	On-shift agency registered nurses	Employed registered managers	Other Costs	Total Costs	Divergence from England
Good or Outstanding	459	£130.04	£34.06	£5.99	Small	£170.08	-2.1%
Requires Improvement, Inadequate or No Published Rating	164	£122.46	£52.64	£5.99	Small	£181.09	4.2%
Total a) All rating performances (weighted by both weighting performance and operator scale bed capacity)		£127.53	£40.20	£5.99	Small	£173.72	0.0%
Total b) All weighting performances (weighted by operator scale bed capacity only, as per Table 1)	623	£128.54	£38.79	£5.99	Small	£173.32	

Note: The nurse activity adjustment factor has been held constant at an all England level to avoid division by zero errors in small rating/enterprise scale segments.

1 To adjust for over-representation of large corporates, the costs reported by survey respondents have been calculated separately for each operator scale (large corporate, medium and small, as per Table 1) and weighted according to the proportion of each rating group's nursing home bed capacity operated by providers in that operator scale.

Table 9 includes a comparison between FNC costs calculated a) after weighting the results for both under and over-representation of different rating performances and over-representation of large corporates in the respondent sample, and b) after weighting the results for over-representation of large corporates only. The two numbers are very close. Therefore, additional weighting by rating performance would not have made a significant difference to the FNC calculation in Table 1, and for this reason we concluded that Table 1 should not include any rating performance weighting.

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5. FNC COST MODEL

5.1 Description

We constructed a model for calculating FNC-qualifying costs per FNC-eligible resident within an Excel spreadsheet.

The spreadsheet contains all of the responses from the cost collection survey and the nurse activity survey.

The survey questions are set out in Appendix 2.

Following elimination of extreme outliers (see Appendix 1), the data set consisted of 623 rows of data (one per respondent nursing home), all 623 of which contained cost data and 74 of which contained nurse activity data.

5.2 Data cleansing

In Appendix 1 we describe the various approaches we adopted, including:

- Quality assurance
- Data validity checks
- Removal of extreme outliers

5.3 Methods for calculating the FNC cost

We describe two methods – Method A and Method B.

Colour coding has been used in the formulae set out below to highlight the fact that the two methods are identical in principle though they differ in the number of records they take into account.

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5.3.1 *Method A*

Method A would have been the preferred one for nursing homes which supplied valid responses to both the cost collection survey and the nurse activity survey. But only 74 nursing homes did so, representing a response rate of only 1.7% of nursing homes in England. In view of the low response to the nurse activity survey, we developed an alternative method, described below as Method B, and it is this method that we have used in all of the calculations presented in this report.

Method A can be expressed simply as:

∑

([Registered nurse costs]

x

[Share of nurse time spent on FNC qualifying residents])

÷

∑ [Number of FNC-eligible residents]
across the set of records with full responses to both surveys.

But this Method would have ignored the great majority of records which have valid responses to the cost collection survey only.

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5.3.2 *Method B*

Method B makes use of data from ALL nursing homes which supplied valid data for EITHER the Cost Collection Survey OR the Nurse Activity Survey.

The general formula is equivalent in principle to Method A:

Σ

[Registered nurse costs] from Cost Collection survey

×

[Share of nurse time spent on FNC-eligible residents] from Nurse Activity survey

÷

[Total number of nursing residents] from Cost Collection survey × [FNC-eligible residents as a share of total nursing residents] from Nurse Activity survey

The Method B formula is in principle equivalent to Method A because the first two lines of each formula are the same and the third lines are equivalent - [Number of FNC-eligible residents] **=** [Total number of nursing residents] **×** [FNC-eligible residents as a share of total nursing residents]

though results will diverge because of different sampling errors in the different samples they draw on.

In essence, Method B calculates registered nurse costs per nursing resident (whether FNC eligible or not) from the 623 cost collection responses and then applies an adjustment factor from the 74 valid responses to the nurse activity survey to arrive at FNC-qualifying registered nurse costs per FNC-eligible nursing resident.

5.3.3 *Missing data*

Where cost information was missing from a submission, or was not usable following data validation, the model uses various features of Excel to ensure that relevant cell(s) are excluded from calculations. In effect, this is very similar to assuming that average values for missing data fields apply.

