Basal Stimulation® in Intensive Care
– Hunch or Evidence?

Qualification Year Paper
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Aarhus University
October 2008
Forord


Billedet på forsiden er fra DR, hvor SCR udstyret og jeg deltog i et lille eksperiment der skulle vise stress respons hos 2 forsøgspersoner i programmet ”Ha’ det godt”.

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Oktober 2008
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**Abbreviations**

<table>
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<th>Abbreviation</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>BP</td>
<td>Blood Pressure</td>
</tr>
<tr>
<td>BS</td>
<td>Basal Stimulation</td>
</tr>
<tr>
<td>CAM-ICU</td>
<td>Confusion Assessment Method for the Intensive Care Units</td>
</tr>
<tr>
<td>CNP</td>
<td>Classification Not Possible (according to the evidence scale)</td>
</tr>
<tr>
<td>EEG</td>
<td>Electroencephalography (measuring brain activity)</td>
</tr>
<tr>
<td>HR</td>
<td>Heart rate pr minute</td>
</tr>
<tr>
<td>ICU</td>
<td>Intensive Care Unit</td>
</tr>
<tr>
<td>PNS</td>
<td>Parasympathetic Nervous System</td>
</tr>
<tr>
<td>RASS</td>
<td>The Richmond Agitation and Sedation Scale</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomised Controlled Trial</td>
</tr>
<tr>
<td>REM</td>
<td>Rapid eye movement (important part of sleep)</td>
</tr>
<tr>
<td>RF</td>
<td>Respiration frequents per minute</td>
</tr>
<tr>
<td>SCR</td>
<td>Skin Conductance Responses</td>
</tr>
<tr>
<td>SpO2</td>
<td>Oxygen saturation</td>
</tr>
<tr>
<td>SNS</td>
<td>Sympathetic Nervous System</td>
</tr>
<tr>
<td>VAC</td>
<td>Vacuum pump that drains blood etc. from abdominal wound</td>
</tr>
</tbody>
</table>
Background
International studies have shown an incidence of delirium from 30% up to 80% depending on the scoring instrument used (Ely et al. 2004, Ouimet et al. 2007a, Ouimet et al. 2007b). In Denmark one study showed at least 39% of patients to have delirium at some time during their ICU stay (Svenningsen 2007). Delirium is induced by physical causes and is characterized by a fluctuating course with periods of inattention, confusion and changed level in consciousness (American Psychiatric Association 2006). The consequences are a higher morbidity, a higher mortality, a longer stay in hospital and cognitive dysfunction after discharge (Dubois 2001; Thomason et al. 2005, Griffiths, Jones 2007, Fann et al. 2007, DiMartini et al. 2007). Delirium is also a distressing condition for the ICU patient (Griffiths, Jones 2007, Fann et al. 2007, DiMartini et al. 2007, Storli, Lindseth & Asplund 2007, Axèll 2001, Besendorfer 2002). To reduce the incidence of delirium many nurses and doctors have tried different strategies. One of the newer strategies that are believed to reduce delirium is Basal Stimulation® (BS). BS has been implemented in many Danish ICUs (FSAIO.NET, 2006).
This report will try to evaluate the existing evidence for BS among critically ill patients and to pilot-test a method to measure the effect of using BS in critically ill patients.

Evidence base health care
Evidence based health care promotes the collection, interpretation, and integration of valid, important and applicable patient-reported, clinician-observed, and research-based evidence (shef.ac.uk). By integrating clinical expertise and the best evidence, moderated by patient circumstances and preferences, the quality of clinical judgements and the cost-effectiveness of health care should be improved. RCT or meta-analyses do not give a definitive answer – the patient’s individually preferences and the possibilities in the health care system can result in other solutions (Sackett et al. 1996). The establishment of national clinical guidelines and their implementation in daily care is one step towards evidence-based health care. Through asking questions, focusing on the essence in the question, searching the literature, critique evaluating of the literature, and finally answering the question if possible, evidence-based health care is started.
Historical background of BS
The concept of BS was developed in Germany for children and young people with multiple handicaps. It has been introduced in ICU care as the situation for many of the patients is similar to that of those with a severely handicap (sensory disturbance, physical weakness, coma etc.) and therefore BS is considered in connection with intensive care in relation to the care of delirious patients. BS in nursing was first mentioned in Germany in 1980 (Fröhlich 1980). The first text-book on BS was published in 1991 (Bienstein 1991) and three years later the first course for BS-instructors was developed in Germany. The first Danish version of text-book “Basal Stimulation” (Nydahl, Bartoszek 2005) was published in 2005. Since 1998 at least 20 courses on BS have been held in Denmark. Denmark has around 50 intensive care units; of these, fifteen use BS or are in the process of implementing BS according to their reports to the national database (FSAIO.NET, 2006).

BS as a concept
BS is a very comprehensive concept based on a holistic approach to health care. Taking patients reactions and preferences into account is expected to reduce stress, help the patient feel at ease, increase social interaction and independence, and give him the opportunity of sensory perception, movement and communication (Nydahl, Bartoszek 2005).
Seven perception-areas are focal points: somatic-, tactile/haptic-, vestibular-, vibration-, oral/olfactory-, auditory- and visual perception. The most common approach is to use elements of BS, depending on the patient’s situation. It is precisely the patient and his / her reaction to the BS or other care that is the linchpin of the whole concept: the nurse adapts the care to the patient’s individual needs and circumstances.

Over and above the concept of individualisation in BS, there are also specific goals:

- That the patient can maintain life and develop experiences
- Feel his/hers own life
- Feel security and build confidence
- Develop his/her own rhythm
- Experience the outside world
- Maintain and establish inter-personal relationships
- Make sense of his/her experiences
- Maintain control over his/hers life
- Experience autonomy and responsibility  (Nydahl, Bartoszek 2005)
To achieve these goals different parts of BS are used with different patients. However, there are some elements common to most cases:

- History of patients everyday life
- Initial contact
- Clear body delineation
- Predictability
- Day/night cycles and other rhythms
- Organization of space
- Stimulating or reassuring body wash
- Positioning
- Support in carrying out ordinary activities

There are many other possible actions - depending on the patient and nurses ability:
Vestibular stimulation e.g. by turning the patient’s head from side to side, vibration via electronic machines to muscles or bones, breath stimulating massage, oral stimulation (taste, consistency) , auditory stimulation (others than alarms from the ICU) etc.

**Summary**
BS is a concept that is becoming widespread in Danish ICUs. But are we ready for BS in the ICUs? In order to implement BS, a paradigm change is necessary in intensive care and implementation will be expensive. Before changing care and treatment procedures, evidence-based analyse is required.

It is important to question whether BS is based on any evidence that justifies its use in critical care. Are there beneficial effects, and how are they measured? How do we know that we don’t harm the ICU patients? To find out more about this, my qualification year has been focussed on BS. A literature review of BS was conducted to find available knowledge and a pilot study was set up to evaluate a way of measuring patients’ reaction to BS.

**The aim of my Qualification Year**
1. to make a review of the existing literature of BS (number, type and evidence classification)
2. to perform a pilot study to evaluate a usable method of measuring the effect of BS
Review of the BS literature

Method

A review (Polit, Beck & Hungler 2001) was conducted according to analyze and synthesize the literature about evidence of BS. Following databases were searched (see table 1):

<table>
<thead>
<tr>
<th>Database</th>
<th>Keyword</th>
<th>Total hits</th>
<th>Relevant or new hits</th>
<th>Date</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bibliotek.dk</td>
<td>Basal stimulation</td>
<td>10</td>
<td>10</td>
<td>11.1.08</td>
<td>10 Danish</td>
</tr>
<tr>
<td>PubMed</td>
<td>Basal stimulation “basal stimulation”</td>
<td>26.134</td>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AND nursing</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOT children NOT premature</td>
<td>13</td>
<td>13</td>
<td>8.6.08</td>
<td>12 German</td>
</tr>
<tr>
<td>Statsbiblioteket.dk</td>
<td>Basal stimulation “Basal stimulation”</td>
<td>2.278</td>
<td>6</td>
<td>8.6.08</td>
<td>1 Danish</td>
</tr>
<tr>
<td>Scopus</td>
<td>Basal stimulation “Basal stimulation”</td>
<td>30.278</td>
<td>62</td>
<td>8.6.08</td>
<td>6 German</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td></td>
<td></td>
<td>1 English</td>
</tr>
<tr>
<td>PsykINFO</td>
<td>Basal stimulation</td>
<td>1</td>
<td>1</td>
<td>8.6.08</td>
<td>1 German</td>
</tr>
<tr>
<td>CINAHL inclusive Pre-</td>
<td>Basal stimulation</td>
<td>3</td>
<td>0</td>
<td>8.6.08</td>
<td></td>
</tr>
<tr>
<td>Scopus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SveMed+</td>
<td>Basal stimulation</td>
<td>3</td>
<td>0</td>
<td>8.6.08</td>
<td></td>
</tr>
<tr>
<td>Embase</td>
<td>Basal stimulation “Basal stimulation”</td>
<td>4.866</td>
<td>15</td>
<td>8.6.08</td>
<td></td>
</tr>
<tr>
<td>Web of Science</td>
<td>Basal stimulation “Basal stimulation”</td>
<td>32.996</td>
<td>0</td>
<td>8.6.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AND nursing</td>
<td>46</td>
<td>0</td>
<td>8.6.08</td>
<td></td>
</tr>
<tr>
<td>The Cochrane library</td>
<td>Basal stimulation</td>
<td>608</td>
<td>2</td>
<td>8.6.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Basal stimulation”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Link search</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td>5 English</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 German *</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 French</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 Norwegian</td>
</tr>
</tbody>
</table>

*Table 1, literature search*  

The primary keyword was basal stimulation, used either as two separate words or as one concept (see table 1). In PubMed the keyword nursing was added; premature and children were deselected with Boolean operators. One hundred and sixty-one articles were found in total. Included were articles in the Scandinavian languages, English, German and French. Titles and abstracts were analysed for all hits. Excluded were articles that dealt with basal stimulation outside the topical concept e.g. by electronic stimulation of the brain. There was no limitation according to publication year.

