

**Table 6. Clinical and Statistical Significance of Findings from Studies on the Effects of Nurse Staffing on Patient Outcomes (adapted from Lang et al. 2004<sup>9</sup>, pp. 330-331)**

| Outcome                            | Effect Size Judged to Be Unimportant  |   | Importance of Effect Size Uncertain |   | Effect Size Judged to Be Important   |   |
|------------------------------------|---|---|-------------------------------------|---|--|---|
|                                    | NS  | P<0.05  | NS                                  | P<0.05  | NS   | P<0.05  |
| <b>1. Failure to Rescue</b>        | Needleman, 2001 <sup>*29,44</sup><br>Needleman, 2001 <sup>*29,44</sup><br>Silber, 1995 <sup>45</sup>  |   |                                     |   |  | Aiken, 2002 <sup>‡,∞12</sup><br>Needleman, 2001 <sup>‡,29,44</sup><br>Needleman, 2001 <sup>‡</sup><br>Aiken, 1999 <sup>‡13</sup><br>Tourangeau, 2002 <sup>30</sup>  |
| <b>2. In-patient Mortality</b>     | Needleman, 2001 <sup>*29,44</sup><br>Needleman, 2001 <sup>*29,44</sup><br>Needleman, 2001 <sup>‡</sup><br>Needleman, 2001 <sup>‡</sup><br>Robertson, 1999 <sup>27</sup><br>Robertson, 1999 <sup>27</sup><br>Robertson, 1999 <sup>27</sup><br>Silber, 1995 <sup>45</sup><br>Bradbury, 1994 <sup>46</sup><br>Bradbury, 1994 <sup>46</sup><br>Shortell, 1988 <sup>47</sup>   | Aiken, 2000 <sup>34</sup><br>Bond, 1999 <sup>35</sup><br>Bond, 1999 <sup>35</sup> |                                     | (Silber, 1995) <sup>45</sup>  | (Blegen, 1998A) <sup>16</sup><br>(Blegen, 1998A) <sup>16</sup><br>Blegen, 1998A <sup>16</sup><br>Bradbury, 1994 <sup>46</sup><br>Manheim, 1992 <sup>32</sup> | Mark, 2004 <sup>31</sup><br>Aiken, 2002 <sup>‡,∞12</sup><br>Aiken, 2000 <sup>34</sup><br>Manheim, 1992 <sup>32</sup><br>Krakauer, 1992 <sup>33</sup><br>Krakauer, 1992 <sup>33</sup><br>Hartz, 1989 <sup>20</sup><br>Hartz, 1989 <sup>20</sup><br>Hartz, 1989 <sup>20</sup> |
