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Research

Interprofessional Collaboration Between Nurses and Physicians in the Perioperative Period

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A B S T R A C T

Keywords:

interprofessional collaboration
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professional boundaries**Purpose:** To explore nurses' and physicians' experiences of the six dimensions of interprofessional (IP) collaboration when using Goal-Directed Therapy (GDT), and to examine how existing protocols on GDT facilitate the six dimensions of IP collaboration.**Design:** A qualitative design using individual semi-structured interviews and participant observations.**Methods:** A secondary analysis of data from participant observation and semi-structured interviews with nurses (n= 23) and physicians (n=12) in three departments of anaesthesiology. Observations and interviews were carried out from December 2016 to June 2017. A deductive, qualitative content analysis using the Inter-Professional Activity Classification as a categorization matrix was used to explore interprofessional collaboration as a barrier to implementation. This analysis was supplemented by a text analysis of two protocols.**Findings:** Four dimensions were identified to influence IP collaboration: commitment, roles and responsibilities, interdependence, and integration of work practices. Negative factors included hierarchical boundaries, traditional nurse-physician relationship, unclear responsibility, and lack of shared knowledge. Positive factors included physician involvement of nurses in decisions and bedside education. The text-analysis showed a lack of clear directions of specific action and responsibility.**Conclusions:** Commitment and roles and responsibilities were dominant aspects of interprofessional collaboration in this context, causing problems for enhanced collaboration. Lack of clear guidance in the protocols might detract nurses' feelings of responsibility.© 2022 American Society of PeriAnesthesia Nurses. Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)

Interprofessional (IP) collaboration comprises different types of health professionals working together to positively impact patient care.^{1,2} Efficient IP collaboration is considered a cornerstone in the delivery of safe, high-quality care.^{1,2} It has been argued that efficient IP collaboration can increase job satisfaction among health professionals, help overcome fragmented service delivery, and improve patient safety and quality of care.³ The World Health Organization's

Framework for Action on Interprofessional Education & Collaborative Practice describes that focusing on IP collaboration can play an important role in mitigating the global health workforce crisis.⁴

An increasing number of research studies aim to improve IP practice and collaboration.¹ Results are showing a slight increase in adherence to recommended practice and improved use of health care resources with externally facilitated IP activities.¹ However, IP collaboration is a broad term that can be conceptualized in different ways depending on the setting in which the work is carried out.² Xyrichis et al.² describe a need for greater clarity about different kinds of IP collaboration to explore them with greater transparency. Therefore, Xyrichis and colleagues developed the framework, InterPACT, in which they define four kinds of IP collaboration: teamwork, collaboration, coordination, and networking. IP collaboration is seen as “an

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E-mail address: mette.baumgarten@regionh.dk (M. Baumgarten).<https://doi.org/10.1016/j.jopan.2022.12.002>1089-9472/© 2022 American Society of PeriAnesthesia Nurses. Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)Please cite this article as: M. Baumgarten et al., Interprofessional Collaboration Between Nurses and Physicians in the Perioperative Period, Journal of PeriAnesthesia Nursing (2022), <https://doi.org/10.1016/j.jopan.2022.12.002>

activity which varies along six key dimensions of the relationship of those working together^{2(p417)}. These dimensions (commitment, roles and responsibility, goals, interdependence, identity and integration of work practices) can, according to Xyrichis et al.² be present, depending on the kind of IP collaboration being explored. In the tightest forms of IP activity, teamwork, which is the form that should be present in the perioperative setting (in this study, it comprises anesthesia, post anesthesia care unit (PACU), and intensive care unit (ICU)), the expected intensity of all six dimensions is high.²