This gave a total of 32 articles. The reference lists of these articles led to a link search with 15 new articles. One website was named in the articles, a second known by me and a third found
by the research librarian. Five studies are mentioned in the book “Basal Stimulation” (marked with * in table 1), but no database has been able to show more details about these studies so they were excluded from further analysis (Heinrich 2000/2001; Lauxterman 2003; Lehnert, K. 2000/2001; Metzing, S.?; Walper, H. 2000/2001).

All articles and books are presented schematically in appendix 1. Excluded assignments and websites are mentioned at the end of appendix 1. To categorise evidence the classification shown in table 2 is used. Literature outside this classification is noted as “classification not possible” (CNP).

<table>
<thead>
<tr>
<th>Publication type</th>
<th>Evidence</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta analyse or systematic overview of RCT</td>
<td>Ia</td>
<td>A</td>
</tr>
<tr>
<td>RCT</td>
<td>Ib</td>
<td></td>
</tr>
<tr>
<td>Controlled, not-RCT</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>Cohort study</td>
<td>IIb</td>
<td></td>
</tr>
<tr>
<td>Case-control study</td>
<td>III</td>
<td>C</td>
</tr>
<tr>
<td>Instructive analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casuistic</td>
<td>IV</td>
<td>D</td>
</tr>
<tr>
<td>Traditional textbook</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional review article</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expert judgment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Article</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Classification of evidence and power (Sundhedsstyrelsen 2004)

Analysis

For each article, book or website (referred to as articles in the following), the following items were analysed: type of publication, languish, population, setting, aim, methods, results, conclusion and evidence level (appendix 1); all are reported as thoroughly as possible. The credibility with regard to the evidence classification will be brought up in the discussion.

Results

Forty-two articles were identified. Of the articles, 22 were published in German, 11 in Danish, 6 in English, 2 in French and 1 in Norwegian. Four of these (Nydahl, Bartoszek 2005, Nydahl 2004, Gsodam, Nydahl 2000b, Gsodam, Nydahl 2000a) were translated into Danish and will be omitted in the following, giving a total of 38.
The types of publication were divided between 30 journal articles, 3 reviews, 2 books, and 3 home pages (FSAIO.NET, 2006, Anonymous?, Internationaler Förderverein Basale Stimulation). Twelve of the publications were descriptive in nature; in seven of them cases were described (Nydahl, Bartoszek 2005, Gsodam, Nydahl 2002, Hoffmann 1995, Nydahl 2002, Nydahl 2003a, Nydahl 2003b, Schipp 2000) and another two had cases but in a less instructive way (Brechbühler 1995, Menke 2006). Nineteen articles had ICU as the setting; of these three were neurological ICUs (Gsodam, Nydahl 2002, Scherzer, Lechner & Buchinger 1999, Trad, Sorensen 2006) and one ICU specialised in burns (Schipp 2000), one was from a medical ICU (Conrad 2004), the remainder were described as or assumed to be general ICUs (Nydahl 2004, Nydahl 2002, Nydahl 2003b, Menke 2006, Belitz, Mecklenburg 2001, Brunke 2007, Dunn, Sleep & Collett 1995, Habermehl 2006, Haut 2005, Havemann 2004, Nydahl 2005, Nydahl, Schüenben 2004, Nydahl 1996, Siebarth 2000). Three studies were from cardiac care units (Griffin et al. 1988, Richards 1998, Guzzetta 1989). Hemiplegic or stroke patients were focal point in two articles (Nydahl 2003a, Priß 2007) and one book (Fröhlich, A. 1995) without elaboration of the setting; this could be nursing homes, as in other articles (Hoffmann 1995, Brechbühler 1995, Schiff 2006). One study is from a general medical unit (McDowell et al. 1998) and two articles point out that their recommendations are for all situations where level of consciousness is affected (Jesche 1999, Fröhlich 1993). Three studies are reviews referring to elements that could be from BS; one (Schiff 2006) refers to back massage, another (Kobe, Sutter 2004) to music therapy and one (Scherzer, Lechner & Buchinger 1999) comparing ICU patients with patients undergoing anaesthesia. Finally, two articles are more personal enthusiastic works than scientific studies (Bergrath 2001, Girard-Hecht 2002). (See appendix 1)

The articles have a total of twenty-four different authors. One author stands out as very productive, Peter Nydahl with 10 publications as first author and 3 as second. The articles from the database search are shown in fig.1. The majority of the articles have been published since 1999.
The web pages were inconsistent: the Danish one was an overview of ICUs using BS (FSAIO.NET, 2006), one, in German (Anonymous?), appeared to be to be the precursor to the more updated page (Internationaler Förderverein Basale Stimulation) where parts of it are translated to several languages. Lots of information about BS, pictures, videos, cases and contacts was available here.

The oldest published articles do not mention BS and are included because they are on the reference lists from the earliest BS-articles. Nevertheless, they deal with elements that are comparable with BS. Thirty-one of the thirty-eight are in some way dealing with BS; most of them in an informative way.

**Evidence classification**

No meta-analyses or systematic overviews of RCT were found (evidence Ia). Four studies could be described as RCT (Ib) (Dunn, Sleep & Collett 1995, Griffin et al. 1988, Guzzetta 1989, Richards 1998) in peer-reviewed journals. Only one RCT was directly concerned with
BS (Conrad 2004) and this was published in a journal without peer-review. No controlled studies without randomisation were found (IIa) and of two cohort-studies (IIb) (Ny dahl 1996, McDowell et al. 1998), neither had BS as the subject. No articles with evidence level III were found, but 14 references were found with evidence level IV (Ny dahl, Bartoszek 2005, Ny dahl 2004, Gsodam, Ny dahl 2002, Ny dahl 2003a, Ny dahl 2003b, Schipp 2000, Scherzer, Lechner & Buchinger 1999, Belitz, Mecklenburg 2001, Ny dahl 2005, Ny dahl, Schürenberg 2004, Fröhlich 1995, Fröhlich 1993, Kobe, Scherzer et al 1999, Sutter 2004), mostly expert valuations, traditional reviews, casuistic cases and small series of articles. This leaves 16 unclassified references (three of these are home pages).

The aims of the studies vary greatly – if the aim was specified at all. In the following, some of the results will be described in themes of content.

Of the classified BS articles none were published in scientific peer-reviewed journals.


In the following, Roman numerals indicate evidence level and “CNP” that classification was not possible.

**Massage**

In a RCT (Ib) Conrad (2004) used BS-breathing stimulation massage versus normally back rubbing on 58 versus 67 patients in a medical ICU. Data on whether patients were intubated were not given in the article and the participating patients had to be able to sit at the bedside for about 10 minutes, which probably excludes patients with seriously respiratory problems and respirator therapy. A questionnaire was designed to describe perception of patients well-being. The results showed a significant increase in well-being in the group that received BS, compared to the control group. The measured RF decreased in the BS group, and it is concluded that if a reduction in RF is advantageous, breathing stimulation massage might be a good idea. HR and SpO₂ were measured but showed no difference in the two groups. Three diagrams with percentages were shown, but there is no explanation of the used statistics.

The importance of the differences between normal massage and breathing stimulation massage as used in BS is pointed out in an expert judgment (IV) (Ny dahl 2004a). Aromatic oils must not be used in BS massage, and Ny dahl here shows a relation to anthroposophy but without naming it.

Helle Svenningsen Qualification Year Paper
Impact on ICU stay
The time taken in weaning from a respirator often influences the length of ICU stay – and the importance of willingness to read the patients’ signals during the weaning process are pointed out by Nydahl (IV) (Nydahl 2003b). In several cases he illustrates the effect of BS, and even suggests a weaning protocol. No systematic studies are carried out, although one study carried out by Lauxterman (2003) described in the BS book (IV) (Nydahl, Bartoszek 2005) gives the impression that a RCT has been carried out. But without autonomous publication it can not be taken into account.

In a study that cannot be classified, Brunke (2007) (CNP) discusses the possibility of an effect on the sedated patient’s perception of reality when the care is preformed as BS. She “concludes” an effect of BS and points out the importance of anamnesis in establishing aims for individual care. The “conclusion” is based on one personal experience of nursing one patient and one interview with a nurse.

