Central area for induction of anesthesia and job satisfaction

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Abstract: A central area for induction of anesthesia (CAIA) is supposed to optimize processes of preoperative patient preparation for anesthesia. The purpose of this study was to assess whether the separation of the anesthesia process into anesthesia induction and anesthesia maintenance is associated with residents’ job satisfaction.

The central area for induction of anesthesia model (CAIA model) was prospectively compared to the conventional model of anesthesia being induced, maintained and ended by the same anesthetist. Quality of senior staff supervision for each day as well as workday satisfaction was additionally graded by a Likert-scale.

More than 80% of residents considered their workday as satisfying or very satisfying, regardless of the model applied. Furthermore, work day satisfaction was significantly associated with the quality of supervision provided by the teaching staff. It was concluded that time and attention provided by the teaching staff rather than the anesthesia organisational model were the major determinants of workday satisfaction.

Key words: Central area for induction of anesthesia (CAIA) ; workday satisfaction ; quality management project ; handover-principle ; questionnaire.

INTRODUCTION

A central area for induction of anesthesia (CAIA) is on the one hand a tool that can be used to reduce the changeover times between operations, improve efficiency in the operating department (OD) and contribute to optimal usage of operating department resources (1). On the other hand an improvement in the training of doctors through the close bundling of anesthetic procedures under constant supervision by consultants can also be achieved.

Job satisfaction is usually understood to mean a rating of the overall work situation or single facets of work. This rating is based on affective experiences at work and subjective judgements of the person involved (2). Job satisfaction can also be described as the result of a cognitive comparative process in which the current work situation (= “is”) is compared to the desirable situation (= “should”) (3, 4). In occupational psychology, job satisfaction is defined as a measure of satisfaction achieved through work and as a measure of the enrichment achieved through work (5).

Recently job satisfaction of doctors has become a focus for health care research strategists (6, 7). Generally two reasons for this are cited in the literature: on the one hand workflows are being rationalised in the context of the restructuring of the German health care system and this is leading to increased workloads and work-related stress (8). On the other hand the job satisfaction of doctors is closely related to both their patients’ satisfaction (9, 10) and the quality of medical care they are providing (11, 12). Further, it has been shown that doctors’ job satisfaction is decisively influenced by their choice of speciality (13). A recent study (7) showed that German anesthetists ranked their job satisfaction lower than the general population and lower than that of a heterogeneous group of hospital doctors. Job satisfaction deficits among doctors seems to be particularly related to positions of low influence and to deficient leadership by management grades (6, 7, 14-16). The introduction of guidelines that dictate patient care, contribute via a perception of reduced clinical autonomy to a reduction in work satisfaction (6).

To the best of our knowledge there are no studies that address the influence of a central anesthetic induction area (a measure that dictates patient care) on the job-satisfaction of anesthetists. The...
introduction of a CAIA can fragment the process of anesthesia and thereby further fragment the anesthetist’s workflow. On the other hand, our hope with introducing the CAIA was to bundle teaching of anesthesiological skills through the CAIA consultant and to gain time for supervision of residents through the operating department consultants.

The aim of the study was therefore to resolve the question of whether further fragmentation had an influence on the job satisfaction residents.

Study design and investigative methods

This quality management project was approved by the local data protection authority, personnel board and ethics committee (EA1/023/11) and the anonymity of all participants was strictly protected. The study was performed in a large university hospital. It involved altogether 34 anesthesiologists (residents) and was performed over 20 days. The area of study was 10 operating rooms in which patients underwent transplant, trauma or general surgery. The operative spectrum ranged from laparoscopic or arthroscopic procedures to major transplantations and oncological procedures.

Groups

We compared two organisational models: the Central Anesthetic Induction Area (CAIA) model with a conventional organisational model (control model). Each model was operated twice for 5 days continuously and this was repeated on one further occasion for each model. The questionnaires were given to all anesthetists involved on the day of the study. Patients who had to be isolated due to infection with a multi-resistant organism were excluded from the study.