Many evidence-based interventions in the perioperative setting demand various aspects of IP collaboration, including efficient teamwork.⁵ However, new interventions are often adopted slowly and variably despite evidence for their use.⁵ In an earlier study on nurse anesthetists, nurses in ICU, nurses in PACU (hereafter referred to as nurses), and anesthesiologists' (hereafter referred to as physicians), perceptions of working with GDT (hemodynamic optimization of tissue perfusion through measurements of changes in stroke volume after administration of a fluid bolus or continuous measurement of stroke volume variation using minimally invasive monitors), IP collaboration was identified to both impede and encourage the use of this intervention.⁶ This was grounded in IP challenges and uncertainty about each other's roles and competency, nurses feeling unimportant in the implementation process, and variation in the use of the existing protocols.⁶ To guide clinicians in daily clinical activities and ensure that decisions about patient care rely on the best available evidence, protocols describing recommended practice by synthesizing the best available evidence in specific areas are developed locally, nationally, or even internationally.^{7,8} However, a close reading analysis by Barrow et al.⁹ suggests that protocols reinforce professional boundaries and hierarchies rather than increase IP collaboration, as they have been found to emphasize expertise and authority based on professions and positions, and are often developed by single experts or an intraprofessional group.⁹

Knowledge of IP collaboration as both a barrier and a facilitator for successful implementation is important, yet not sufficient to tailor future developmental and implemental initiatives. Deeper knowledge of nurses' and physicians' perceptions of the dimensions of IP collaboration is needed to strategically guide implementation maintenance strategies. Consequently, a secondary analysis of interview and observational data using the six dimensions described in the framework developed by Xyrichis et al.² was performed to explore nurses' and physicians' experiences of the six dimensions of IP collaboration when using GDT. This exploration was supplemented by an examination of how existing protocols on GDT possess the potential to facilitate the six dimensions of IP collaboration.

Methods

Design

A qualitative design using individual semi-structured interviews and participant observations.

Setting

The study was conducted at three Departments of Anesthesiology located at three university hospitals in Denmark, all having emergency surgical centers. Each department used minimally invasive monitoring devices, measuring stroke volume for GDT during surgery¹⁰ in patients undergoing high-risk abdominal surgery and/or elective colorectal surgery. Two departments had an online protocol for the use of GDT. The third department did not have an official protocol. Of the two departments where a protocol was available, one offered a monthly one-hour education session on how to use GDT. All three departments experienced difficulties in the implementation of

GDT (it was not used correctly, timely, and sometimes not used at all), and an earlier study had identified IP collaboration as a barrier and facilitator. In Scandinavia a nurse anesthetist is a bachelor prepared nurse who has received another two years of specialist training in anesthesiology nursing. Nurse anesthetists work independently but in close collaboration with an anesthesiologist. Normally the anesthesiologist leaves the operating room shortly after induction of anesthesia and the nurse anesthetist is responsible for the patient

Data-Collection

Data were collected using different approaches:

- 1) Field observations using participant observation to observe nurses and physicians practice and collaboration when using GDT and explore situations that had become so routine-like that it could be difficult to put into words.¹¹ Totally 33 observations were carried out. Of these, 19 were in the operating room, five in PACU, and nine in the ICU. Observations took place from December 2016 to April 2017. Situations on emergency and elective surgery, in which nurses and physicians interacted, were selected for observation. Observations were also carried out in the ICU and PACU. Condensed field notes were taken on the spot. These notes were expanded with further details immediately after observation.¹¹
- 2) Semi-structured interviews¹² were performed to elucidate nurses' and physicians' perceptions of working with GDT. 35 interviews were conducted, including 23 nurses and 12 physicians. The interviews were audio-recorded and transcribed verbatim.
- 3) Two local protocols for the management of GDT during major surgery were identified in the hospitals' compilation of protocols on their intranet sites.

Participants

Participants consisted of a purposive sample¹² of nurses and physicians. Seeking to explore the subject from a broad and varied perspective, participants with varying ages and seniority were selected. The majority of the nurses are female, reflecting that most nurses in Denmark are female. See [Table 1](#).

Analysis

In the first step, a secondary analysis of field observation notes and transcribed semi-structured interviews from a qualitative multicenter study⁶ was performed. Across the three departments, data were grouped into three datasets. The first dataset comprised field observation notes, the second comprised nurses' transcribed interviews, and

Table 1
Characteristics of Participants.

Characteristics of Participants	
OBSERVATIONS	
Female/male	41/5
Age, median (range), years	43 (26-65)
Seniority*, median (range), years	18 (3-41)
Interview Nurses	
Female/male	21/2
Age, median (range), years	45 (29-52)
Seniority*, median (range), years	20 (4-40)
Interview Physicians	
Female/male	5/7
Age, median (range), years	44 (33-60)
Seniority*, median (range), years	14(2-34)

* Seniority is defined as years of clinical experience postgraduate.

