

## **TITLE PAGE**

Title: Determining Nursing Staffing Levels for Stroke Beds in Scotland

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**Word count:** Abstract text = 135; Manuscript text = 1, 597; Number of tables = 1; Number of figures = 2; Number of references = 7.

### **Acknowledgements**

We would like to thank members of the Scottish Stroke Nurses Forum for taking part in this study. There were no competing interests.

## **Abstract**

**Background:** National guidelines suggest that at the very least there should be one whole time equivalent (WTE) nurse per stroke bed with a skill mix ratio of two registered nurses to one unregistered nurse. The aim of this study was determine nursing staff levels in stroke units in Scotland.

**Methods:** Questionnaires asking for information on staffing levels and skill mix were sent to 46 stroke units throughout Scotland.

**Results:** On average there were 1.1 whole time equivalent (WTE) nurses for each stroke bed. Only 3 NHS Boards had a skill mix ratio of registered and unregistered nurses of at least 2:1

**Conclusion:** These data describe typical nurse staffing levels and skill mix ratio for stroke units in Scotland and will serve as a benchmark for future audits and research studies of stroke unit care.

## **Introduction**

Stroke remains the third commonest cause of death and leading cause of disability in the developed world. Research from randomised controlled trials (RCTs) has shown conclusively that stroke unit care saves lives and reduces the need for long-term institutional care<sup>1</sup>. However, it is not clear why stroke unit care works and which of the individual components contribute to improving the neurological condition and reduce long-term disability after stroke. Possible components are the levels of nursing staff and skill mix, which should relate directly to effective stroke unit care<sup>2</sup>. Scottish Intercollegiate Guidelines Network guidelines suggest that at the very least there should be one whole time equivalent (WTE) nurse per stroke bed with a skill mix ratio of two registered nurses to one unregistered nurse<sup>3</sup>. It has also been suggested that adequate nursing levels should be appropriate to the number of beds on the stroke unit and the dependency of the patients<sup>4</sup>. However, at present staffing levels on stroke units are being collected using different measurement methods, which are often developed within the institution<sup>2,4</sup>. Therefore there is no clear indication whether nursing staffing levels and skill mix are similar regardless of the type of stroke unit (acute, rehabilitation or combined) and/or between different NHS boards.

The purpose of this study was to establish the level and skill mix of nursing staff working in designated stroke units in Scotland, which could be used as a baseline by healthcare planners to help develop and improve stroke unit care.

## **Methods**

### **The study sample**

Charge nurses working in units with designated stroke beds completed a questionnaire. The sample consisted of 46 different units in 40 different hospitals across 13 NHS Boards in Scotland (2 Scottish NHS Boards – Orkney and Shetland do not have hospitals with units with designated stroke beds and therefore were not included in the sample). A stroke unit was defined either as a hospital ward that exclusively takes stroke patients or a ward that did not exclusively take stroke patients (mixed ward), but had designated stroke beds. There are three main types of stroke unit, including: Acute (patients are admitted acutely and treatment continues for several days or weeks after stroke onset); Rehabilitation (patients are admitted after a period of several weeks and treatment continues for several weeks or months after stroke onset); and Combined (patients are admitted acutely and treatment continues throughout stroke rehabilitation)<sup>5</sup>. Wards that did not have designated stroke beds, but also care for stroke patients were not included (i.e. general medical, elderly, rehabilitation, continuing care and neurology specialist wards and community hospital wards). Ethical approval was sought to approach Scottish Stroke Nurses Forum (SSNF) members to take part in the survey.

### **Questionnaire**

The questionnaire was designed as a snapshot of nursing levels and skill mix. Questions included: the type of stroke unit; total number of beds; total number of stroke beds; and a record of all ward nursing staff in whole time equivalents

(WTE). It was first administered as a hand delivered questionnaire by SSNF Committee Representatives for each eligible NHS Board between 1 July 2005 and 30 September 2005. A reminder was sent via email and/or by letter to non responders between 1 November 2005 and 31 January 2006.

### **Data Analysis**

The closed questions were entered into a database (SPSS for Windows version 12.0.1, SPSS Inc. 2003). Data were analysed with standard descriptive statistics, using non-parametric tests, as data were not normally distributed.