Caring for patients with pain
Nydahl (IV) (2004b) writes about different kinds of pain-reducing care. The interaction with the patient is central for giving the patient a sense of security, combined with pain-relieving medication. Special care for relieving pain can be: rubbing, massage, breathing exercises, humid, warm or cold bandage etc. Care is adjusted according to the patient’s reaction and the article describes many examples. One of many described methods of minimising pain is washing; instead of rubbing the patient’s skin with the facecloth it is suggested that a small towel is wetted and laid on the skin. The towel is then stroked– this will give the patient the feeling of being washed - drying can be done the same way. There is no scientific test or feed-back collection concerning patients’ opinions or experiences of the care in the text or references.

Pain relief for burns patients is a challenge addressed by Schipp (IV) (2000), who describes possible methods in all seven BS perception areas. Contact, mobilisation and even light touch can be extremely painful for these patients and must be used with caution. The article is informative and without studies or references.
Positioning of sedated or stroke patients is a special area, but by the use of special mattresses some of the problems may be reduced. Prüß (2007) describes this in an article outside evidence classification.

**Case-descriptions**

The cases described in these articles show a range of different challenges in caring; from the teenager (Gsodam, Nydahl 2000b, Gsodam, Nydahl 2000a, Gsodam) (both IV) surviving an accident, but staying in a coma until nurses “wake her up” with BS, to the geriatric woman (Hoffmann 1995)(CNP) progressing from disorientation, forgetfulness and screaming to a life where the outside world is interesting instead of frightening.

A similar situation is described by a journalist (Menke 2006) (CNP), where a patient in awake-coma returns to full consciousness. One article (Havemann 2004) (CNP) suggests BS as a solution to a complicated patient situation – but without actually trying it. Nydahl cites many cases to illustrate BS e.g. (Nydahl 2002, Nydahl 2003a) (both IV). Finally three assignments from the BS-Supervisor course give in-depth descriptions of each patient case including anamnesis and epilogue; unfortunately these are only referred to in the book of BS (Nydahl, Bartoszek 2005) (IV).

**Delirium-prevention**

None of the reference has delirium-prevention as the aim for BS intervention. In the most comprehensive book (Nydahl, Bartoszek 2005) (IV) delirium is not mentioned at all. But sensory disturbances are mentioned, such as confusion according to time and place, hallucinations, communication problems, emotionally disturbances, loss of identity and strikingly aberrant behaviour – all elements of delirium but not described as such. Many of the cases show excellent examples of how BS helps the confused patient to a less disturbing mental state (Nydahl, Bartoszek 2005 (IV), Hoffmann 1995 (CNP), Nydahl 2002 (IV), Brunke 2007(CNP)) but none of these, or any other of the references, uses the definition of delirium (American Psychiatric Association 2006) or attempts to diagnose it thorough screening tests.

**Implementing BS**

Three studies analyse different challenges involved in the implementation of BS (Belitz, Mecklenburg 2001 (IV), Habermehl 2006 (CNP), Haut 2005 (CNP)). A single Danish
example points out the decisions that have to be taken when implementing BS (Trads, Sørensen 2006) (CNP).

Results with elements of BS
The following results are from articles that did not directly have BS as focus, but they describe elements which are similar to those in BS. More literature mentioning elements of BS can probably be found by expanding search criteria.

Prioritising in ICU-care
Although they do not explicitly describe BS, a few studies are interesting when trying to understand the functions of BS: Nydahl (Nydahl 1996) (IIb) asked 178 former ICU patients to complete a questionnaire. Forty-nine percent responded and the conclusions were that constant supine positioning, thirst, pain, sleep deprivation and lack of communication were most unpleasant for the ICU patients. In his later works Nydahl shows how BS can help the nurse to “read” the patient to eliminate most of the discomfort.

Massage, relaxation and music therapy
In a RCT (Dunn, Sleep & Collett 1995) (Ib) aromatic massage was compared with non-aromatic massage and periods of rest. The 93 patients felt less anxious and more positive immediately following the aromatherapy, but the effect was neither sustained nor cumulative. HR, RF and BP showed no significant differences. Another randomized intervention study (Richards 1998) (Ib) showed increased sleep including REM when patients received six minutes of back massage, compared to control group. Relaxation techniques combined with music showed less effect. In another study (McDowell et al. 1998) (IIb) back rub was offered to 111 patients who requested sleeping medication. Combined with other parts of the protocol, such as the offer of warm milk and/or relaxation tapes, there was a dose-response relationship with the greatest effect in those receiving 2-3 parts of the protocol. Two of the earliest studies had focus on relaxation technique alone (Griffin et al. 1988) (Ib) or combined with music therapy (Guzzetta 1989) (Ib); both studies showed significant results, but these must be viewed with a degree of caution due to the age of the studies.
One review (Kobe, Sutter 2004) (IV) of five journal articles was made with regard to music therapy for coma patients, and another review examined back massage (Schiff 2006) (IV).
Neither was able to draw conclusions regarding the effects, but nevertheless give recommendations for the promotion of sleep/relaxation.

Discussion
The review revealed that only a few studies establish an evidence base for the effect of BS. The relative small number of hits in the literature search was noteworthy, especially in the light of the wide search criteria. This could relate to uneven distribution of BS, which the prevalence of German articles suggests. Another explanation could be that scientific studies don’t appeal to the group of people that use BS, or possibly that measurement of the effect is extremely difficult when dealing with a holistic and perhaps anthropological aspect of care. However, in one study with a high degree of evidence, some elements of BS were measured for effect (Conrad 2004). Conrad’s study was published in a non-peer reviewed journal (Pflege) and with no explanation of the statistics, so the results must be interpreted with caution – although it is the most persuasive study regarding to BS, the strength is reduced due to the lack of methodical explanation. Very little information about the patients’ illness, resources and overall situation were given. This makes the application of conclusions, to for example, intubated patients problematic.

The validity (Andersen, Matzen 2005) of this and the remainder of the studies dealing with BS was low: methodological stringency, specification of limitations or bias and other fundamental areas were inadequate or not described. It was not possible to use checklists for evidence value (Sundhedsstyrelsen 2004) due to the unscientific structure of the articles. They should therefore be considered as having little or no evidence value - if classification is at all possible. However, despite not fulfilling these evidence criteria, some of the articles do contribute to a base from which further, more scientific research can be undertaken.

Five studies were excluded because they were impossible to retrieve from any database. They are all referred to in Nydahl/Bartoszek (2005) and appeared to be relevant.

Another major problem to the concept of BS is the absence of a theoretical framework explaining the effect of BS and how the theory can be transferred from one area, the multi-handicap child, to another area, the ICU patient. Frölichs book (1995) gives an explanation with elements of theory of why BS works in the case of the multi-handicapped child. But can an ICU patient be treated as having a handicap? Normally an ICU patient will have all his/hers faculties but is hindered in using them because of sedation, intubation and/or

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delirium. It seems obvious that normally healthy adults must have some frame of reference for sensory input, or do they really have to start all over again because of the ICU stay? This was not discussed in the literature.

In creating a new nursing theory, the questions “What is it?” and “How does it function?” can be considered essential starting points (Chinn, Kramer 2004). If a theory is to be more than just that - to be a part of the daily nursing care, as the increasing use of BS in Denmark could indicate (FSAIO.NET, 2006), more studies are needed. BS is not a nursing theory, however it is a theory drawn into the nursing and the widespread implementation of BS might lead to the development of a new theory of ICU care. The question “What is it” is described in some cases. But without a theoretical framework this question will be inadequately answered, and the other question “How does it function?” even less so.

In most of the literature, the application of BS is described superficially, while observation of the patient’s reaction tends to be overlooked. Frölich’s (1995) detailed description of the small child’s behaviour, needs and ways of learning leads us to the best understanding of elements of BS. The textbook of BS in ICU care (Nydahl, Bartoszek 2005) provides many explanations, but not “why” BS works as claimed.

Most of the articles in this review were informative, both with and without cases. Kirkevold (1996) describes systematic and profound cases, which can help nurses to understand complex situations, exemplified by a significant writer such as Benner (Benner, Wrubel 2001). There are many stories of patients, who didn’t benefit from normal care, responding to BS, either by regaining consciousness or in another ways (Gsodam, Nydahl 2002, Hoffmann 1995, Menke 2006). Case descriptions can be useful, but a more unifying whole would be more valuable. Cases should be combined with observational studies to in order to be of evidential value.

Evidence-based health care should primarily be based on systematic research (Sackett et al. 1996). A non-researchable personal component can, at best, be classified as having a very low degree of evidence. But if no randomised trial has been carried out the next best external evidence must be used and work continued from there.

To enable comparative studies, BS must be meticulously implemented (Belitz, Mecklenburg 2001, Habermehl 2006, Haut 2005). If implementation is successful, indicators must be measured in order to assess the benefit or otherwise for the patient. For example, days on a respirator, days in ICU or a patient’s score in CAM-ICU (Ely 2007). From several cases it
appears that BS helped the patient out of delirium, but the documentation for this is not available.

