

Knowledge of anaesthetists in a department of anaesthesiology regarding “do not resuscitate” orders during the perioperative period

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg in partial fulfilment of the requirements for the degree of Master of Medicine in the branch of Anaesthesiology.

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Declaration

I, Tebogo Benedict Monchwe declare that this research report is my own unaided work. It is being submitted for the Degree of Master of Medicine in the branch of Anaesthesiology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.



02 November 2021

This research is dedicated to Thatayame, Nkhono and Mmasolly Tshabang and
Mojahi Motoko. Your song may have stopped but your melodies linger on.
Continue resting in eternal power and peace.

Abstract

Background

The ethical principle of autonomy is codified in the constitutional and legislative laws governing South Africa. Patients have the right to refuse life-prolonging or sustaining medical therapies; this is inclusive of their right to have directives indicating orders not to resuscitate in possible critical circumstances. The aim of this study was to assess the knowledge of anaesthetists regarding do not resuscitate (DNR) orders during the perioperative period in the Department of Anaesthesiology at the University of the Witwatersrand.

Methods

A cross-sectional, contextual research study design was followed using an anonymous self-administered online questionnaire. The study population consisted of anaesthetists working in the department. Convenience sampling was used. An online submission of the questionnaire implied consent. Adequate knowledge was defined as a score of $\geq 60\%$ as determined by the Angoff method.

Results

The participants mean (SD) score was 63.5% (11.8%), with seniors obtaining a score of 65.3% (12.4%) and juniors 62.4% (11.2%). This difference was not statistically significant ($p=0.262$). Of the 83 (57.2%) participants who achieved a pass score, 36 (59%) were seniors and 47 (56%) were juniors. This difference was not statistically significant ($p=0.100$).

Conclusion

A mean score of 63.5% was achieved by participants in this study indicating adequate knowledge. However, only 57.2% obtained a pass mark of $\geq 60\%$. The majority of participants had limited training and experience regarding DNR orders and therefore the feeling of discomfort while treating these patients as a finding was expected. With an estimated 15% of patients having a living will specifying DNR orders and still choosing to undergo surgical procedures, it is important for the anaesthetist to have training and adequate knowledge of DNR orders.

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To Blaise, thank you for the comic relief.

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Most of all, my mother Nkhononyane who, against all odds, committed herself to making sure that our circumstance created by the legacy of the apartheid past does not define our future. You are my anchor, thank you for your commitment to all your children.

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Abbreviations

CPR	Cardiopulmonary resuscitation
DNR	Do not resuscitate
HPCSA	Health Professions Council of South Africa
PVS	Persistent vegetative state
Wits	University of the Witwatersrand

Statement

The Research Report consists of a literature review, draft article, study proposal and appendices. The study proposal is included for background reference and is not for examination.

The formatting of this Research Report complies with the University of the Witwatersrand's Style Guide for Theses, Dissertations and Research Reports. The formatting of the draft article may differ from the author guidelines of the Southern African Journal of Anaesthesia and Analgesia, the journal to which it is intended to be submitted, in order to comply with the University's style guide.

Section 1: Review of the literature

1.1 Introduction

In this section, individual autonomy and health care choices in the South African context, do not resuscitate (DNR) orders and the anaesthetist, ethical competence and DNR orders, learning and developing of ethical competence regarding DNR orders, health care providers' knowledge of DNR orders and health care providers' comfort with treating patients with DNR orders will be discussed.

1.2 Individual autonomy and health care choices in the South African context

Death was once a matter of fate, and now, it is increasingly becoming a matter of human choice (1). The right to self-determination or self-rule is codified in Chapter 2 of the Constitution of the Republic of South Africa Act No. 108 of 1996 (2) (hereafter referred to as the Constitution). This right embodies the ethical principle known as autonomy (3). The right to autonomy allows an individual to express in writing directives addressing future health care wishes (4). Living wills, durable power of attorney and related DNR orders fall under the umbrella term advanced directives (5). These are legal instruments through which an individual make decisions about future life-sustaining treatments, which should be respected and implemented even when the individual no longer has decisional capacity (6).

Regarding individual autonomy, the Constitution (2) further states in Section 12.2 that "everyone has the right to bodily and psychological integrity, which includes the right to security in and control over their body". According to Nienaber and Bailey (7), this implies the right to make decisions concerning one's body without undue interference from others. However, Herring (8) warns that this right should be interpreted with caution; individuals can choose to have treatment or not but do not have the right to dictate what treatment they should receive. Nienaber and Bailey (7) state that "It should be the norm that patients decision to refuse treatment stands unless the interest of justice or the community permit otherwise."