## **Results**

Forty-six (100%) questionnaires were returned. Of the 46 stroke units, there was a total of 789 designated stroke beds (including 4 hyper-acute stroke monitoring beds) and 872.3 WTE registered and unregistered nurses, including 51.4 WTE nursing staff vacancies. Of the 46 stroke units, 24 (52%) were mixed, i.e. they included beds for non-stroke patients (range 3 to 22 non-stroke beds).

### **Nursing staffing levels for stroke beds according to the type of stroke unit**

Of the 46 stroke units: 13 (28%) are acute with 183 stroke beds; 20 (43%) are rehabilitation units with 361 stroke beds; 12 (26%) are combined with 241 stroke beds; and there is a hyper-acute unit with 4 beds where patients are admitted within the first few hours after stroke onset. Acute units had more registered nurses for stroke beds (130.8/183, 71%) than rehabilitation (208.6/361, 58%) and combined (162.5/241, 67%) units, but this difference was not statistically significant ( $p=0.26$ , Kruskal-Wallis test). There were also no significant differences between levels (grades G – D) of registered nurses between the three types of units. Combined units had a significantly lower proportion of unregistered nurses to stroke beds (98.1/241, 41%) than acute (87.3/183, 48%) and rehabilitation (178/361, 49%) units ( $p = 0.018$ , Kruskal-Wallis test).

### **Nursing staffing levels for mixed compared with stroke-specific units**

The 24 mixed wards, regardless of the type of stroke unit, had less staff than units that included stroke patients exclusively (see figure 1). Mixed wards had a significantly lower proportion of registered nurses for stroke beds than stroke specific units (192.19/333, 58% versus 309.66/452, 69%,  $p = 0.017$ , Mann-Whitney test). The proportion of unregistered nurses to stroke beds was similar between mixed and stroke specific units (150.93/333, 45% versus 212.48/452, 47%,  $p = 0.59$ , Mann-Whitney test). The results remain unchanged if 51.39/789 (6.5%) WTE nursing staff vacancies per stroke bed were excluded from the analyses.

### **Nursing staffing levels for stroke beds according to NHS Board**

Of the 13 NHS Boards with designated stroke units, 10 NHS boards had more than one WTE nurse (registered and unregistered) per stroke bed (table 1). In total for every stroke bed there are 1.1 WTE nurses (registered and unregistered) and there were 1.4 WTE registered staff to every one unregistered nurse (ratio of registered to unregistered nurses = 1.4:1) The remaining three NHS Boards (Scottish Borders, Highland and Western Isles) had less than one WTE nurse per stroke bed (table 3). Three NHS Boards (Lanarkshire, Tayside and Western Isles) had skill mix ratio of at least 2:1, whereas the other 10 NHS Boards had a skill mix ratio  $\leq 1.8:1$  registered/unregistered nursing staff (table 1). It should be pointed out that the number of stroke beds was variable and not representative of the population of the NHS board, for example Tayside had the largest population per stroke bed compared to any other NHS board (table 1).



## Discussion

The present survey provides a broad indication of typical nursing staffing levels of Scottish stroke unit establishments. We found that ten of the 13 healthboards with designated stroke beds had the minimum level of nursing staff for the size of unit (ratio of nursing staff to stroke beds should be at least 1:1), regardless of the type of stroke unit<sup>3</sup>. Only three NHS Boards met the SIGN guidelines minimum standard of having a skill mix ratio 2:1 registered/unregistered nurses<sup>3</sup>. Regardless of the type of unit, mixed stroke units had a lower level of registered nurses compared to stroke-specific units. This may explain the trend towards better outcomes within stroke-specific wards as opposed to mixed wards describe by other studies<sup>1</sup>. However, the staffing levels and skill mix on mixed wards should be interpreted with caution as there is likely to be cross-over with non-stroke beds.

Overall, we found that there was wide variation in nursing staffing levels and skill mix across NHS boards. This may be because nursing staffing levels are likely to be determined by individual NHS boards, which probably use a tool that is not stroke specific to determine stroke nursing levels. However, even if the institutions do adopt the minimum SIGN guidelines to determine stroke nursing staffing levels, it should be acknowledged that these guidelines were based on limited evidence from 11 controlled clinical trials that calculated staffing levels in different ways<sup>2</sup>. It has been suggested that the Functional Independence Measure (FIM) instrument (a tool designed to measure a person's functional status, or level of skill, in performing daily living tasks) may be a better predictor of nursing staffing levels as it takes into consideration

the dependency of the stroke patients<sup>4</sup>. However, such systems are likely to be time-consuming and costly to administer and would therefore require thorough investigation.