Table 2
InterPACT Dimensions.

Dimension	Definition
Team commitment	The psychological attachment health professionals feel towards their team
Team identity	The collection of meanings health professionals attach to their team
Team goals	The explicit articulation of purpose and ambition of the team
Team roles and responsibility	Differentiation of health professional jurisdiction among the interprofessional team members
Team interdependence	The extent to which the outcome depends on the decisions and choices of all team members
Integration of work practices	The alignment of interprofessional practice towards a whole product to which health professionals contribute

the third comprised physicians’ transcribed interviews. Each dataset was analyzed separately using deductive qualitative content analysis.¹³ A structured categorization matrix¹³ was developed based on the InterPACT framework’s six dimensions (Table 2). The matrix was used as a lens to guide and structure the analysis.¹³

The first and the last author conducted the content analysis inspired by Graneheim and Lundman’s¹⁴ approach. It began with several readings of the field notes and interview transcripts to become familiar with the data and obtain an overview of the text. Then the text was reviewed for content, and text corresponding to the dimensions in the matrix was transferred into the relevant categories. The authors individually read and transferred relevant text into the categories before they met, compared, and discussed their work. Then the text was condensed into text near descriptions and coded. The codes were then abstracted into subcategories under each category (Table 3). Codes and subcategories were discussed in the research group (including three experienced qualitative researchers AB, VN, and GB) until a consensus was reached.

In step two, we analyzed the protocols on GDT from two of the involved departments. A close reading text analysis was used as a guide.¹⁵ Close reading is described as “reading with an eye for the gaps, incommensurability, and repetitions in the text...less a search for meaning than recognition and demonstration of how the meanings of the texts are constructed”^{15(p71)}. The close reading text analysis was based on the framework by Barrow et al.⁹ The framework consists of the following questions (Table 4).

The first and the last author conducted the text analysis. They read and coded the texts separately and then met to compare results. Adjustments were made, and a single dataset was developed. Then they read and coded the remaining text individually, met again, and compared the coding, adjusted, and the categories were developed. The results were discussed in the research group until consensus was reached.

Table 3
Example of Meaning Unit, Condensed Meaning Unit, Codes, Subcategories and Categories.

Example of the Analytical Process/Process of Analysis				
Meaning Unit	Condensed Meaning Unit	Codes	Subcategory	Category
The physicians are discussing whether the patient should have albumin. They decide to measure, and fluid optimize with GDT before establishment of the epidural catheter. The physicians are giving the first fluid-bolus. The nurse assists them because the drip is not working properly. At the same time, she starts up documentation. Stroke Volume increases from 35-37. The physicians conclude that the patient is optimized.	Physicians make decisions regarding when and how to use GDT. The nurse is assisting them and documenting	Physicians makes decisions about GDT Physicians perform GDT Physicians use results The nurse does practical things	Physicians are taking responsibility for patient treatment Nurses are focusing on work-flow	Roles and responsibility

Ethical Considerations

According to Danish law, ethical approval is not needed for a non-interventional study. The study was approved by the heads of the departments. Participants received written and oral information about the study and were asked to sign informed consent before interviews and observations commenced. They were informed that they could withdraw from the study without consequences at any time. One participant withdrew after an observation, as she did not find the situation representative of her work.

Results

The most dominant dimensions found were commitment, roles and responsibility, and team interdependence. Here it became clear how IP collaboration was challenged when a new intervention was implemented. Table 5 illustrates categories and subcategories found in the analysis.

Commitment

Commitment was found to be both a positive and a negative factor in IP collaboration. Both nurses and physicians expected the other part to show team commitment and attachment toward their IP collaboration. However, they did not always live up to each other’s expectations, which could affect commitment negatively.

Furthermore, it was found that nurses did not experience commitment from physicians in that they were not involved in physicians’ rationale behind using GDT. It also became evident that nurses often were left out of bedside education and discussions regarding results and decisions when GDT was used. Sometimes learning to use GDT was hampered because of traditional hierarchical boundaries. At times nurses were ignored if they tried to suggest or offer the physicians help. This was observed when physicians did not engage nurses in discussions and decisions regarding their patients. In the following quotes, the head anesthesiologist is teaching some younger colleagues how to interpret data from the GDT monitor.