CAIA model: in this model all patients, with the exception of the first patient on the operating list, were induced in the CAIA. The CAIA is equipped with 4 anesthetic workplaces and was in general staffed by a consultant and 2 residents. Residents were assigned to the CAIA for 1 week at a time and according to a rotation roster. On average 12 patients were induced in the CAIA every day. In the CAIA model the patients were induced by the CAIA residents, supervised by the CAIA consultant and then, after a detailed hand-over, transferred to the care of a non-CAIA resident who finished the case (see figure 1a) and was supervised by another consultant.

Control model: in the classical model patients were induced by a resident working under consultant supervision in the CAIA. This same resident then continued the case in a corresponding operating room under the supervision of another consultant and there was, in contrast to the CAIA model, no transfer of patient care (see figure 1b).

The survey was conducted over 20 days (see figure 1c): 10 days using the CAIA model, 10 days using the control model.

Questionnaire

Anonymous questionnaires (see Addendum) were given to all the involved residents at the end of each day. The number of anesthetics performed (broken down into induction, maintenance and emergence/extubation) as well as the number of intubations, regional anesthetic techniques and central venous catheter placements. Furthermore job satisfaction as well as subjective experience of the level of supervision by the attending consultant was measured using a Likert scale.

Ethical committee approval

Ethical committee approval was waived due to total anonymity of patient and physician data. Data authorisation was obtained and consent was given. (Ethical committee application number: EA1/023/11).

Job satisfaction

Amongst doctors, job satisfaction correlates strongly with five specific factors: 1. Type of practice (vs. in training), 2. Medical specialty, 3. Estimated time spent on administrative work per week, 4. Estimated time spent on continuing education, 5. Estimated total work time per week (13).

One-item-scales for the investigation of job satisfaction in doctors have proven to be of value in various studies (15, 17-19). Job satisfaction was therefore, for the purpose of this study, defined as the satisfaction of the anesthetists’ with the workday under investigation. This was measured using a 4-point Likert scale: very satisfied, predominantly satisfied, predominantly dissatisfied, very dissatisfied.

Residents’ degree of satisfaction with their contact time with the attending consultant was measured using a 3-point Likert scale: “as much as I wanted”, “less than I would have liked”, “far too little”.

For the purposes of statistical analysis, each of the scales was compacted into two categories.

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Statistical analysis

The questionnaire data were entered into a database and exported into SPSS for Windows. The exact Chi-square test was used to evaluate the two groups with respect to the following procedures: induction, maintenance, emergence, intubations, regional anesthetic techniques and central venous catheter insertions. Regarding the evaluation of the residents’ contact with the attending consultant, and doctors’ job satisfaction, the two groups (as represented by the compressed Likert scale data) were compared using Fisher’s exact test. Finally multivariate logistic regression analysis was used to determine which of the following factors had an influence on anesthetists’ job satisfaction: organizational model (i.e. CAIA or control), satisfaction with contact with the attending consultant, and frequency of central line insertions.

A p-value of less than 0.05 (two-tailed) was considered significant. As the statistical tests were exploratory, no adjustment was made for type-1 errors. All statistical tests were performed using SPSS, Version 17, Copyright © SPSS, Inc., USA.

RESULTS

In total, 195 questionnaires were handed out and 108 were returned. That corresponded to a return quota of 54%. As is always the case with surveys, not all of the 108 returned questionnaires...
were complete. This resulted in varying numbers of
missing values across the various questions.
Because of this, the number of questionnaires actu-
ally analysed is provided with the data concerning
each individual question (Table 1).

Since the questionnaires were anonymous and
each individual resident was asked to fill out one
questionnaire per day, it is not possible to name the
percentage of residents who responded. There were
no significant differences (exact Chi-square test)
concerning the frequency of procedures (induction,
maintenance, emergence, central lines, intubations)
between the Caia and control models (Table 1).

Concerning satisfaction with the level of
contact with the attending consultant (as measured
by the compacted two-point scale : “as much as I
wanted” versus compacted numbers for “not
enough contact”, “less than I would have liked”
and “far too little”), there was no difference between
the CAIA and control groups (p = 0.508).