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6. SENSITIVITY ANALYSIS

6.1 Weighting for variables which were under or over-represented in the respondent sample

The calculation of FNC costs in Table 1 was sensitive to the decisions we took to weight results for those variables (attributes of nursing homes) which were under or over-represented in the respondent sample.

The most important decision was to weight all raw results by operator scale, in order to correct a systematic bias resulting from over-representation of large corporate providers in the respondent sample. As shown in Table 1, weighting by operator scale made a difference of over £25 per week to the calculated FNC rate. The rationale for the weighting is explained in Section 4.4.2.

The calculation of FNC costs was much less sensitive to the decisions we took not to weight for under or over-representation of other variable (attributes of nursing homes) which were to a greater or lesser extent under or over-represented in the respondent sample. The sensitivity to each variable is illustrated in Tables 3 to 9 in Section 4.5.

6.2 Nurse activity adjustment factor

The calculation of FNC costs in Table 1 is hardly sensitive at all to the decision we took on how to apply the nurse activity adjustment factor (derived from the nurse activity survey) to the registered nursing costs (derived from the cost collection survey). Table 1 is weighted by operator scale and the issue was whether to apply the nurse activity adjustment factor specific to each operator scale or, on the other hand, hold the nurse activity adjustment factor constant at a single, all operators level.

We decided to adopt the former, resulting in a calculated FNC of £173.32 (Table 1). If we had opted for the latter the FNC rate would have been calculated at £172.96, a difference of 36 pence[15].

[15] For Tables 3 to 9, on the other hand, we held the nurse activity adjustment factor constant at a single, all operators level in order to avoid anomalous results and division by zero errors when performing calculations on small sub-segments of the respondent sample. The difference in approach is justified since Tables 3 to 9 have no impact on the calculated FNC rate, being intended solely to demonstrate that it was unnecessary to weight raw results by variables (nursing home attributes) other than operator scale

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6.3 Treatment of outliers

For consistency with the 2016 Mazars report, we were instructed by the DHSC to exclude extreme outliers in the cost collection survey using the Tukey method (see Appendix 1, Section A1.4). Sensitivity to different approaches to outliers is presented in Table 10. Excluding potential as well as extreme outliers would have reduced the national FNC calculation from £173.32 by £5.37 to £167.95 per week, whereas inclusion of both potential and extreme outliers would have raised it by £3.64 to £176.96 per week.

Table 10 Sensitivity of FNC result to treatment of outliers[1]

	No.	On-shift employed registered nurses £ pw	On-shift agency registered nurses £ pw	Employed registered managers £ pw	Other supernumerary registered nurse costs £ pw	Total registered nurse costs £ pw
Principal calculation (excluding extreme outliers)	623	£128.54	£38.79	£5.99	small	£173.32
Alternative calculation (excluding extreme and potential outliers)	551	£125.35	£36.61	£5.99	small	£167.95
Alternative calculation (including extreme and potential outliers)	654	£132.11	£38.87	£5.99	small	£176.96

Note: The nurse activity adjustment factor has been allowed to vary with category in the outlier analysis (as it has in the FNC calculation in Table 1), whereas in exploratory Tables 3 to 9 the adjustment factor has been held constant at an all England level to avoid division by zero errors in small segments.

1 Outliers defined according to the Tukey method, see Appendix 1 Section A1.4

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APPENDIX 1 QUALITY ASSURANCE AND MITIGATION OF RISKS

We describe here the quality assurance approaches we adopted to mitigate risks throughout the entire process from initial survey planning to the final report.

A1.1 Data protection

To protect confidential data collected through the Cost Collection and Nurse Activity surveys, all data was stored on a secure server, accessible only by our Chief Technology Officer (CTO) or an appropriate second line individual in the event of unavailability, in line with the Short Form Agreement for Services, we will delete all data collected from the two surveys following completion of the project.

A1.2 Surveys

Sampling

Requests to respond to the two surveys were sent by email to all nursing homes in England and all groups which operate them. The establishment and contact details were drawn from Care*Search*, a proprietary data product maintained by LaingBuisson. Care*Search* is updated daily for basic registration details via the CQC API. Other details including council and region of location, group ownership, provider sector and purpose-built status are maintained by LaingBuisson staff. With these routine processes in place, we can be fully confident that our survey database was accurate.