It should be noted that this survey is not representative of the total number of beds needed for each NHS board. Indeed, many areas may appear to be adequately staffed for the number of stroke beds, for example Tayside. However, Tayside has very few beds per head of population. Therefore, further details from the Scottish Stroke Care Audit will be essential to assess whether the number of beds is adequate for the number of strokes per head of population in each NHS board<sup>6</sup>.

This study has a number of other limitations. Firstly it is only a snapshot of the stroke units and hence will already be out of date for some areas. Second, it is likely that there are different levels of staff and skill mix per shift (i.e. differences between day and night staff). However, there is very limited data available on adequate nursing staffing levels per shift. Indeed, the National Sentinel Stroke Audit only collects data about nursing staff on duty at 10:00 in the morning on weekdays (arguably the busiest time of the day). Third, charge nurses (grade G) are not always clinically based and should perhaps not be included in the staffing levels. Finally, it is difficult to assess the effect sickness and maternity leave has on each of the areas.

In summary, we have described the typical nurse (WTE) staff level and skill mix ratio in designated stroke units in Scotland. These data will serve as a benchmark for future audits and research studies of stroke unit care.

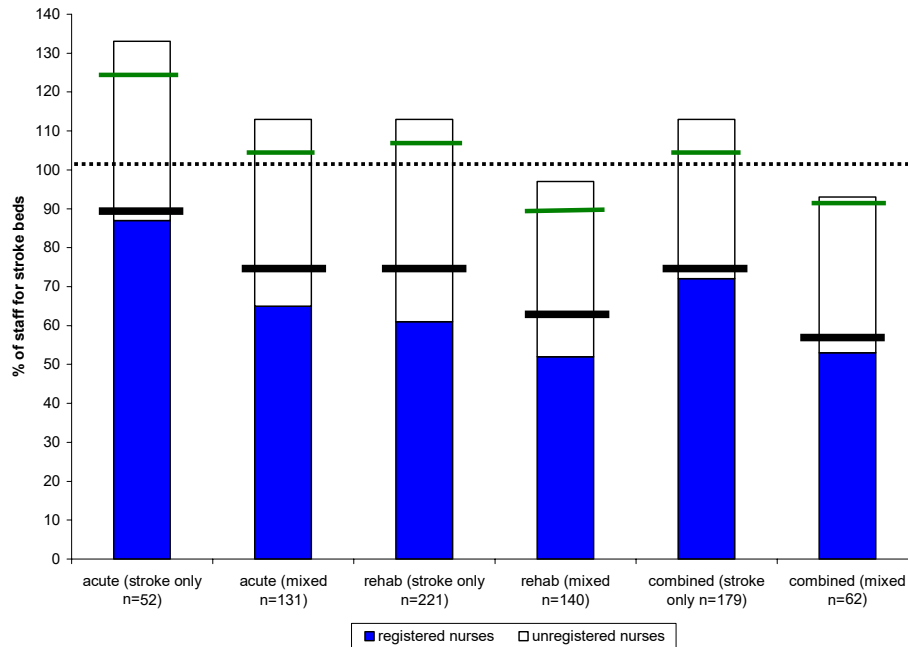
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**Table 1: Nursing Staffing Levels (WTE) for stroke beds according to NHS board**