In the control group, 36 residents (78%) answered “as much as I wanted” versus 50 (83%) residents in the CAIA group. Ten answered “less than I would have liked” in the CAIA group compared to 9 in the control group (17% versus 20%). Overall 1 (2%) doctor (from the control group) answered “far too little” (Fig. 2).

Concerning satisfaction with the workday, as
measured using the compacted 2-point scale (“very
satisfied” or “predominantly satisfied” versus “pre-
dominantly dissatisfied” or “very dissatisfied”),
there was no significant difference between the two
groups (p = 0.261). Fourteen residents from the
CAIA group answered “very satisfied” versus 11
from the control group (23% versus 24%). In the
CAIA group 36 colleagues answered “predomi-
nantly satisfied” versus 31 in the control group
(59% versus 67%). Ten from the CAIA group
answered “predominantly dissatisfied” versus 4
from the control group (16% versus 9%). Only 1

Table 1

<table>
<thead>
<tr>
<th>Questionnaire answers and evaluation of manual tasks</th>
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<tbody>
<tr>
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<tr>
<td>Analyzed forms (n)</td>
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<tr>
<td>Special/Resident / no entry (n)</td>
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<tr>
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<tr>
<td>Maintenance*</td>
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<tr>
<td>Emergence*</td>
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<tr>
<td>Regional anesthesia*</td>
</tr>
<tr>
<td>Intubations*</td>
</tr>
<tr>
<td>CVC-insertion*</td>
</tr>
<tr>
<td>CAIA-model</td>
</tr>
<tr>
<td>n = 62</td>
</tr>
<tr>
<td>5 / 56 / 1</td>
</tr>
<tr>
<td>96 (n = 61)</td>
</tr>
<tr>
<td>127 (n = 61)</td>
</tr>
<tr>
<td>100 (n = 58)</td>
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<tr>
<td>14 (n = 58)</td>
</tr>
<tr>
<td>86 (n = 61)</td>
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<tr>
<td>27 (n = 60)</td>
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<tr>
<td>control-model</td>
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<td>n = 46</td>
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<tr>
<td>2 / 44 / 0</td>
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<td>80 (n = 46)</td>
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<td>79 (n = 46)</td>
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<td>6 (n = 45)</td>
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<tr>
<td>73 (n = 46)</td>
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<tr>
<td>16 (n = 45)</td>
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<td><strong>p-value</strong></td>
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<td>0.906</td>
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<td>0.999</td>
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<tr>
<td>0.325</td>
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<tr>
<td>0.706</td>
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<tr>
<td>0.584</td>
</tr>
</tbody>
</table>

*Sum of the individual entries regarding the number of performed tasks.
CVC: central venous catheter.

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resident (2%) (from the CAIA group) answered “very dissatisfied” (Fig. 3).

Those residents who answered either “very satisfied” or “predominantly satisfied” were more likely to be satisfied with the quality of their contact with the attending consultant (85.9% versus 46.2%, see table 2). There was a strong relationship between satisfaction with the quality of contact with the attending consultant and the residents’ job satisfaction (p = 0.003).

A multivariate examination of which factors independently influenced job satisfaction (compacted into two categories) was performed using multivariate logistic regression. The target variable was job satisfaction and the influencing variables were “contact with the attending consultant” (compacted into two categories), “organisational model” and “central line insertion”. This showed that only “contact with the attending consultant” significantly and independently (from the organisational model) influenced job satisfaction (p = 0.005).

**Discussion**

The most important result was that a central anesthesia induction area did not affect job satisfaction of the residents involved. This was, to the best of our knowledge, the first time that this has been investigated. More than 80% of the residents were "very satisfied" or "predominantly satisfied" with their working day. The practice dictating measure – the central anesthesia induction area – had accordingly no influence on perceived job satisfaction.