The nurse is standing behind the physicians. She asks them if she should administer the medication now or wait. They tell her to administer it now. The physicians are looking intensively after p-waves on the patient’s monitor. The nurse offers to take a 12-lead electrocardiograph. No answer. The nurse checks the amount of aspirate in the patient’s ventricle. (Fieldnote)

The physicians discuss the patient’s hemodynamical condition in a low voice while leaving the room. Nurse 1 asks nurse 2, “was this the round?” They laugh. (Fieldnote)

Nurses experienced commitment from physicians when they took time to discuss how they expected the nurse to use GDT after the physicians had left the operating room. When physicians showed interest in results from GDT and involved the nurses in clinical reflections regarding the use of GDT it was appreciated by nurses.

Table 4
Questions for Text Analysis.⁹

1) Authorship
2) Who is responsible for development of the guideline?
3) Who is the stated or implied target readers?
4) What is the stated purpose of the guideline?
5) What is the form and structure of the document?
6) Who are the subjects created in the guidelines?
7) Who are the objects?
8) Is there a specific or unusual repeated terminology?
9) Intertextuality e.g. references to other documents?
10) What is the discourse in the document?
11) Are any subject positions created?

However, nurses often described that they missed clear communication about what the physician was expecting them to observe and when they should contact the physician again.

I have experienced that some of the physicians are having a hard time giving us some guidance. I miss being able to use it independently, to think if stroke volume is decreasing, then you administer a fluid bolus. The whole algorithm. I do not think the physicians have done a good job involving us. (Nurse 19)

Especially younger physicians were attentive and involved nurses in their considerations regarding GDT. However, even though a lot of bedside education seemed to be primarily between physicians, there were times when physicians were aware that nurses needed help and guidance from them to be able to perform tasks related to GDT. This help and guidance were represented by physicians taking time to give prescriptions to the nurse just before leaving the operating room.

The physician tells the nurse that he must attend to another patient, but he would like to pass on some information first. They both look at the monitor. The physician explains that the nurse must pause phenylephrine and ephedrine to see what the patient's status is. If the stroke volume is low, she should give humane albumin. If stroke volume rises more than 10 %, the patient is responding. The physician leaves the room. (Fieldnote)

Table 5
Categories and subcategories from Fieldnotes and Interviews.

Categories and Subcategories				
Categories, Field Notes	Commitment	Roles and Responsibility	Interdependence	Integration of Work Practices
Subcategories	<ul style="list-style-type: none"> - Hierarchical boundaries create resistance - Nurses with knowledge are investigative - The physician show responsibility for nurses learning - Physician's take responsibility for own learning 	<ul style="list-style-type: none"> - GDT is physician's domain (nurses' perspective) - Nurses are depending on physicians' prescriptions - Nurses are focusing on work-flow (instead of learning) - Nurses are expected to report on observations and assist (physicians' perspective) - Physicians are taking on their responsibility as liable for treatment 	<ul style="list-style-type: none"> - Mutual dependence on knowledge - The responsibility is handed from the physicians to the nurse 	<ul style="list-style-type: none"> - Gliding structures of tasks at known procedures - GDT is not incorporated
Categories, interview nurses	Commitment	Roles and responsibility	Interdependence	
Subcategories	<ul style="list-style-type: none"> - One must take responsibility for own learning - It is the physician's responsibility to involve nurses 	<ul style="list-style-type: none"> - GDT is physician's domain - Physicians are liable for treatment - Nurses domain is unclear 	<ul style="list-style-type: none"> - Cooperation is physician-led - Depending on physician's knowledge 	No findings
Categories, interview physicians	Commitment	Roles and responsibility	Interdependence	
Subcategories	<ul style="list-style-type: none"> - Nurses should follow physicians' priorities - Learning is a prerequisite - Young physicians are depending on nurses and consultant physicians 	<ul style="list-style-type: none"> - Knowledge and competencies are lacking to make GDT work - Different attitudes toward GDT affects nurses use of GDT 	<ul style="list-style-type: none"> - Physicians are dependent on nurses' competencies 	No findings

Physicians described that they expected commitment from nurses to follow the physicians' prioritization. They sometimes found it difficult to implement new treatments because some nurses got annoyed if they were expected to deliver extra workload. This annoyance was not always taken seriously by the physicians, who regarded it as important that nurses had some understanding of the physicians' interest in new treatments to be able to help them.