**Conclusion**

The benefit of BS for ICU-patients has not yet been established. Unmonitored implementation of BS in the ICU is not recommended. The challenge is to find valid indicators to enable further research into the benefits (or otherwise) of BS. However, this does not mean that the practice of BS should cease in the mean time. At present there is no literature explaining the impact of BS. In the following, one method to measure the effect is tested.
Pilot study to measure stress response by Skin Conductance Response

The literature revealed only modest evidence of the effect of BS. Therefore a simple means of testing an effect of BS is desirable. The complicated nature of the ICU patients’ conditions makes this task difficult: comparison between patients is complicated by to the different courses of illness; answering questions is difficult if the patient is intubated and vital care would always be the first priority. Consequently the idea of finding a test with as few complicating elements as possible was born. To find a basic, measurable and reliable tool, the stress response was chosen. Pain and mental stress cause a rapid increase in hormone secretion followed by cortisone release (Lusk, Lash 2005) but because of the large number of blood tests the ICU patients already are subjected to, a non-invasive solution was to be preferred. Another element of the stress response was chosen for measurement: perspiration. An intervention had to be chosen which was stressful for the patient, but which could be made less stressful using BS. Thirst, having tubes and cables and the inability to communicate (Cornock 1998) are reported as most stressing by former ICU patients; but reducing or increasing these elements of stress would be either impossible or unethical. Bodily manipulations have been mentioned as stress-triggering as well, and it is recommended that interventions to reduce distress should focus on the preparation of patients (Porter 1995). Turning in bed is a necessary intervention, performed approximately every second hour, and this was chosen for the study. Another advantage was the possibility of differentiating between normal and BS turning. An overview of the physiology behind the stress response, methods of measuring stress response and the specific problems relating to ICU patients will now be given.

The sympathetic nervous system

The sympathetic nervous system (SNS), together with the parasympathetic nervous system (PNS) makes up the autonomic nervous system. The SNS allows the body to react quickly to risk situations. The most important function of the SNS is "fight-or-flight response". In a stressful situation, the level of activity of the sympathetic nervous system (coordinated by the hypothalamus) increases rapidly, while the activity of the parasympathetic nervous system is reduced to a minimum. The adrenal glands excrete adrenaline which stimulates the circulation - increasing blood pressure (increased minute-volume in the heart, vasoconstriction) and pulse rate. The blood supply is redistributed by reducing the flow to the gastrointestinal tract and skin, and increased to skeletal muscle and the heart. Blood flow to the brain is regulated
locally and receives therefore the same amount as before. Respiratory frequency rises and bronchial tubes expand, while salvia secretion reduces giving changes in the composition of salvia, so we still can moisten mucous membranes in the airways remain moist despite the increased breathing. The SNS also affects the eyes, so that the pupils dilate (so that more light gets in and the field of vision is wider), while the eye muscles relax, causing the lens of the eye to relax improving sight over long distances. In addition, the metabolism also changes: The liver increase its production and excretion of sugar (glucose) into the blood and the fat is metabolised, so more energy is available to the body. In the skin, blood vessels contract - this reduces the total blood flow to the skin, while maintaining temperature regulation. Finally, the activation of the SNS increases the rate of excretion of other hormones in addition to adrenaline. The SNS can be stimulated in varying degrees so all the above-mentioned reactions may be seen in a greater or lesser extent. The response of the SNS may vary from situation to situation, and the “fight-or-flight-response” illustrates the role of the SNS way to respond. Total blood flow to the skin, heart rate and respiratory frequency are elements we can observe and thereby measure the activity of the sympathetic nervous system.

**SNS and ICU patients**

Unpleasant or painful procedures can lead to increased activity of the SNS in ICU-patients, which in turn will affect the physiological reactions, for example increased respiration, heart rate, and perspiration. Respiration and heart rate are continuously monitored in ICU-patients. However, respiratory-therapy and some of the medications used in the ICU may influence the respiration frequency and pulse. It is therefore appropriate to include measurement of perspiration to assess whether BS reduces the sympathetic response by example, a turn in bed. According to the unique SNS controlled function, sweating is suitable to use as a picture of SNS influence (Naqvi, Bechara 2006). Sweating can be measured by skin conduction response (SCR) using two electrodes placed on the palm (or sole of a foot), where

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*Figure 2 SCR (Naqvi, Bechara 2006)*

*Figure 5.2 Skin conductance response to winning $140 of play money, illustrating the measurement of skin conductance response amplitude (SCR amp). Here, the response interval begins 1 sec after stimulus onset and ends 5 sec after stimulus onset. Although the peak of the response may occur outside of this interval, the response must initiate within this interval. The tick mark in the task marker channel is 1 sec long.*

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a weak current is sent between the electrodes. The amplitude of this measurement is proportional to the skin conductivity measured in microsiemens (µS) while the reciprocal is skin resistance measured in kg-ohm (kΩ) (Naqvi, Bechara 2006). The SCR is commonly used in research into pathological gambling. Together with respiration and pulse rates, these measurements give a picture of the subject’s stress levels associated with winning or loosing and perhaps also the ICU patient's stress levels associated with care (or treatment) provided. Such investigations on ICU patients are not described anywhere in the international databases, and therefore a pilot study was carried out.

Many medications used in the ICU affect the sympathetic nervous system, and thereby also SCR: adrenalin, noradrenalin, dobutamine, dopamine, propofol, midazolam, morfin, metoclopramide and others including some psychoactive drugs. Since the substances are so frequently used in intensive therapy it is not feasible to use such therapy as an exclusion criterion. To take into account the influence of the administration of such medication on SCR, dosages are measured and recorded. In order to select an adapted stress-situation turning of the patient in bed was chosen. Patients who have impaired attention or are sedated (RASS <0) are the most relevant in whom to study the effect of turning, since distressed motor function (RASS > 0) makes measurement of SCR difficult. Patients who are aware and relaxed (RASS = 0) will often turn themselves in bed; their inclusion would therefore not be appropriate. Other studies also suggest that sedated patients experience the most stressful situations associated with the unreal experiences they can have (Samuelson, Lundberg & Fridlund 2007), so focusing on patients RASS < 0 appears to be reasonable.

Baseline SCR will vary from patient to patient. In order to obtain a baseline specific to each patient, levels are monitored for 5 minutes before the intervention (turning) takes place. The intervention takes between about 5 and 15 minutes (depending on the patient's individual needs). The measurements recorded are SCR amplitude (maximum fluctuations) (SRCamp). The carrying out of the intervention is likely to cause signal artefact in the measurements and this must be taken into account (Naqvi, Bechara 2006).

No studies on SCR in an ICU setting have been performed or are available. Therefore a pilot study was conducted with the aim of investigating whether patients turned in bed with or without BS showed differences in stress level (SCR) measured as peaks in µS.
The hypotheses for this pilot study were:

- SCR, HR and RF can be used to measure changes in intubated ICU patient’s stress levels.

- The turning the patient by BS will lead to a reduction in SCR, HR and RF compared to turning according to normal practice.

- SCR, HR and RF will return to baseline levels more rapidly after BS turning than after normal turning.

Methods
The first five patients on ICU-600 that met the inclusion criteria (intubated, age at least 18 years, RASS < 0) were included. Patients with neurological injury were excluded, as were terminal patients due to ethical considerations.

The programme “BIOPAC MP100WS system and ACQ software program (Santa Barbara, CA)” was used for measuring RF, HR and SCR and the analysis of peaks in SCR. RF was measured using a sensor held in place by an elastic band round the chest (respiratory effort TSD 201), HR by two electrodes at the left shoulder and right flank, SCR was measured by two electrodes on the patient left or right palm. The Galvanic Skin Response Amplifier - GSR100C was used. All cables were linked via the box to a computer positioned close to the patient's bed. Measurements were taken while turning patients from back to side or from one side to the opposite side, with some 2 hours between. Four turns were carried out for each patient.

The type of turn was decided by randomisation, where each patient was guaranteed both types of turn twice, but in different sequences. This enabled each patient to be their own control. Randomisation was carried out in advance. Ten envelopes had been prepared, each containing one of six possible options (four of these options were duplicated). When an appropriate patient was included in the study, one envelope was opened, and the patient turned according to that option. To ensure that the same procedure was used for either a general or a BS turn, two sided-signs were made and were hung on the monitor of each patient and turned to show which turning method was to be used.
A routine turn:

- Monitoring for 5 minutes before the turn
- Address patient by name and give explanation of procedure
- The duvet, pillows etc are removed
- The patient is turned, positioned with pillows etc.
- The duvet is replaced
- Monitoring for 5 minutes post-turn

A BS turn:

- Monitoring for 5 minutes before the turn
- Check for REM sleep, without speaking to or touching the patient. If no REM sleep continue:
  - Initial contact - typically the shoulder is touched
  - Continuous assessment of the patient for reaction. Patient addressed by name and explanation of procedure
  - Firm stroke along the patient’s side - the side on to which patient will be turned
  - The duvet is removed
  - The patient’s hand is guided to the edge of the mattress
  - The patient is rocked 3 times, preferably in their own rhythm
  - The patient is turned and positioned
  - Defining contact – the patient is stroked firmly from the top of the head to the toes.
  - The duvet is replaced.
  - Terminating contact – as with initial contact, the shoulder is often touched.
  - Monitoring for 5 minutes post-turn

Analyse

SCR peaks were analysed using the computer software. HR and RF were counted over 30 seconds and 1 minute respectively by analysing the recorded data, and shown as per minute. The data will be too small for statistical analysis. The whole material will therefore be presented in tables and diagrams.
Results

Five patients were included, all males. Their ages were 63-75 years and they were included at the 2nd – 15th day of stay at the ICU (table 2). Each turning was performed by at least two nurses and up to 3 nurses and 2 hospital porters, and with me as observer.