The inherent non-derogable right to human dignity is protected entirely by Section 10 of the Constitution (2). This human right to intrinsic dignity would include dying with dignity, and it must be respected (9-12). Providing a dignified death in the perioperative period to an individual with a directive stating their DNR wishes is further supported by the ethical principles of beneficence and non-maleficence (13). Beneficence refers to the act of doing good for the individual, while non-maleficence refers to the do no harm ethos (3). Artificially prolonging or sustaining life can be detrimental to the individual's dignity and quality of life, particularly when there is little to no hope of recovery (11, 14). Health care providers face situations where they may either need to withhold or withdraw treatment modalities that artificially prolong or sustain life as the burden and risk of continuing these modalities are outweighed by the benefit (11, 14). In making these decisions, the individual or their surrogate decision-maker should be involved (11, 15). In those lacking decisional capacity, the ethical principles of beneficence and non-maleficence need to be balanced to determine their best interest (3, 15).

Chapter 2 of the National Health Act of South Africa No. 61 of 2003 (15) (hereafter referred to as the Health Act) and the National Patients' Rights Charter (16) (hereafter referred to as the Charter) provide that individuals have the right to autonomy regarding their health care wishes. Health care providers must inform individuals of the range of diagnostic and therapeutic options, the risks, benefits and costs of these options, and the individual's right to refuse these provided that the informed refusal of such options does not endanger the health of others (15). Individuals are also entitled to be provided with information regarding their health condition or circumstances unless they have expressed otherwise so that they can plan for their possible health care needs (15). However, if there is substantial evidence that this information may not be in the individual's best interest, the health care provider has the right to withhold such information (11, 15).

Section 7.1 of the Health Act (15) further states that in cases where individuals are not able to grant informed consent regarding their health care wishes due to a lack of decisional capacity, the individual can mandate in writing a health care proxy to make decisions on their behalf. When the individual lacks decisional capacity and has a directive nominating a health care proxy, the individual must as far as

possible still be included in the decision-making process. If an individual has not nominated a proxy, one of the following surrogates listed in order of priority may make decisions on the individual's behalf: a person authorised by any law or court order, spouse or partner, parent, grandparent, adult child or brother or sister (15).

The individual's autonomy regarding health care choices in South Africa is also addressed in the Health Professions Council of South Africa Guidelines for the Withholding and Withdrawing of Treatment (11) (hereafter referred to as the HPCSA Guidelines). This guideline is based on the World Medical Association Declaration on Terminal Illness (14). The HPCSA Guidelines (11) emphasise that the relationship between the individual and the health care provider is based on "mutual trust and professionalism" and that the practice of health care is a "moral enterprise". Furthermore, the HPCSA Guidelines make a firm statement that the standards set in the guidelines will be used in the evaluation of complaints of professional misconduct. The HPCSA Guidelines elaborate on the Health Act by addressing advance directives and health care proxies. The human right to intrinsic dignity is also stressed in the HPCSA Guidelines (11).

It is important to note that the individual's right to autonomy may be influenced by the resource-limited South African context. The HPCSA Guidelines (11) draw attention to distributive justice, individual autonomy versus the community's greater good. Withholding of treatment may not always be in the best interest of the individual. This may be in direct conflict with the principles of beneficence and non-maleficence, which may impact the individual's right to autonomy. In the HPCSA Guidelines, provision is made for withholding of treatment due to the scarcity of resources. The HPCSA Guidelines state that health care institutions have the right to limit life-sustaining treatments without the individual's informed consent. However, if the individual meets the criteria for the administration of these life-sustaining treatments and the health care institution cannot offer the treatment based on resource scarcity, the institution must make the necessary efforts to ensure that the individual is transferred to another health care institution where such resources are available. The HPCSA Guidelines warn that the provision of futile medical care for the sole purpose of financial gain is unethical (11).

1.3 DNR orders and the anaesthetist

DNR orders are a form of passive euthanasia (17) and only apply to withholding or withdrawing of cardiopulmonary resuscitation (CPR) (11, 17). DNR orders may be considered lawful when:

- attempts at CPR are considered to be futile according to clinical judgement,
- it has been decided by the individual or their surrogate decision-maker that the risks and burdens of CPR outweigh the benefits,
- an individual with decisional capacity makes the informed decision to refuse such attempts or makes an advance refusal of such attempts (17).

Orders not to attempt resuscitation are just that. These orders do not preclude health care providers from their responsibilities of administering ethically and clinically sound appropriate and aggressive end-of-life care treatment (11, 14)

Extension of DNR orders to the perioperative period has been met with some resistance, with Truog (18) making the first published argument for their automatic suspension. The author argues that the practice of anaesthesia is unique as pharmacological agents that disturb homeostasis are administered to provide a balanced anaesthetic and if an iatrogenic cardiopulmonary arrest is to occur in the operating room, not resuscitating such an individual may be unethical (18). However, the automatic suspension of DNR orders impedes the ethical principle of autonomy as provided for by the Constitution (2) and the Health Act (15). Position statements by the American Society of Anesthesiologists(19), American College of Surgeons(20) and Association of periOperative Registered Nurses (21) advocate for reconsideration of DNR orders in the perioperative period. The HPCSA Guidelines (11) also recommend that individuals should be given the opportunity to reconsider and re-evaluate their advance directives regularly and not only perioperatively.