Everybody knows that if you are going to place a monitor in the operating room that takes up space and needs to be installed, then you can see a sign of resignation (from nurses). However, it is not seriously meant. It is not a problem, and nobody refuses to do it. (Physician 9)

Those nurses who seemed to be more knowledgeable about hemodynamics were more committed to learning to use GDT. They experienced that if they were investigative, physicians were usually willing to teach, and they believed they were an important part of it.

The physicians are only there at the beginning of the anesthesia, and then they leave, and it is important that we can use it (GDT) because often you do not see them (the physicians) unless you call them. (Nurse 6)

Younger physicians experienced team commitment from nurses. They were depending on nurses' ability to teach them how to use GDT. This organization of introduction and training also included other basic skills like intubating patients. Physicians described it as a unique education culture where learning from each other is expected.

It is expected that you help each other and you ask and learn from each other. (Physician 11)

Roles and Responsibilities

Roles and responsibilities, defined as health professionals' jurisdiction among the IP team members, were characterized by a traditional physician-nurse relationship when working with GDT. The physicians had an active role, taking the initiative to provide fluid boluses, evaluating and acting on the results from GDT. They prescribed orders to the nurses, like asking them to take an arterial blood gas, telling them what they wanted the patient's vital parameters to be or what kind of fluid they wanted the patient to have. The

physicians took the overall responsibility for the patient's treatment. Nurses' role regarding GDT seemed to be more passive. They expected the physicians to provide them with prescriptions for how they were supposed to use GDT in the physicians' absence. They were doing many assisting tasks and reporting their observations to the physicians, and they were depending on the physicians' prescriptions to be able to use GDT.

The physician wants to hand over the patient to the nurse. She (the nurse) wants to know when she should call him (the physician) and asks what the different values on the GDT should be. The physician introduces the different parameters and their value levels. He says he is almost satisfied (with the parameters on the GDT monitor), but not quite. (Fieldnote)

This division of work practices seemed to be grounded in nurses' perception that GDT is the physicians' domain, and therefore it is the physicians' responsibility to make it work. This perception seemed to be grounded in nurses' beliefs that GDT is a difficult task demanding knowledge that can be expected from physicians but not from nurses. Furthermore, nurses' understanding that physicians are not interested in GDT when they have left the operating room, causing extra workload to nurses, which physicians cannot expect nurses to have time for, reinforces the division of work practices and hampers IP collaboration. When nurses were assembling and using GDT, it was sometimes described as something they did for the physicians and not as an integrated part of their work.

But what is acceptable in this situation? I am not educated as a physician, and it is not me/I am not the one who makes decisions. I must make some agreements (with the physician), and goals for the patient in collaboration with the physician" (nurse 23)

The fact that GDT was regarded to be the physicians' domain became clear, given that physicians made decisions and were responsible for GDT. The nurse could take the initiative and point out other opportunities to the physicians. However, in the end, the physicians' decisions counted, which sometimes led to nurses' resignations even if they did not agree with the physicians' decisions. In that way, it did not seem like nurses regarded themselves to be an important part of using GDT.

When you have been a nurse for a long time, then you do what they (physicians) decide. (Nurse 12)

While there seemed to be an overall agreement among nurses about the physicians' responsibility, it was more unclear what their role was and what jurisdictions they had regarding the use of GDT. They experienced a lack of knowledge, which made support from physicians essential. However, they described that the division of jurisdictions was not communicated to them, and they did not find the department's guidelines helpful regarding this.