<table>
<thead>
<tr>
<th></th>
<th>Age in years</th>
<th>Days on ICU when included</th>
<th>RASS at time of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient A</td>
<td>75</td>
<td>2</td>
<td>-3 / -4</td>
</tr>
<tr>
<td>Patient B</td>
<td>73</td>
<td>6</td>
<td>-2 / -3</td>
</tr>
<tr>
<td>Patient C</td>
<td>71</td>
<td>11</td>
<td>-1 / -2</td>
</tr>
<tr>
<td>Patient F</td>
<td>73</td>
<td>15</td>
<td>-1 / -4</td>
</tr>
<tr>
<td>Patient J</td>
<td>63</td>
<td>8</td>
<td>-3 / -4</td>
</tr>
</tbody>
</table>

Table 2: Patients’ data.
Results SCR:
As shown in figures 3 and 4, the peaks in SCR varied greatly. On most occasions there were no peaks before or after the turn and in seven cases not even during the turn. However, immediately before patient B’s 3rd normal turn was started, the SCR peaked at 672. During this turn, peaks were less than half of this and after 2 minutes less than 100. In the same patient’s 2nd turn, SCR peak was zero before and after but 285 during the turn.

![Figure 3: SCR peaks normal turn](image)

![Figure 4: SCR peaks BS turn](image)

Artefact in the measurements can not be excluded as the reason for some of the peaks.
Results Heart Rate:
Heart rate increased more often in the BS turns than in normal turns.

Figure 5: HR normal turn

Figure 6: HR BS turn
Results Respiratory Frequency:
It was not possible to measure RF in patient B. In the other four patients the RF increased in seven cases with normal turns (compared with measurement before starting the turn) and in five cases with BS turns, decreased once for each type of turn (although in different patients), and was unchanged in two patients with BS turns. Two minutes after turning only one patient had an increased RF following a normal turn compared with three with a BS turn. On six occasions the RF was decreased after a normal turn and on four occasions following a BS turn.

![Normal turn](image1)

**Figure 7: RF normal turn**

![BS turn](image2)

**Figure 8: RF BS turn**

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Medication

All patients received medication. On six occasions potentially significant events happened. Medication was administered either during or immediately before the turn. These were noted and are shown in Table 3.

<table>
<thead>
<tr>
<th>Turn</th>
<th>Patient</th>
<th>SCR peaks</th>
<th>HR/min</th>
<th>RF/min</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>before</td>
<td>under</td>
<td>after 2 min</td>
</tr>
<tr>
<td>A</td>
<td>1 b</td>
<td>0 28 0</td>
<td>180 100 100</td>
<td>25 15 16 x 9 5 50</td>
</tr>
<tr>
<td>A</td>
<td>2 a</td>
<td>0 30 0</td>
<td>102 102 108</td>
<td>9 11 9 x 9 0 50</td>
</tr>
<tr>
<td>A</td>
<td>3 b</td>
<td>0 2 0</td>
<td>100 100 102</td>
<td>7 7 6 x 9 0 50</td>
</tr>
<tr>
<td>A</td>
<td>4 a</td>
<td>1 75 40</td>
<td>94 94 90</td>
<td>8 11 7 x 9 0 50</td>
</tr>
<tr>
<td>B</td>
<td>1 a</td>
<td>0 19 0</td>
<td>94 96 94</td>
<td>x</td>
</tr>
<tr>
<td>B</td>
<td>2 b</td>
<td>0 285 0</td>
<td>86 94 94</td>
<td>x</td>
</tr>
<tr>
<td>B</td>
<td>3 a</td>
<td>672 293 88</td>
<td>80 88 86</td>
<td>x</td>
</tr>
<tr>
<td>B</td>
<td>4 b</td>
<td>0 0 0</td>
<td>86 96 88</td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>1 a</td>
<td>0 44 0</td>
<td>62 62 62</td>
<td>16 26 16 x</td>
</tr>
<tr>
<td>C</td>
<td>2 a</td>
<td>0 0 0</td>
<td>62 58 72</td>
<td>30 24 18 x</td>
</tr>
<tr>
<td>C</td>
<td>3 b</td>
<td>0 0 0</td>
<td>52 62 64</td>
<td>23 27 30 x</td>
</tr>
<tr>
<td>C</td>
<td>4 b</td>
<td>0 0 0</td>
<td>60 60 60</td>
<td>21 24 24 x</td>
</tr>
<tr>
<td>F</td>
<td>1 a</td>
<td>0 16 13</td>
<td>102 94 104</td>
<td>11 19 14 x</td>
</tr>
<tr>
<td>F</td>
<td>2 b</td>
<td>0 0 0</td>
<td>104 106 102</td>
<td>13 19 18 x</td>
</tr>
<tr>
<td>F</td>
<td>3 b</td>
<td>0 36 17</td>
<td>104 106 110</td>
<td>14 19 17 x</td>
</tr>
<tr>
<td>F</td>
<td>4 a</td>
<td>4 94 6</td>
<td>102 96 98</td>
<td>9 12 14 x</td>
</tr>
<tr>
<td>J</td>
<td>1 a</td>
<td>0 91 0</td>
<td>96 100 100</td>
<td>18 22 21 x</td>
</tr>
<tr>
<td>J</td>
<td>2 b</td>
<td>0 13 0</td>
<td>104 100 98</td>
<td>18 18 19 x</td>
</tr>
<tr>
<td>J</td>
<td>3 b</td>
<td>0 62 0</td>
<td>98 120 96</td>
<td>19 26 21 x</td>
</tr>
<tr>
<td>J</td>
<td>4 a</td>
<td>0 0 0</td>
<td>94 104 98</td>
<td>14 15 15 x</td>
</tr>
</tbody>
</table>

Table 3: Total results with medication and notes of other potentially significant events. Turns: a = normal, b = BS. Medicine administered during measurements (capitals) or less than 24 hours before (X).

*1 Cough, mini-recruitment
*2 Blood sample at the end
*3 Personal hygiene
*4 EKG disconnect, suction
*5 After VAC change
*6 Esmeron/ neuro-muscular blocker in connection with tracheotomy earlier at the same day

Discussion

The primary aim of this SCR pilot study was to test the following hypothesis: that SCR can be used to measure changes in stress levels in intubated ICU patients. The twenty turns leaves us with too little data for statistical analysis.
There were no identifiable patterns in the SCR, HR or RF with either BS or normal turning. These findings may be explained by the very small µS (ca. 0.25-2) compared to values for pathological gamblers (7–10). Medication, the influence of electronic machines (e.g. respirator) and different illnesses may also influence the results. Using the patients as their own control should have eliminated the influence of medication, but due to the severity of illness in these patients, medication dosages often change markedly from hour to hour – and make stability in these situations impossible to achieve.

The secondary aim of the pilot study was to see if turning by BS lead to a reduction in SCR, compared with “normal” turning. No conclusions can be drawn from the results but there is a tendency of fewer SCR peaks when turned using BS, as shown in figures 3 and 4. Using a more stressing intervention (Cornock 1998, Porter 1995) – for example tracheal suction - could perhaps have given more conclusive results – but tracheal suction can only be justified by clinical need, and is nowadays infrequently carried out if secretion is normal. Therefore the pilot study would have taken much longer to carry out increasing bias due to changes in the patient’s condition or shift changes. To perform suction more than clinically necessary would be unethically.

The tertiary aim of the pilot study was to see if SCR would return to the baseline more quickly after turning if BS were used instead of normal turning. To investigate this, measurements were continued for two minutes after completion of the turn. A period of two minutes was chosen to make the session as short as possible but nevertheless long enough for the patient to settle in the new position. That only one BS turn and 4 normal turns showed any peaks during this period could indicate that 2 minutes was too long. The appearance of the curves on the computer suggests that a shorter period may have changed the results noticeably, but this was not tested.

In this study, measurement of SCR failed to give information on the patients’ stress levels. This test has been validated in relation to gambling (Tchanturia et al. 2007), domestic violence (Babcock et al. 2005) and other psychological areas (Fung et al. 2005) with much higher levels of µS. The small µS measured in his study increased the risk of over-estimating peaks as any small change in the µS was counted as a peak caused by stress. Using patients as their own control was an attempt to take this into account, but was unsuccessful in this aim.
Conclusion

The conclusion of the SCR pilot study is therefore:

- SCR can not directly be used for measuring ICU patient’s stress levels.
- SCR change was often greater with normal turning than with BS turning, but data were inconclusive
- BS did not consistently lead to a faster return to SCR baseline

Because of the link between SCR, HR and RF (SNS), the results of HR and RF were also analysed. Once again, these data are probably influenced by medication, illness or other factors. Both HR and RF are increased if patients have pain. In this pilot study four patients were given morphine as analgesia, but it was often difficult to assess whether they received adequate doses. It is therefore not possible to draw conclusions regarding HR and RF.

It seems plausible that the use of BS optimised the preparation of the patient before the intervention / turn took place as recommended by Porter (Porter 1995). Inclusion of more patients was not possible in this study.