| <b>3. Pneumonia</b>                | Cho, 2003 <sup>37</sup><br>Unruh, 2003 <sup>39</sup><br>Unruh, 2003 <sup>39</sup><br>Kovner, 2002 <sup>38</sup><br>ANA, 2000 <sup>‡18</sup><br>ANA, 2000 <sup>‡18</sup><br>Kovner, 1998 <sup>22</sup>   | Kovner, 2002 <sup>38</sup><br>Kovner, 1998 <sup>22</sup>                          |                                     | Cho, 2003 <sup>37</sup><br>Cho, 2003 <sup>37</sup>  |  | Mark, 2004 <sup>31</sup><br>Needleman, 2001 <sup>*29,44</sup><br>Needleman, 2001 <sup>*29,44</sup><br>Needleman, 2001 <sup>‡</sup><br>Needleman, 2001 <sup>‡</sup><br>ANA, 2000 <sup>18</sup><br>ANA, 2000 <sup>18</sup><br>Kovner, 1998 <sup>22</sup>                      |
| <b>4. Urinary Tract Infections</b> | Unruh, 2003 <sup>39</sup><br>Unruh, 2003 <sup>39</sup><br>Cho, 2003 <sup>37</sup><br>Cho, 2003 <sup>37</sup><br>Cho, 2003 <sup>37</sup><br>Kovner, 2002 <sup>38</sup><br>(Kovner, 2002) <sup>38</sup><br>Sovie, 2000 <sup>40</sup><br>Sovie, 2000 <sup>40</sup><br>Sovie, 2000 <sup>40</sup><br>Sovie, 2000 <sup>40</sup><br>Sovie, 2000 <sup>40</sup><br>Sovie, 2000 <sup>40</sup><br>ANA, 2000 <sup>18</sup>  | Needleman, 2001 <sup>‡</sup><br>29,44<br>Kovner, 1998 <sup>22</sup>               |                                     | Sovie, 2000 <sup>40</sup><br>Needleman, 2001 <sup>‡,29,44</sup><br>Kovner, 1998 <sup>22</sup> |  | Mark, 2004 <sup>31</sup><br>Needleman, 2001 <sup>*29,44</sup><br>Needleman, 2001 <sup>*29,44</sup><br>ANA, 2000 <sup>18</sup><br>ANA, 2000 <sup>18</sup><br>ANA, 2000 <sup>18</sup>   |
| <b>5. Pressure Ulcers</b>          | Donaldson, 2005 <sup>42</sup><br>Cho, 2003 <sup>37</sup><br>Cho, 2003 <sup>37</sup><br>Whitman, 2002 <sup>41</sup><br>Needleman, 2001 <sup>29,44</sup><br>Needleman, 2001 <sup>29,44</sup><br>Needleman, 2001 <sup>29,44</sup><br>Needleman, 2001 <sup>29,44</sup><br>Sovie, 2000 <sup>40</sup><br>Sovie, 2000 <sup>40</sup><br>Sovie, 2000 <sup>40</sup><br>Sovie, 2000 <sup>40</sup><br>ANA, 2000 <sup>18</sup><br>ANA, 2000 <sup>18</sup><br>(Blegen, 1998A) <sup>16</sup> | (Cho, 2003) <sup>37</sup>   |                                     | Unruh, 2003 <sup>39</sup><br>Unruh, 2003 <sup>39</sup><br>Sovie, 2000 <sup>40</sup>           | (Blegen, 1998A) <sup>16</sup>  | Mark, 2004 <sup>31</sup><br>ANA, 2000 <sup>18</sup><br>ANA, 2000 <sup>18</sup><br>ANA, 2000 <sup>18</sup><br>ANA, 2000 <sup>18</sup><br>ANA, 2000 <sup>18</sup><br>ANA, 2000 <sup>18</sup><br>ANA, 2000 <sup>18</sup><br>Blegen, 1998A <sup>16</sup>                        |