I do not think that we use GDT as it should be used. I think it has something to do with how it has been implemented but also with the attending physician who is responsible for it. They (physicians) are not good at following up or communicating with us. What do they expect us to pay attention to, and how can we use it optimally? (Nurse 19)

Physicians did not describe what expectations they had toward nurses' jurisdictions when using GDT. However, they seemed to expect nurses to report their observations to them and assist them in doing tasks. They did describe nurses were divided in their attitudes toward learning and using GDT, which they experienced as affecting their competencies regarding the use of GDT. Some physicians described their cooperation with nurses as good because they never complained, while others described that they believed and were surprised that some nurses did not want to learn how to use GDT.

When GDT was in use, e.g., during surgery, younger physicians often saw it as an opportunity to learn how to use it, and more experienced physicians were taking the time to involve them and teach. Most often during this bedside education, nurses were busy doing practical tasks necessary to get the patient ready for surgery and secure workflow instead of taking the opportunity to learn how to use GDT.

Team Interdependence

Team interdependence, understood as the extent to which the outcome of IP interaction depends on all team members' decisions, seemed to depend on nurses and physicians having a shared knowledge about why and how to use GDT. This interdependence became clear when physicians had to leave the operating room to do other tasks. Then they were depending on the nurses' ability to work independently and make decisions and choices following measurements from GDT. Physicians described the dependence as an issue which, at times, decreased the possibility of using GDT adequately because of varying competencies among nurses, which provided physicians with extra work.

It is my impression that the competencies among nurses are not high enough. They have not understood what it is, so you must allocate a physician. (Fieldnote)

In some nurses' opinion, GDT was a complicated task, and decisions regarding when to use it were up to the attending physician. Therefore, their bedside learning possibilities completely depended on the attending physician's skills and attitude toward using GDT.

Sometimes I think that with certain physicians, using GDT is more often purposed. If I suggest using GDT for a patient, the answer depends on the physician's familiarity with using it. (Nurse 2)

Nurses were dependent on the attending physician's skills because they needed his/her prescriptions regarding how much fluid they should give the patient and when they should contact the physician again. Some described that they liked guidelines that they systematically could follow because it made them feel more independent from the physician. However, some described the GDT protocol did not provide clear guidance on when and how to measure and give a fluid bolus.

I read it last week, and ehh, you can always interpret it a little bit yourself. That is perhaps the biggest. ..., I mean it is not like a recipe. It's more up to oneself how you want to give a fluid bolus. That is my impression. (Nurse 1)

Integration of Work Practices

Integration of work practices was observed regarding the process around the induction of anesthesia. This work practice was characterized by a routine, where nurses and physicians had their roles, and everything most often went smoothly and calmly with very little talking and a strong focus on the patient's needs. GDT was not integrated as a part of this routine. Tasks were divided differently every time depending on who had some experience in finding the remedies, assembling them and connecting them to the patient, when to administer a fluid bolus, and how to interpret the values. This lack of integration sometimes resulted in inadequate and late use of GDT.

Text Analysis of Protocols

Authorship, Approval, and Access

An expert physician and expert nurse had developed one of the protocols. The other protocol did not state any developers or approving authority. Health professionals have access to both protocols through the hospitals' intranet sites (Table 6).

Target Users, Form, Structure, and Subjects Created

Target users are not stated in any of the protocols. In protocol 1, the complete anesthetic procedure is described in detail, including how to secure the patient airway and how to use GDT, what kind of fluid and how much fluid to administer, and when to give inotropes as well as blood products. All procedures are described in boxes with short facts on what should be done pre-, intra-, and postoperatively. The GDT algorithm is shown as a flowchart in the middle of the page. Protocol 2

Table 6
Results From the Text Analysis.