Overall conclusion

There are many good intentions in the literature regarding BS, but very low evidence value. There is not yet enough substance in the research to indicate whether BS has a positive effect on the well-being of ICU patients or if it has a delirium-preventing effect. The SCR-pilot study did not give conclusive results regarding which method is least stressful, and the method was not practicable.
References


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Nydahl, P. 2005, "Basal stimulation in patients who are unconscious but still able to perceive", Journal fur Anaesthesie und Intensivbehandlung, vol. 12, no. 1, pp. 244-245.


Helle Svenningsen Qualification Year Paper


Helle Svenningsen Qualification Year Paper


Svenningsen, H. 2007, "Intensivdelirium i Danmark: Første incidens opgørelse.".


Helle Svenningsen Qualification Year Paper
### Appendix 1: Schematic overview of the literature concerning BS

<table>
<thead>
<tr>
<th>Author, title, journal etc.</th>
<th>Pub.type, languish, methods</th>
<th>Setting/population, aim</th>
<th>Results, conclusion</th>
<th>My comments, evidence standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Belitz, A. &amp; Mecklenburg, T. 2001, &quot;Introduction to basal stimulation: enthusiasm alone is not enough&quot;, Pflege Zeitschrift, vol. 54, no. 7, pp. 501-506.</strong></td>
<td>Journal article German Questionnaire to and interview of staff.</td>
<td>2 ICUs (A and B) Research question: What action is required before the BS can be implemented? What elements of the concept can be impl. in practice? How is the staff’s recommendatio n to the time consumption by implementing BS? What changes does BS bring on the evidence, teamwork and motivation? (and others)</td>
<td>ICU B was only in the study for 3 days because of acute lack of staff. ICU A did not manage to do as planned because of isolated patients in the planed BS beds. But they were more enthusiastic than B and they tried to do as much BS as possible at random. It was not possible to answer the research questions because of the reverse conditions. Although the researchers recommend: Extern person to steer the implementation. The impl. period should be at least 6 months. Need for steady staff. At least 75% of the staff must participate at the BS course. The leadership must be positive to BS. The work will need new organization. The approach to personal behaviour and care need to be changed. Relatives should be participators.</td>
<td>OK study, relevant according to implementation of BS. Does not give anything to the evidence of BS itself.</td>
</tr>
<tr>
<td><strong>Bergrath, C. 2001, &quot;International &quot;Basal Stimulation&quot; Congress: touch induces movement—movement induces touch&quot;, Pflege Zeitschrift, vol. 54, no. 8, pp. 543.</strong></td>
<td>Journal article German Summary from an international congress</td>
<td>All</td>
<td>Short presentation of BS and the history behind. Nursing can be an independent discipline and still be therapy</td>
<td>Very enthusiastic, especially the present of the “mother” of nursing in Germany Liliane Juchli was a seal of approval to the congress</td>
</tr>
<tr>
<td><strong>Brechbühler, M. 1995, &quot;Basal stimulation. Reviving through the senses&quot;, Krankenpflege. Soins infirmiers,</strong></td>
<td>Journal article French/ Switzerland Describe, small cases</td>
<td>Rehabilitation</td>
<td>Appetizer where Christel Beinstein tells about BS at a conference and a little photo session to illustrate somatic tactile stimulation</td>
<td>Thought-provoking</td>
</tr>
</tbody>
</table>
**Author, title, journal etc.**

<table>
<thead>
<tr>
<th>vol. 88, no. 8, pp. 26-29.</th>
</tr>
</thead>
</table>

**Pub.type, languish, methods**

| Journal article. 
German. 
Controlled randomized study. 
Questionnaire according to well being etc. Measurements of PSO2, RF, pulse. |
| Journal article from a Special education report. 
German. 
1 interview, 1 nursing experience from the care |
| Journal article English. 
Randomized, single blinded study with 93 patients’ pre- and post- therapy assessments of stress, anxiety level, mood and ability to cope with ICU experiences. |

**Setting/population, aim**

| ICU. Discuss if BS does any difference to the sedated ventilator patients’ experiences of reality. |
| ICU. It was the order of the 3 therapies that was randomized: aroma-therapy massage, massage without aroma and rest for 30 minutes. 
54% had all 3 therapies. |
| ICU. |

**Results, conclusion**

| Via BS the patients are met individually according to wishes and needs. The anamnesis is important to establish aim for the care |
| Questionnaire: Significant increased well-being at the intervention group. 
PSO2: No changes, and no difference between the groups 
RF: Increased at the control grope after 30 min. 
Pulse. No differences |
| There were no statistically significant differences in the physiological stress indicators (blood pressure, HR and RF) or observed or reported behaviour of patients' ability to cope following any of the three interventions. However, those patients who received aromatherapy reported significantly greater improvement in their mood and perceived levels of anxiety. They also felt less anxious and more positive immediately following the therapy, although this effect was not sustained or cumulative. 
It is mentioned the research in |