Findings in parentheses indicate worse outcomes with better nurse staffing.

Findings in bold are from the 12 key studies.

NS, not statistically significant at the .05 level;

\*Medical patients.

†Surgical patients.

‡New York hospitals.

§California hospitals.

ANA, American Nurses Association.

‡AIDS patients.

∞ Pennsylvania hospitals.

**Table 6. Clinical and Statistical Significance of Findings from Studies on the Effects of Nurse Staffing on Patient Outcomes (Continued) (adapted from Lang et al. 2004<sup>9</sup>, pp. 330-331)**

| Outcome                              | Effect Size Judged to Be Unimportant  |   | Importance of Effect Size Uncertain |  | Effect Size Judged to Be Important                                   |  |
|--------------------------------------|---|---|-------------------------------------|--|--|--|
|                                      | NS  | P<0.05  | NS                                  | P<0.05   | NS   | P<0.05   |
| <b>6. Falls</b>                      | <b>Donaldson, 2005</b> <sup>42</sup><br>Dunton, 2004 <sup>†</sup> <sup>43</sup><br><b>Cho, 2003</b> <sup>37</sup><br><b>Cho, 2003</b> <sup>37</sup><br><b>Cho, 2003</b> <sup>37</sup><br>Arbesman, 1999 <sup>48</sup><br>Taunton, 1994 <sup>49</sup><br>Ceria, 1992 <sup>50</sup><br>Blegen, 1989A <sup>16</sup><br>Blegen, 1989A <sup>16</sup><br>(Blegen, 1989A) <sup>16</sup><br>Blegen, 1989B <sup>15</sup><br>Wan, 1987 <sup>28</sup><br>Wan, 1987 <sup>28</sup><br>Kustaborder, 1983 <sup>51</sup><br>Kustaborder, 1983 <sup>51</sup> |   |                                     | Krauss, 2005 <sup>52</sup><br>Dunton, 2004 <sup>‡</sup> <sup>43</sup><br><b>Unruh, 2003</b> <sup>39</sup><br>(Unruh, 2003) <sup>39</sup><br><b>Sovie, 2000</b> <sup>40</sup><br><b>Sovie, 2000</b> <sup>40</sup> | <b>Sovie, 2000</b> <sup>40</sup><br><b>Sovie, 2000</b> <sup>40</sup> | Krauss, 2005 <sup>52</sup><br>(Grillo-Peck, 1995) <sup>53</sup><br>Blegen, 1989B <sup>15</sup>                   |
| <b>7. Nosocomial Infections</b>      | <b>Unruh, 2003</b> <sup>39</sup><br><b>Unruh, 2003</b> <sup>39</sup><br><b>Cho, 2003</b> <sup>37</sup><br><b>Cho, 2003</b> <sup>37</sup><br><b>Cho, 2003</b> <sup>37</sup><br><b>Cho, 2003</b> <sup>37</sup><br><b>Cho, 2003</b> <sup>37</sup><br><b>Cho, 2003</b> <sup>37</sup><br>Whitman, 2002 <sup>41</sup><br><b>ANA, 2000</b> <sup>‡</sup> <sup>18</sup><br>(Blegen, 1998A) <sup>16</sup><br>Blegen, 1998A <sup>16</sup><br>(Grillo-Peck, 1995) <sup>53</sup><br>Shukla, 1983 <sup>54</sup>   | Taunton, 1994 <sup>49</sup>   |                                     |  |  | <b>ANA, 2000</b> <sup>‡</sup> <sup>18</sup><br>ANA, 2000 <sup>‡</sup> <sup>18</sup><br>Haley, 1982 <sup>55</sup> |
| <b>8. Treatment Errors</b>           | Blegen, 1998B <sup>15</sup><br>(Blegen, 1998A) <sup>16</sup><br>(Blegen, 1998B) <sup>15</sup><br>Grillo-Peck, 1995 <sup>53</sup><br>Grillo-Peck, 1995 <sup>53</sup><br>Taunton, 1994 <sup>49</sup><br>Taunton, 1994 <sup>49</sup><br>Wan, 1987 <sup>28</sup><br>Wan, 1987 <sup>28</sup><br>Wan, 1987 <sup>28</sup><br>Wan, 1987 <sup>28</sup>   | Blegen, 1998B <sup>15</sup><br>(Blegen, 1998A) <sup>16</sup><br>(Blegen, 1998B) <sup>15</sup><br>(Blegen, 1998B) <sup>15</sup>                                    |                                     | Blegen, 1998A <sup>16</sup>  |  | (Blegen, 1998B) <sup>15</sup>  |
| <b>9. Patient Satisfaction</b>       | Blegen, 1998A <sup>16</sup><br>(Blegen, 1998A) <sup>16</sup><br>Bostrom, 1993 <sup>56</sup><br>Shukla, 1983 <sup>54</sup><br>Shukla, 1983 <sup>54</sup><br>Shukla, 1983 <sup>54</sup><br>Hinshaw, 1981 <sup>57</sup><br>Hinshaw, 1981 <sup>57</sup>   | <b>Sovie, 2000</b> <sup>40</sup><br><b>Sovie, 2000</b> <sup>40</sup><br>Hinshaw, 1981 <sup>57</sup><br>Hinshaw, 1981 <sup>57</sup><br>Hinshaw, 1981 <sup>57</sup> |                                     | Seago, 2006 <sup>58</sup>  |  | (Shukla, 1983) <sup>54</sup>   |
| <b>10. Unspecified Complications</b> | <b>Kovner, 1998</b> <sup>22</sup><br>Flood, 1988 <sup>23</sup>  | (Silber, 1995) <sup>45</sup>  |                                     |  | Behner, 1990 <sup>59</sup><br>Flood, 1988 <sup>23</sup>              | Behner, 1990 <sup>59</sup>   |
| <b>11. Venous Thrombosis</b>         | <b>Needleman, 2001</b> <sup>* 29,44</sup><br><b>Needleman, 2001</b> <sup>* 29,44</sup><br><b>Needleman, 2001</b> <sup>† 29,44</sup><br><b>Needleman, 2001</b> <sup>† 29,44</sup><br><b>Kovner, 1998</b> <sup>22</sup><br><b>Kovner, 2002</b> <sup>38</sup><br>(Kovner, 2002) <sup>38</sup>  |   |                                     | <b>Kovner, 1998</b> <sup>22</sup><br><b>Kovner, 1998</b> <sup>22</sup>   |  |  |