	Protocol 1	Protocol 2
Authorship	The overall patient course is developed by expert surgical physician and expert nurse. Approved by chief surgical consultant. It is not stated who wrote the GDT protocol.	Not stated.
Target users/readers	Not stated. Implicit clinicians from the department of anaesthesiology.	Not stated in the GDT protocol. In the overall patient course, it is stated that target users are health professionals in department of surgery and department of anaesthesiology.
Form and structure	Web document. The anaesthetic part consists of three pages. The text in these pages is organized in boxes and with dots making it easy to read what to do in short time. One page is an algorithm describing how to respond to measurements from the GDT and what kinds of fluid, inotropes, and vasopressors to use and when.	Web document. The anaesthetic part consists of 6 pages with very different layout. Some of the text is in boxes with arrows guiding the reader through decisions while two pages is normally written text. Two pages describes how to gather, start and use GDT inclusive and an algorithm for GDT. Pictures of the monitor are used to guide the reader.
Document purpose	Not described.	Not described.
Subjects created by the document	Surgical senior physician. Anaesthetic senior physician.	Surgical senior physician, anaesthetic senior physician.
Objects created by the document	A defined specific group of patients is the target for the various actions/interventions described in the document. Observed and manipulated as necessary.	The patient is target for inclusion and optimization. They are risk stratified, observed and manipulated as necessary
Specific/unusual repeated terminology	Passive voice.	Passive voice.
Intertextuality	Only one reference in the part with surgical apgar score.	On the front page there is a link to Danish Society of Anaesthesiology and Intensive Care Medicine – DASAIMs Recommendation for perioperative fluid and a link to a regional recommendation for perioperative fluid treatment to adult patients.
Discourse in the document/ subject positions created	Normative, scientific-biomedical discourse. Prescriptive. All verbs are in the "passive voice/form", without any instructions as to who is supposed to do whatever is needed to be done.	Normative, scientific-biomedical discourse. Prescriptive. All verbs are in the "passive voice/form", without any instructions as to who is supposed to do whatever is needed to be done.

shows the GDT algorithm as a flowchart. It is not described whether it should be started pre- or intraoperatively. It is described that inotropes should be used at a certain point, but it is not described what kind of inotropes. Instead, this protocol is more practical, showing how to assemble, start, and use the monitor with pictures and text. Nurses are mentioned indirectly as subjects in the text, as it is described that the physician should be contacted after three fluid boluses. None of the protocols explicitly state who is expected to do specific actions, making it open as to who is the acting person (subject).

Objects Created, Discourses, and Terminology

The overall discourse in both protocols is scientific/biomedical. They are written in normative language using passive voice, which is often used in formal texts. The passive voice is often used if we do not know or do not want to express who performs the action, and it puts the focus on the performance rather than the performer. In these protocols, the passive voice places interventions like fluid administration and measurement of stroke volume in the object position while the division of roles and responsibilities is unclear. Patients are not present in the text besides being mentioned a few times as someone to observe and manipulate as necessary.

Discussion

Results emerging from this deductive analysis of IP collaboration suggest that nurses and physicians were not working as a team when it came to integrating GDT into their clinical practice. According to the framework developed by Xyrichis et al.,² the six dimensions: commitment, roles, and responsibilities, interdependence, integration of work practices, goals and identity should be present, depending on the kind of IP collaboration needed.

Commitment towards a team means that members are committed to the goals and values of the team and have an emotional attachment to the team. If a member has this attachment, then it is likely that they will engage in behaviors that will be beneficial to the team.¹⁶ Through interviews and observations, we found that professional boundaries

could affect nurses' team commitment negatively. Hierarchical boundaries with medical dominance are congruent with findings from other studies.^{17–19} It is well known from the literature that nurses and physicians are embedded in a problematic relationship where the protection of professional boundaries has made IP collaboration difficult.³ Reeves et al.³ argue that there is a need for a contract between nurses and physicians specifying roles and responsibilities with one another to have a clearer approach to their work and to provide a basis for efficient IP collaboration.

The differentiation between nurses and physicians' jurisdictions, making physicians legally responsible for patient management, might lead to uncertainty about roles and responsibilities. Nurses regarded GDT to be the physicians' domain. They found that their role and responsibilities regarding this specific intervention were unclear, making them leave the responsibility for related tasks and decisions to the physicians. In "The Behaviour Change Wheel", a guide to designing implementation interventions developed by Michie et al.,²⁰ it is stated that it is important to specify the target behavior in precisely specified terms of who, what, when, where, how often, and with whom.²⁰ Specifying the target behavior can help individuals to change their behavior because it increases the extent to which information is understood and remembered.²¹ However, the text analysis of protocols in this study identified no such information. Instead, protocols were written in normative language using passive voice, leaving it unclear to the reader who is responsible for performing the tasks.