**My comments, evidence standard**

| CNP |
| CNP |
| The most carefully worked study! 
Breathing stimulating massage (BS) might be a good idea where a reduction of RF is required. 
This unit is normally offering massage. |
| Not BS – but this study has parts of elements that I regular used in BS. 
The thoughts in order to design discussion (individualise the care and to know the patients preferences) can be translated to coming studies |
<table>
<thead>
<tr>
<th>Author, title, journal etc.</th>
<th>Pub.type, languish, methods</th>
<th>Setting/population, aim</th>
<th>Results, conclusion</th>
<th>My comments, evidence standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frölich, A. 1993, &quot;Basal Stimulation&quot;, Deutsche Krankenpflegezeitschrift, vol. 46, no. 3, pp. 160-164.</td>
<td>Journal article German, Instructive</td>
<td>All areas where patients are consciousness affected.</td>
<td>ICU is difficult because of the very complex area.</td>
<td>in BS.</td>
</tr>
<tr>
<td>Frölich, A. 1995, “BASAL STIMULERING for mennesker med multifunksjons-hemming</td>
<td>Book Norwegian</td>
<td>Home and institutions for multi-handicapped from newborn to old people with Alzheimer</td>
<td>Movement, communication and perception are pointed out as elements that have to work together to improve patients personal development.</td>
<td>The cornerstones to inspire German nurses to BS?</td>
</tr>
<tr>
<td>Girard-Hecht, E. 2002, &quot;Basal stimulation and nursing care. A precious aid for patients with sensory perception losses&quot;, Krankenpflege Soins infirmiers, vol. 95, no. 9, pp. 76-77.</td>
<td>Journal article French Describes BS</td>
<td>?</td>
<td>Primary written for the care of multi-handicapped children, but useful in the care for adults as well. Describes carefully who is to be seen as multi-handicapped, their attitudes, generally and specially care and organisation of the care.</td>
<td>The essence of BS is really clear in this book. Very well written – easy to read and very inspiring – for the care of multi-handicapped – but not for the ICU patient.</td>
</tr>
<tr>
<td>Griffin, J.P., Myers, S., Kopelke, C. &amp; Walker, D. 1988, &quot;The Effects of Progressive Muscular Relaxation on Subjectively Reported Disturbance Due</td>
<td>Journal article English Randomized controlled study. Interventions group had instruction in Bernstein-Bokovecs progressive</td>
<td>100 acutely ill. 2 groups at 25 in respectively Coronary CU and telemetry unit. PMR was</td>
<td>PMR group had significantly lower amount of disturbance due to hospital noise after being instructed in the use of PMR than prior to the intervention. Control group demonstrated no such changes. Noise sensitivity was found to be unrelated to disturbance due to</td>
<td>20 years old!</td>
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Helle Svenningsen Qualification Year Paper
<table>
<thead>
<tr>
<th>Author, title, journal etc.</th>
<th>Pub.type, language, methods</th>
<th>Setting/population, aim</th>
<th>Results, conclusion</th>
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<tbody>
<tr>
<td>to Hospital Noise&quot;, Behavioral Medicine, pp. 37-42.</td>
<td>muscular relaxation technique; control group had a short visit. Scales and questionnaires</td>
<td>carried out at least twice a day in 24 hours.</td>
<td>hospital noise in this sample.</td>
<td></td>
</tr>
<tr>
<td><strong>Gsodam, R. &amp; Nydahl, P. 2002, &quot;Alt virkelig liv ligger i mødet. en casestudie i basal stimulation”, Klinisk sygepleje, vol. 16, no. 2, pp. 22-32.</strong></td>
<td>Journal article. Danish One case description incl. day plan</td>
<td>Neurological - Intensive</td>
<td>Very detailed descriptions of the care and thoughts according to the care of a 16 year old girl.</td>
<td>As many other case descriptions: very positive reading – makes one believe in the concept. <strong>IV/D</strong></td>
</tr>
<tr>
<td><strong>Guzzetta, C.E. 1989, &quot;Effects of relaxation and music therapy on patients in a coronary care unit with presumptive</strong></td>
<td>Journal article. English. Randomized intervention study with a control group. Stress was</td>
<td>Coronary care unit. 80 AMI patients, 30 – 72 year, music therapy (n=26) or relaxation therapy (n=27) (both groups)</td>
<td>HR: significant lower in both groups. Finger temperature: Immediately effect (warmer) where music therapy was the most effective, secondly relaxation. But no</td>
<td>Nearly 20 years old study. Only 1 in control group used sleeping medication bit 2-4 in the</td>
</tr>
<tr>
<td>Author, title, journal etc.</td>
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<td>acute myocardial infarction”, Heart &amp; Lung, vol. 18, no. 6, pp. 609-616.</td>
<td>measured as HR, finger temperature, need for medication, ”satisfaction”.</td>
<td>performed 20 minutes twice a day or control group (n=27).</td>
<td>significant difference over time. Medication: No significant differences. Patients were satisfied with both music and relaxation therapy.</td>
<td>intervention group. This was not significant. The qualitative part of the study seems rather random, but the results can be ok any way.</td>
</tr>
<tr>
<td>Habermehl, A. 2006, &quot;Basale Stimulatone - der Theorie-Praxis-Konflikt”, Intensive, vol. 14, pp. 164-171.</td>
<td>Journal article. German. Intent to analyse if a BS course increases the use of BS and how many in fact used BS. Questionnaire in two parts: 1. basically 2. care 3. leadership</td>
<td>Intensive</td>
<td>1: age, experience, time since course were without importance 2: Reasons for not using BS: Lack of time, to little knowledge, missing motivation, overcoming, and tradition of feed back. Reasons to use BS: Patients wellbeing, closer contact, pain reducing 3: Shorter in ICU-stay. Staff often not ready for changes/BS. From force of habit.</td>
<td>Unclear in the % results. There is a great lack of systematic in analyse and results. No clear conclusion, but many thoughts of why and why not BS is used as part of the care.</td>
</tr>
<tr>
<td>Haut, A. 2005, &quot;An Grenzen geraten&quot;, Intensivepflege, vol. 2, pp. 20-24.</td>
<td>Journal article. German. Interview survey among the implementation of BS</td>
<td>ICUs personal.</td>
<td>BS meets boarders in different areas: One self: feelings, body and communication. Among colleges: missing understanding and prejudicing about the structure: persons, time and space. It is complicated to implement BS and requires time for reflection and sharing experiences.</td>
<td>Relevant according to implantations of BS.</td>
</tr>
<tr>
<td>Havemann, L. 2004, &quot;Mødet med en kritisk patient”, Sygeplejersken, vol. 104, no. 1, pp. 6-11.</td>
<td>Journal article Danish Instructive.</td>
<td>ICU</td>
<td>Anne Meiniches negative experiences described in ”To kaffe og en staveplade” leads to an accommodation of BS to ensure better communication with the ICU patients. 6 elements of BS are described.</td>
<td>CNP</td>
</tr>
<tr>
<td>Author, title, journal etc.</td>
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<tr>
<td>Hoffmann, D. 1995, &quot;Basal stimulation in nursing&quot;, Osterreichische Krankenpflegezeitschrift, vol. 48, no. 2, pp. 12-15.</td>
<td>Journal article. German (Austria) Describes BS and one case description incl. day plan</td>
<td>Nursing home</td>
<td>A 92 year old lady change from disorientated, forgetful, balance disturbed, screaming when nursed to more orientated, more “her self as before” inclusive better hearing and listening. Her mobility and interest to the world increased.</td>
<td>Impressing how much an intense BS care can change the life quality for an old lady.</td>
</tr>
<tr>
<td>Jesche, M. 1999, &quot;Basal stimulation in nursing--heard about it?&quot;, Osterreichische Krankenpflegezeitschrift, vol. 52, no. 8-9, pp. 26-29.</td>
<td>Journal article. German Describes possible caring offers that is naturally in BS</td>
<td>All places where conscious, disorientated, somnolent, brain injured, apoplexies etc. is taking care of.</td>
<td>Describes aims and ways to reach the aims according to the 3 areas that BS is focusing on: Somatic, vestibular and vibration offering.</td>
<td>CNP</td>
</tr>
<tr>
<td>McDowell, J.A., Mion, L.C., Lydon, T.J. &amp; Inouye, S.K. 1998, &quot;A non-pharmacologic sleep protocol for hospitalized older patients&quot;, Journal of the American Geriatrics Society, vol. 46, no. 6, pp. 700-705.</td>
<td>Journal article. English. Prospective cohort study with 111 patients that asked for sleeping medication while in patients. The main outcomes of sleep quality and sedative-hypnotic drug (SHD) use were measured by patient</td>
<td>A 34-bed general medical unit in a university-affiliated teaching hospital. A total of 175 consecutive admissions aged 70 years or older. INTERVENTION: A non-pharmacologic sleep protocol con consisting of a back rub, warm drink, and relaxation</td>
<td>111 patients, mean age 79.3, received the sleep protocol. Patients required the protocol for a mean of 4.9 days per patient. The quality of sleep correlated strongly with the number of parts of the protocol received, suggesting a dose-response relationship, with the highest correlation for receiving two to three parts. The sleep protocol was successful in reducing SHD use from the baseline pre-intervention rate of 51/94 (54%) to 34/111 (31%) (P &lt; .002). The sleep protocol had a stronger association with quality of sleep (p = .75, P = .001) than did SHDs. However, chronic SHD users were more likely to refuse the</td>
<td>Not BS – not ICU. But could absolutely be interesting to see repeated in an ICU and preferably including BS.</td>
</tr>
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Helle Svenningsen Qualification Year Paper
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<tr>
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<tr>
<td><strong>Menke, P. 2006, &quot;Basal stimulation of persons in a vegetative state--a case report: back into a more aware life&quot;, Pflege Zeitschrift., vol. 59, no. 3, pp. 164-165.</strong></td>
<td>Journal article. German. journalistic Case description</td>
<td>Brain damaged patients in “awake – coma” and respirator.</td>
<td>protocol than nonusers (64% vs 41%, P &lt; .03) and received SHDs 4.5 times more often than nonusers (67% vs 15%, P = .001). CONCLUSION: The non-pharmacologic sleep protocol provides a feasible, effective, and non-toxic alternative to SHDs to promote sleep in older hospitalized patients. Use of the protocol can substantially decrease use of SHDs.</td>
<td>Written by a journalist. <strong>CNP</strong></td>
</tr>
<tr>
<td><strong>Nydahl, P. &amp; Bartoszek, G. 2005, Basal Stimulation, Munksgaard, København.</strong></td>
<td>Book, Danish, instructive. Several small cases</td>
<td>ICU</td>
<td>One heart-warming story: a patient gets out of coma properly because of BS, and is able to participate in personal care with support from BS – nurse.</td>
<td>References to several smaller studies, pre-scientific. <strong>IV/D</strong></td>
</tr>
<tr>
<td><strong>Nydahl, P. 2002, &quot;Det bedste er, at du selv bestemmer!: basal stimulation i sygeplejen&quot;, Klinisk sygepleje, vol.</strong></td>
<td>Journal article. Danish Instructive. Cases.</td>
<td>Intensive</td>
<td>The care must be based on pedagogy and be specialized for each individual. Patients’ reaction must be integrated in the coming activities. BS is a learning process for both patient and nurses.</td>
<td>Primary pedagogic <strong>IV/D</strong></td>
</tr>
<tr>
<td>Author, title, journal etc.</td>
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<td>Setting/population, aim</td>
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<tr>
<td>Nydahl, P. 2003, &quot;Træk så vejret dybt!. basal stimulation ved respiratoraftrapi ng&quot;, Klinisk sygepleje, vol. 17, no. 1, pp. 11-28.</td>
<td>Journal article. Danish Instructive. Cases.</td>
<td>Respirator weaning ICU</td>
<td>Points out willingness to read the patients signals as important. Several of these cases are about trust.</td>
<td>Weaning protocol with nursing observations etc.</td>
</tr>
<tr>
<td>Nydahl, P. 2004, &quot;Basal stimulation in caring for pain patients&quot;, Pflege Zeitschrift, vol. 57, no. 6, pp. 2-7.</td>
<td>Journal article. German Instructive.</td>
<td>Intensive Pain relieving care/ care with less pain</td>
<td>Describe how BS is especially good for patients with different types of pain.</td>
<td>Good questions in the article to get specific answers according to the pain problems. IV/D</td>
</tr>
<tr>
<td>NYDAHL, P., 2005. Basal stimulation in patients who are unconscious but still able to perceive, Journal fur Anesthesie und Intensivbehandlu ng. 12(1), pp. 244-245</td>
<td>Journal article German. Informative</td>
<td>Intensive</td>
<td>Short information about the background, development, studies, and goals for BS.</td>
<td>Short, sweet and simple… IV/D</td>
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**Helle Svenningsen**