Sampling was used only to select 10% of the universe of English nursing homes for intensive follow-up. We downloaded all nursing homes from Care*Search* and stratified them into separate Excel spreadsheets by region and nursing home size, before using an Excel random number generator to extract the 10% sample from each. With routine Care*Search* processes in place, we can be fully confident that our stratification was accurate.

Survey content

We used our in-house capacity to design and implement the two surveys, using experience from our regular programme of on-line surveys of healthcare providers as regards effective presentation of web form questionnaires. The questions within the cost collection and nurse activity surveys were carefully thought through with a view to minimising the burden on respondents while at the same time collecting essential information. All survey questions were approved by DHSC prior to survey launch.

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Data output

Output of confidential survey data was managed to minimise risk of accidental release. The CTO downloaded data from the secure server, passed it on to a member of the LaingBuisson data team, who in turn forwarded it to the project lead. The project lead used the survey data to populate an Excel spreadsheet used to analyse results. Only the project lead and LaingBuisson's Chief Operating Officer (COO) had access to this spreadsheet.

A1.3 Data validation

Cost collection survey

Several validation columns were added to the Analysis spreadsheet, so that survey data could be checked for consistency and sense, as and when it was added to the spreadsheet. Where we identified obvious typographical errors we corrected them in both the Analysis spreadsheet and the secure database. Where we identified 'suspect' responses to key fields (i.e. responses outside the expected range) we entered 'not yet validated' in the Validation Status field and called the respondent to challenge the responses. If they were able to give a convincing explanation or (rarely) made a correction, we entered 'validated' in the Validation Status field. If we could not succeed in contacting the respondent, and if the suspect item of data was a key driver of FNC costs, we entered 'validation failed' in the Validation Status field. We followed this process until all records were flagged as 'validated' or 'validation failed'. Some records which had nurse activity data but no cost collection data were flagged as 'Validated – nurse activity only' and included within the 623 valid responses.

The validation checks embedded in the analysis spreadsheet included:

- **Nursing (CHC + FNC Qualifying) residents as % of all residents**, as a check on answers to Q2b to Q2j on the breakdown of FNC qualifying and FNC non-qualifying residents by funding source. Anything over 100% is clearly incorrect and very low percentages would be suspect as well. We found a number of anomalies and called respondents to challenge the suspect numbers. We were able to find that certain groups providing a central response to the cost collection survey do not have full visibility, via central systems, of the FNC status of residents in some homes. Faced with this, we asked all homes to provide an additional information field – 'Total Nursing Residents' – to fill what would otherwise have been a gap in the Method B cost calculation. The additional field was obtained for all providers

- **On-Shift Employed and Agency Nurse hours per nursing resident per week (<4 and >15 is suspect),** as a check on this key driver of FNC costs. We telephoned a number of providers whose homes were in the suspect range, and on each case found a satisfactory explanation. For example, a very high cost home was found to be recently opened, with only two residents. The record was marked as 'validated', though it was subsequently excluded as an extreme outlier

- **On-Shift Nurse payroll costs per hour (period normalised to 1 week)** as a check on another key driver of FNC costs

- **On-Shift Nurse agency costs per hour (period normalised to 1 week)**

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We also carried out spot checks on cost collection responses by visiting the offices of four of the large corporate groups and asking them to reproduce *de novo* from their central management information systems the same numbers as they had supplied to us, for a sample of nursing homes selected randomly by LaingBuisson staff on the day of the spot-check visit.

At each visit we found that the respondents' back office staff were able to reproduce numbers exactly as they were in the survey return. The exercise provided us with reassurance that the cost collection survey was diligently and accurately answered by the corporate groups concerned. However, it was noticeable that producing the data was not always straightforward and often required manipulations to produce information in the form we requested. Because of this, there is potential for human error, though no evidence of human error for the sample of responses we spot-checked.

Nurse activity survey

Validation of the nurse activity responses was more problematic because we were not able to make direct contract with nurses and, even if we were, nurses would have no permanent record of their activity to refer to if challenged. Therefore, all complete nurse activity responses (complete in the sense of reporting data on both numbers on List A and List B and activity) were accepted. Incomplete responses were entered in the Analysis spreadsheet, but not referred to in any of the analyses.