In Denmark, nurse anesthetists and nurses in the ICU and PACU can perform some of the same tasks as physicians, but on a delegated responsibility from the anesthesiologists.²² To promote IP collaboration, it is important that nurse anesthetists and anesthesiologists know each other's competencies.²³ In this study, physicians expressed nurses were lacking knowledge about GDT, which restricted its use and made it difficult to delegate responsibility. However, nurses' perception of their professional role has changed over time from thinking of themselves as physicians' assistants to conceiving themselves as being autonomous professionals, meaning they are more active and independent in patient care.²⁴ Nurse anesthetists appreciate the professional independence

they receive through their special training, although they are working under a delegated responsibility.²³ They experience the potential for independent decision-making in the established structures and prescriptions of general anesthetic procedures. One example is the intubation of patients before surgery. This is regarded as an important task, providing nurses with feelings of strength and independence.²³ In this study, it was found that in contrast to GDT, the induction of the anesthesia, including intubation of the patient, was carried out with efficiency with clear division of roles. Like the induction of anesthesia, GDT is a biomedical task, and nurses will have to act on a delegated responsibility. According to Xyrichis et al.,² team interdependence is defined as the extent to which the outcome of an IP interaction depends on decisions and choices from all team members. In this study, the interdependence consisted of making nurses able to work more independently with GDT. One first step could be to specify nurses' responsibilities clearly in the protocols.

The dimensions of team identity and team goals were not found during the deductive analysis of field notes and interviews. There can be several reasons for this. Identity and goals are not necessarily something that you talk about or something that shows during an observation situation. The participants were not interviewed specifically about the dimensions of IP collaboration since this study is a secondary deductive analysis of data. However, findings from this study suggest that nurses and physicians did not regard themselves as a team when it came to working with GDT, which may explain why they did not refer to themselves as a part of a team.

Strengths and Limitations

This study has several strengths. By using field observations, semi-structured interviews, and document analysis, we were able to not only validate conclusions, but also to see patterns in IP collaboration that were not acknowledged by the participants.²⁵ Obtaining supporting data from documents can help explain participants' attitudes and behavior as well as verify details that emerged through interviews.²⁶

To increase the study credibility, a purposive sampling strategy was chosen to shed light on the research question from a variety of aspects.¹⁴ Investigator triangulation provided valuable discussions and was a way to determine if there was an agreement in how data was labeled and sorted.¹⁴

The study's dependability may have been affected by a six-month data collection period as it increased the risk of inconsistency. Interviewing and observing is an evolving process, and the interviewer and observer might obtain new insight into the phenomena under study, which might affect follow up questions and narrow the scope for observations.¹⁴ To increase transferability, a comprehensive description of context, data collection, and analysis has been made to increase readers' basis to assess whether findings from this study can be related to their position.²⁶

Data collection tools, interview and observation guides were originally constructed for another study "Nurse and Physician Perceptions of Working With Goal-Directed Therapy in the Perioperative Period".⁶ This is a secondary analysis of interview and observational data. Accordingly, there is a limitation that observation and interview guide did not focus on IP collaboration.

Since data collection, the context and experiences of working with GDT might have developed. However, we believe that the results of this deductive analysis contribute to important knowledge of what to consider when implementing new interventions involving IP collaboration.

Conclusion

By using the six dimensions of IP collaboration as described in Inter-PACT, we extended our understanding of this concept in a context where nurses and physicians make use of GDT in the

perioperative period. The two dimensions, commitment and roles and responsibilities were dominant aspects of IP collaboration in this specific context, causing both problems for enhanced collaboration as well as increasing it. The findings emphasize that nurses and physicians collaborated according to traditional professional roles: physicians were active, delegating prescriptions to nurses, while nurses executed these prescriptions. Working side by side instead of together was unsatisfactory, especially for nurses who felt unimportant.

The protocols were written in a passive voice, making it unclear for readers to understand who was responsible for which actions. This passive voice might lead to uncertainty about what competencies one should accomplish and thereby detract from clinicians' feelings of responsibility toward using the protocol. As these protocols are intended for health professionals with varying educational levels and jurisdictions, a more specified description of roles and responsibilities regarding the use of GDT might be a simple and cost-effective way to increase the implementation of GDT.

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