**Qualification Year Paper**
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<tr>
<td>Nydahl, P. 1996: Wie erleben Patienten die Intensivstation? Eine pflegerische Studie. In: intensiv, Heft 4, pp. 250-254</td>
<td>Journal article German. Quantitative cohort study. Questionnaires to patients whom had been at the ICU. Analysed and results shown as percents</td>
<td>Intensive</td>
<td>178 former ICU patients participated (response rate 49%) at average 4 days at the ICU. Patient helplessness/ tense/ sleepless/ pain/ confusion/ low body sense was analysed according to different circumstances. Strains listed in priority.</td>
<td>Not BS, but very inspiring and helpfully as a fundament of decision-making in the ICU: what parts of nursing/ BS should be first priority?</td>
</tr>
<tr>
<td>Richards, K.C. 1998, “Effect of a Back Massage and Relaxation Intervention on Sleep in Critically Ill Patients”, Am.J.of Crit.Care, vol. 7, no. 4, pp. 288-298.</td>
<td>Journal article English. Randomized intervention study with a control group. EEG was measured in a specially ”sleep laboratory”</td>
<td>Cardiac CU. 69 men (55.79 year). 24 had six minutes back massage (not BS); 28 had relaxation technique inclusive 7,5 minutes music; 17 was control.</td>
<td>The massage group slept &gt; 1 hour longer had 10 minutes more REM sleep than controls. A larger sample of subjects would properly have provided sufficient power. Factors that awakened subject are listed: automatic BP measurements are worst.</td>
<td>According to BS massage can be both stimulation and relaxation. In this study is the relaxation in focus. Nice study. Possible biases are well described.</td>
</tr>
<tr>
<td>Scherzer, W., Lechner, K. &amp; Buchinger, E. 1999, &quot;Rehabilitation orientated Intensive care of</td>
<td>Journal Article German, English abstract review of literature</td>
<td>Head Trauma, Intensive</td>
<td>It cannot be excluded that even seemingly unconscious severe head injury patients have perceptions in some manner. In the everyday life of intensive care all involved persons must structure unavoidable stimuli in a Conclusions made on review of the literature. No autonomous study.</td>
<td></td>
</tr>
<tr>
<td>Author, title, journal etc.</td>
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<td>Setting/population, aim</td>
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<tr>
<td>the severe head injury patient&quot;, Acta Chirurgica Austria, vol. 31, no. SUPPL. 156, pp. 127-129.</td>
<td>Assessing ICU patients with patients undergoing anaesthesia</td>
<td></td>
<td>way they do not harm the patient, but so that a stabilization of basic perception functions happens as soon as possible. This demand is best fulfilled by BS and Ziegel's concept of dialogue construction in the early stages of rehabilitation.</td>
<td>IV/D</td>
</tr>
<tr>
<td>Schiff, A. 2006, &quot;Rückenmassage und verwandte Techniken zur Förderung des Schlafes bei älteren Menschen: Eine Literaturanalyse&quot;, Pflege, vol. 19, pp. 163-173.</td>
<td>Journal article. German. Literature review. Back massage and similar techniques can promote sleep to elderly people.</td>
<td>Nursing home. Wards (somatic) Psyche. ward Intensive (2 studies)</td>
<td>Nothing precisely can be said about these studies. Their qualities are to poor and the used methodology to different for any conclusions. But it seems as if back massage etc can lead to relaxation but they can not conclude on the effect on the people. More research required.</td>
<td>Good review of the studies grouped after languishes but the article is in German. IV/D</td>
</tr>
<tr>
<td>Siebarth, I. 2000, &quot;Basal stimulation in the Intensive care unit&quot;, Journal für Anästhesie und Intensivebehandlung, vol. 7, no. 3, pp. 203.</td>
<td>Journal article German Project information</td>
<td>Intensive</td>
<td>Two projects are reported. The results from the first one are at top of this list: Belitz, A. &amp; Mecklenburg, T. 2001, &quot;Introduction to basal stimulation: enthusiasm alone is not enough&quot;, Pflege Zeitschrift, vol. 54, no. 7, pp. 501-506. The other study has not been published yet.</td>
<td>See Belitz CNP</td>
</tr>
<tr>
<td>Trads, M. &amp; Sørensen, L.S. 2006, &quot;Implementering af basal stimulation&quot;, Klinisk sygepleje, vol. 20, no. 2, pp. 70-77.</td>
<td>Journal article Danish Instructive</td>
<td>Neurological ICU</td>
<td>Describes the decisions and implementing process according to BS. Call for more evidence…</td>
<td>CNP</td>
</tr>
<tr>
<td>Heinrich, H.</td>
<td>Final assignment at the supervisor education in BS</td>
<td>Intensive</td>
<td>Profound description of one patient case including anamnesis and epilogue</td>
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<tr>
<td>2000/2001</td>
<td>Quantitative controlled clinical trial. German. Controlled study with 9 patients in each group</td>
<td>Intensive. Intervention (A-group): BS was used when there were signs of confusion. Control (B-group): traditional care.</td>
<td>A-group: At the ICU 2.77 day (mean) B-group: 4.44 day (mean) Less Halperidol, Dormicum, Atosil (?) and Catapresan in A-group. They were less restrained (!) ½ hour versus 5 hours in B-group. A-group uses doublet nursing time as B-group</td>
<td>One of the most convincing studies. Shame that it is not published in an international journal.</td>
</tr>
<tr>
<td>Lautermark, F. Study performed in 2000 Published 2003 in ?? <a href="mailto:lautermark@mae.com">lautermark@mae.com</a> (mailed but no answer)</td>
<td>Final assignment at the supervisor education in BS. Case.</td>
<td>Intensive</td>
<td>Profound description of one patient case including anamnesis and epilogue</td>
<td></td>
</tr>
<tr>
<td>Metzing, S. Year?</td>
<td>Type? 12 in depth interview analysed with Grounded Theory</td>
<td>Intensive</td>
<td>The visits of relatives have a great importance to the critical ill. Relatives should be the nearest ones. More peripheral relatives are not understood as relatives of the critical ill ones, and their visits should be limited.</td>
<td>Interesting results and citations. Is however too general and not specifically to BS</td>
</tr>
<tr>
<td>Walper, H. 2000/2001</td>
<td>Final assignment at the supervisor education in BS. Case</td>
<td>Intensive</td>
<td>Profound description of one patient case including anamnesis and epilogue</td>
<td></td>
</tr>
<tr>
<td>Homepages</td>
<td>FSAIO.NET, forskernetværk for Intensivesygeplejersker 2006, Available: [<a href="http://www.dsr.dk/msite/text.asp?id=181">www.dsr.dk/msite/text.asp?id=181</a> &amp;TextID=7523](<a href="http://www.dsr.dk/msite/text.asp?id=181">www.dsr.dk/msite/text.asp?id=181</a> &amp;TextID=7523) [2007, 06/26]</td>
<td>Homepage. Danish.</td>
<td>ICUs in Denmark – not all of them</td>
<td>Overview of Danish ICUs which use BS or parts of it. The homepage is updated by FSAIOs research network for ICU nurses.</td>
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<tr>
<td><a href="http://www.basale-stimulation.de">www.basale-stimulation.de</a> Organization: Internationale Förderverein Basale Stimulation e.v.</td>
<td>Homepage German and partial translations</td>
<td>All</td>
<td>Lots of information, descriptions, cases and contact addresses. Updated</td>
<td>Mostly German.</td>
</tr>
<tr>
<td><a href="http://www.basalestimulation.net">www.basalestimulation.net</a></td>
<td>Homepage German</td>
<td>All</td>
<td>Some information, videos for sale etc.</td>
<td>Doesn’t seem updated</td>
</tr>
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</table>
Appendix 2: Course certificates

AARHUS UNIVERSITET

Klinik sygeplejespecialist
Helle Svenningsen
Tokkerbakken 30
8240 Risskov

KURSUSBEVIS

Det bekræftes herved, at De i dagene 28.-29. juni 2007 på tilfredsstillende
måde har fulgt det af Det Sundhedsvidenskabelige Fakultet i Århus
afholdte

PH.D.-FORBEREDELSESKURSUS

Michael J. Mulvany
Professor, dr.med.
Ph.d-studieleder

Kursusledere:
Lektor, dr.med. Lise Wogensen Bach og
professor, dr.med. J. Michael Hasenham

J.NR. 108/08A

ECTS: 1,0

Kursets indhold:
Forskningsprocessens faser, fra idé til forskningsprotocol. Etiske overvejelser ved
pladsopgave af et projekt. At vælge en vejleder. At vælge et forskningsprojekt. Design af et
forskningsprojekt, herunder vurdering af dataskilderskab og statistisk evaluering af et
projekt. Vedligeholdning og praktiske oplysninger ved evnen til ph.d.-studiet. Orientering fra DFU,
projekt. Forskningsplan. Nogle planteagte ph.d.-projekter, hvor deltagerne presenterer
foreløbige ideer som oplæg til diskussion.

Helle Svenningsen
Qualification Year Paper
KURSUSBEVIS

Det bekræftes herved, at De i dagene 19.-20. november 2007 på tilfredsstillende måde har fulgt det af Det Sundhedsvidenskabelige Fakultet i Århus på ph.d.-uddannelsesniveau afholdte kursus i

LITTERATURSØGNING

Michael J. Mulvany
Professor, dr.med.
Ph.d.-studieleder

Kursusleder: Hanne Munch Kristiansen

J.NR. 88/30

ECTS: 0,5

KURSUSBEVIS

Det bekræftes herved, at De i dagene 7. og 11. december 2007 på tilfredsstillende måde har fulgt det af Det Sundhedsvidenskabelige Fakultet i Århus på ph.d.-uddannelsesniveau afholdte kursus i

MICROSOFT EXCEL
I BIOMEDICINSK FORSKNING

Michael J. Mully
Professor, dr.med.
Ph.d.-studieleder

J.NR. 113/05

Kursusleder: Adjunkt, ph.d. Mads Ronald Dahl

ECTS: 1.0


Helle Svenningsen                      Qualification Year Paper