<b>NHS board</b>	<b>Number of units with designated stroke beds</b>	<b>Total number of stroke beds</b>	<b>Estimated population per stroke bed (estimated by GRO June 2005)</b>	<b>Total number of registered staff (including vacancies)</b>	<b>Total number of unregistered staff (including vacancies)</b>	<b>Level of nursing staff per stroke bed</b>	<b>The skill mix ratio of registered nurses to one unregistered nurse</b>	<b>Total number of staff vacancies</b>
<b>Argyll &amp; Clyde</b>	4	64	6469	36.45	28.62	1.01	1.4	4.00
<b>Ayrshire &amp; Arran</b>	4	76	4829	43.84	34.68	1.03	1.3	3.43
<b>Borders</b>	1	15	7315	5.68	4.45	0.68	1.3	0
<b>Dumfries &amp; Galloway</b>	1	10	9889	6.77	3.86	1.06	1.8	0.26
<b>Fife</b>	4	58	6149	40.25	25.26	1.29	1.6	7.11
<b>Forth Valley</b>	2	45	6320	23.34	22.90	1.03	1.0	2.25
<b>Grampian</b>	4	66	7969	43.29	31.03	1.13	1.4	4.55
<b>Greater Glasgow</b>	10	177	4903	104.02	94.73	1.12	1.1	9.68
<b>Highland</b>	2	27	7911	15.25	10.37	0.95	1.5	0.47
<b>Lanarkshire</b>	3	73	7631	60.15	27.19	1.20	2.2	7.30
<b>Lothian</b>	7	136	5828	92.87	61.90	1.14	1.5	10.09
<b>Tayside</b>	3	36	10825	33.34	16.79	1.39	2.0	2.25
<b>Western Isles</b>	1	6	4395	3.60	1.63	0.87	2.2	0
<b>Total (*mean)</b>	<b>46</b>	<b>789</b>	<b>90433</b>	<b>508.85</b>	<b>363.41</b>	<b>1.10*</b>	<b>1.4*</b>	<b>51.39</b>

Figure 1: The percentage of WTE registered and unregistered nurses for stroke beds according to the type of stroke unit (acute, rehabilitation or combined) and whether the unit included stroke patients only or was a mixed ward (i.e. included non-stroke patients).



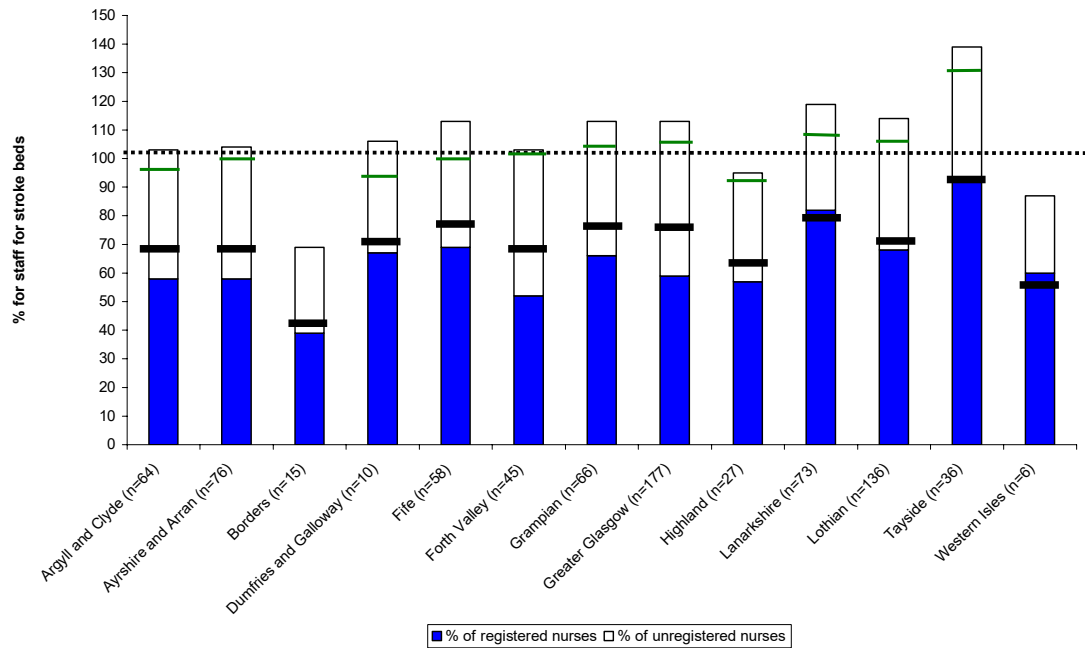
Key:

..... = 100% is the minimum number staff per stroke bed<sup>3</sup>.

———— = the 2:1 skill mix ratio of registered to unregistered nurses<sup>3</sup>.

———— = the total percentage of nursing staff (registered and unregistered) vacancies at the time of the survey.

Figure 2: The percentage of WTE registered and unregistered nurses for stroke beds in each NHS Board with designated stroke units.



Key:

..... = 100% is the minimum number staff per stroke bed<sup>3</sup>.

———— = the 2:1 skill mix ratio of registered to unregistered nurses<sup>3</sup>.

———— = the total percentage of nursing staff (registered and unregistered) vacancies at the time of the survey.