In this context, the fact that the individual steps in the process such as the frequency of performance of induction, maintenance and emergence from anesthetics and the performance of anesthesia-specific techniques did not significantly differ between groups, seems to be important. These results confirm earlier studies showing that a work situation characterised by diversity of responsibilities has a positive influence on job satisfaction (20). Whether a fragmentation of the workflow offset by

![Satisfaction with the workday (p=0.261)](image)

**Table 2**

<table>
<thead>
<tr>
<th></th>
<th>Sum</th>
<th>“Satisfied” with the workday</th>
<th>“Dissatisfied” with the workday</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant contact :</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“ enough”</td>
<td>85</td>
<td>79 (85.9%)</td>
<td>6 (46.2%)</td>
<td></td>
</tr>
<tr>
<td>“ not enough”</td>
<td>20</td>
<td>13 (14.1%)</td>
<td>7 (53.8%)</td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>n = 105</td>
<td>92</td>
<td>13</td>
<td>0.003</td>
</tr>
</tbody>
</table>
a quantitative gain in diversity may have an impact on job satisfaction, has, to the best of our knowledge, not yet been investigated. This study points out that job satisfaction is not influenced by fragmentation.

Over 80% of the questioned residents received as much attention as they wished from their attending consultants. The intensity of the consultant contact was not significantly differently rated between the two groups. We attribute this to the residents in the CAIA always having immediate contact to the consultant attending there, or in some cases being directly supervised by the consultant. The CAIA also reduced the workload of the attending consultants in the operating theatres. The consultants, after the inductions of the first cases on the lists, were not required to supervise any further inductions and therefore had more time to spend in theatre with residents and more time for teaching. As the study was performed in a teaching hospital, the results could have been different in a general hospital without any residents.

The study does not allow to make any judgement with respect to the level of job satisfaction between the CAIA-residents and the residents conducting the maintenance and emergence of the anesthesia. Since during the CAIA-model two residents per day worked in the CAIA it would have been impossible to conduct an anonymous questionnaire.

In the logistic regression only the intensity of the consultant contact remained as a significant factor for the anaesthetists’ satisfaction with their working day. Other studies have also shown that the quality of interaction with superiors is important for job satisfaction (6, 13, 17). Generally it has been shown that contact with and trust in superiors is a prerequisite for imposed changes in workflows being received in a positive manner by employees (21).

It is important to qualify this by saying that the economic effects of a central anesthesia induction area, particularly with a view to the optimisation of changeover times in operating rooms, was not a focus of this study. These questions have already been investigated in detail by Kriek et al. (1).

A further limit of this study was that the reasons for non-response (non-response rate of 46%), could not be addressed because of the requirement to strictly maintain anonymity. In similar studies looking at job satisfaction in a medical setting, response rates in the region of 35-76% (depending on the survey method) were achieved (7, 13-15, 17, 18).

The conclusion of this survey is that, regarding job satisfaction, intensive contact with the attending consultant is more important than organisational structure. On the basis of this, we reason that a central anesthesia induction area does not necessarily result in a decline in the working atmosphere due to dissatisfied residents.

References

Addendum : Questionnaire

The aim of this study is to establish the job satisfaction of anaesthesia residents in connection with the organisational form of the central area for induction of anaesthesia.

The evaluation is not a recording of services rendered. The completion of this form is voluntary.

The submitted forms will be stored by Dr. Föhre and only analysed in a summarised form.

Dr. Föhre is responsible for the destruction of the completed questionnaires in a Data Protection Law compliant manner. The destruction of the forms is to take place within 2 months of their completion.

Date : 

I am :
A certified specialist in anaesthesia
Resident in year : ........

Today (during the data shift) I :
Was responsible for the induction of ...... anaesthesias
Was responsible for the maintenance of ...... anaesthesias
(please only enter cases when you were present for at least 75% of the total maintenance time)
Was responsible for emergence from ...... anaesthesias
Carried out ...... regional anaesthesias
Carried out ...... intubations
placed ...... CVCs

Regarding my contact with the attending consultant, I had :
--- as much as I wanted
--- less than I would have liked
--- far too little

With my workday today, I was :
--- very satisfied
--- predominantly satisfied
--- predominantly dissatisfied
--- very dissatisfied

Comments or suggestions (this section is optional; you may also use the reverse of this form) :