Findings in parentheses indicate worse outcomes with better nurse staffing.

Findings in bold are from the 12 key studies.

NS, not statistically significant at the .05 level;

\*Medical patients.

†Surgical patients.

ANA, American Nurses Association.

‡AIDS patients.

‡New York hospitals.

§California hospitals.

°Pennsylvania hospitals.

**Table 6. Clinical and Statistical Significance of Findings from Studies on the Effects of Nurse Staffing on Patient Outcomes (Continued) (adapted from Lang et al. 2004<sup>9</sup>, pp. 330-331)**

| Outcome                         | Effect Size Judged to Be Unimportant  |   | Importance of Effect Size Uncertain |        | Effect Size Judged to Be Important |  |
|---------------------------------|---|---|-------------------------------------|--------|------------------------------------|--|
|                                 | NS  | P<0.05  | NS                                  | P<0.05 | NS                                 | P<0.05   |
| <b>12. Pulmonary Compromise</b> | Unruh, 2003 <sup>39</sup><br>Kovner, 2002 <sup>38</sup><br>Kovner, 2002 <sup>38</sup><br>Needleman, 2001 <sup>29,44</sup><br>Needleman, 2001 <sup>29,44</sup> | Unruh, 2003 <sup>39</sup><br>Kovner, 1998 <sup>22</sup> |                                     |        |                                    |  |
| <b>13. Gastrohemorrhage</b>     | Needleman, 2001 <sup>‡,29,44</sup><br>Needleman, 2001 <sup>‡,29,44</sup><br>Kovner, 1998 <sup>22</sup>  | Needleman, 2001 <sup>*29,44</sup>                       |                                     |        |                                    | Needleman, 2001 <sup>*29,44</sup>                                      |
| <b>14. Shock</b>                | Needleman, 2001 <sup>‡,29,44</sup><br>Needleman, 2001 <sup>‡,29,44</sup>  |   |                                     |        |                                    | Needleman, 2001 <sup>*29,44</sup><br>Needleman, 2001 <sup>*29,44</sup> |
| <b>15. Morbidity</b>            | Bradbury, 1994 <sup>46</sup><br>Bradbury, 1994 <sup>46</sup>  |   | Bradbury, 1994 <sup>46</sup>        |        |                                    |  |
| <b>16. Adverse Drug Events</b>  | Cho, 2003 <sup>37</sup><br>Cho, 2003 <sup>37</sup><br>Cho, 2003 <sup>37</sup>   |   |                                     |        |                                    |  |
| <b>17. Intravenous Errors</b>   | Wan, 1987 <sup>28</sup><br>Wan, 1987 <sup>28</sup>  |   |                                     |        |                                    |  |
| <b>18. Cardiac Arrests</b>      | Kovner, 1998 <sup>22</sup><br>Blegen, 1998B <sup>15</sup><br>Blegen, 1998B <sup>15</sup>  |   |                                     |        |                                    |  |
| <b>19. Patient Injuries</b>     | (Wan, 1987) <sup>28</sup><br>(Wan, 1987) <sup>28</sup>  |   |                                     |        |                                    |  |

Findings in parentheses indicate worse outcomes with better nurse staffing.

Findings in bold are from the 12 key studies.

NS, not statistically significant at the .05 level;

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