A1.4 Outliers

At the request of DHSC we removed extreme outliers from the data set using the Tukey method. According to this method, extreme outliers are defined as any values which are:

- Greater than the third quartile value plus three times the inter-quartile (first and third) range; or
- Less than the first quartile value less three times the inter-quartile range.

We applied this rule and eliminated all records which were identified as extreme outliers for any one of the following parameters which have a bearing on the value of the calculated FNC rate:

- On-shift employed registered nurse costs per nursing resident
- On-shift agency registered nurse costs per nursing resident
- On-shift employed and agency registered nurse costs per nursing resident, which is a composite of the first two
- Manager (if registered nurse) costs per nursing resident per week

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A1.5 Spreadsheet logic verification

The logic embedded in the Analysis spreadsheet, for calculating FNC costs under Method A and Method B, has been checked multiple times: by the project lead, by an Excel expert bought in by LaingBuisson to undertake an independent check, and also by DHSC staff engaged on the project. Several minor errors and omissions have been corrected and several improvements have been made. At the end of the process, it is believed that there are no remaining significant errors.

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A2.1 Cost Collection Survey questions for nursing homes

Data was collected from individual nursing homes using a home specific web form linked directly to a secure LaingBuisson database.

Nursing home groups were given (and took) the option of making a central return by populating a spreadsheet with one line per home, the data subsequently being uploaded into a secure LaingBuisson database.

In each case the questions were:

1a End date of reporting week for registered nurse hours
1b Number of employed registered nurse hours (daytime) in week
1c Number of employed registered nurse hours (night-time) in week
1d Number of employed registered nurse hours (daytime + night-time) in week
1e Number of agency registered nurse hours (daytime) in week
1f Number of agency registered nurse hours (night-time) in week
1g Number of agency registered nurse hours (daytime + night-time) in week
1h Number of home manager hours (daytime) in week
1i Number of home manager hours (night-time) in week
1j Number of home manager hours (daytime + night-time) in week
1k Number of supernumerary nurse hours (daytime) in week
1l Number of supernumerary nurse hours (night-time) in week
1m Number of supernumerary nurse hours (daytime + night-time) in week
2a Resident census data

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2b Number of residents funded by local authorities (total)
2c Number of residents funded by local authorities and eligible for NHS FNC
2d Number of residents funded by local authorities and not eligible for NHS FNC
2e Number of residents funded by NHS (total)
2f Number of residents funded by NHS and eligible for NHS FNC (should be zero)
2g Number of residents funded by NHS and not eligible for NHS FNC
2h Number of self-funded residents (total)
2i Number of self-funded residents eligible for NHS FNC
2j Number of self-funded residents not eligible for NHS FNC
3a Payroll responses start date
3b Payroll responses end date
3c Payroll costs (including on-costs) for employed on-shift registered nurses
3d Payroll costs (including on-costs) for Manager
3c Payroll costs (including on-costs) for Supernumerary nurses
4 Incur agency costs (Yes/No)
5a Accounting period start date for agency costs
5b Accounting period end date for agency costs
5c Agency costs for on-shift nurses
5d Agency costs for Managers
5e Agency costs for Supernumerary nurses
6 Total number of nursing residents

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A2.2 Nurse activity options

The manager of the nursing home was asked to report:

- Number of residents on the day of the survey who were eligible for NHS FNC
- Number of residents on the day of the survey who were not eligible for NHS FNC

On-shift nurses responding to the nurse activity survey were given the following mutually exclusive and exhaustive options and asked to report which one best described the activity they were engaged on each time they were alerted to respond at selected times of the day or night. 'List A' means residents eligible for NHS FNC and 'List B' means residents not eligible for NHS FNC:

- Undertaking direct or indirect nursing tasks for resident(s) on List A
- Undertaking direct or indirect nursing tasks for resident(s) on List B
- Undertaking direct or indirect nursing tasks for more than one resident at the same time, at least one being on List A and at least one being on List B
- Undertaking direct or indirect nursing tasks and Don't Know whether recipient(s) are on List A or List B
- Undertaking collateral activities (qualifying for FNC)
- Undertaking non-nursing tasks (not qualifying for FNC)

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