The concerns regarding DNR orders in the perioperative period can be divided into two main categories: concerns regarding the validity and reliability of the DNR order itself and difficulties related to the nature of the operating room environment (22). Regarding the validity and reliability of the DNR orders, Ewanchuk and

Brindley (22) argue that the anaesthetist is usually not the primary health care provider; thus, there may be some scepticism regarding the DNR order. The authors further argue that the DNR orders may either be overly vague or restrictive, thus making its usage in the operating room challenging.

The nature of the operating room environment, as argued by Truog (18), involves deliberate disruption of cardiopulmonary homeostasis followed by resuscitation, including ventilatory support. Thus, resuscitation is the primary role of the anaesthetist and does not constitute an extraordinary intervention. What could be considered extraordinary may be the use of chest compressions or electrical cardioversion (22). Therefore, requiring anaesthetists not to resuscitate may be fundamentally flawed, and anaesthetists may find it morally distressing to provide care to individuals with DNR orders (23). In a systematic review (24), it was demonstrated that the overall survival following perioperative CPR ranged between 32 — 55.7% with a viable survival of 25% when adjusted for neurological outcome at follow up, while out of hospital cardiac arrest survival rates range from 2 — 11% globally (25). Thus, not allowing individuals the opportunity to reconsider their DNR orders in the perioperative period based on anecdotal favourable survival rates after CPR in the perioperative period may be flawed.

It is estimated that 15% of patients with DNR orders still choose to undergo surgical procedures (21, 26, 27). However, no studies were identified assessing the rationale for surgical patients with DNR orders choosing to accept a surgical intervention (28). In non-surgical terminally ill patient studies, it has been documented that even though they have DNR orders in place, they would still consider a surgical intervention if the intervention will result in a return to “present quality of life” (29, 30). A systematic review (28) suggests that in non-surgical patients, health care providers tend to provide less aggressive medical treatment to patients with DNR orders. However, this bias is not evident in surgical patients with DNR orders. It was also documented that surgical procedures in patients with DNR orders compared to those without tend to be of similar duration and complexity with similar postoperative complication rates observed between these two groups (28).

1.4 Ethical competence and DNR orders

The availability of ethical guidelines and legislation has grown exponentially, resulting in an increased interest in ethical competence (31). Eriksson et al (31) suggest a communicative model of being, doing and knowing to address ethical competence. The ethics of being or virtue ethics refers to the good character traits that the health care provider needs to be ethically competent in addition to having knowledge about ethics (31). Pettersson et al (32) identified empathy, respect, compassion, openness, courage and humbleness as character traits that will contribute to a health care provider's ethical competence regarding DNR orders.

The ethics of doing refers to how the health care provider should act in certain ethical circumstances (32). The legal framework for guiding health care providers regarding DNR orders in the South African context has been addressed in Sections 1.2 and 1.3.

Eriksson et al (31) emphasise that although being and doing are important components of ethical competency; the health care provider also needs to “know” to be ethically competent. Learning and developing ethical competence and the knowledge of health care providers of DNR orders address the knowing of ethical competence and will be discussed.

1.4.1 Learning and developing ethical competence regarding DNR orders

Inadequate theoretical teaching regarding the ethics guiding DNR orders is pervasive. Pettersson et al (32) reported that physicians and nurses in their qualitative study in Sweden mainly received theoretical ethics education during their undergraduate training. Participants express the need for more formal ethics training programs to better prepare for clinical practice. Junod Perron et al (33) stated that one of the possible reasons that only 31% of the junior internal medicine trainees could correctly define DNR orders was that Swiss undergraduate medical students receive little to no training in medical ethics. Hadler et al (34) concluded that at their institution, training of surgeons and anaesthetists in implementing DNR orders was lacking, and their practises and understanding were contrary to clear and well-defined professional guidelines. The authors highlighted that understanding and practises of DNR orders were possibly

further influenced by the generational gap between trainees' and attending physicians' beliefs and practices (34). Similarly, Sanderson et al (35) reported that physicians and nurses working in the intensive care units of two Boston children's hospitals received very little under- and postgraduate training regarding DNR orders.

Although theoretical ethical education is essential, Pettersson et al (32) reported that participants interviewed were of the opinion that theoretical education alone is not enough, as it will not make engaging with difficult situations less difficult. The participants suggested that the best way to learn was by gaining experience while supervised by an experienced supervisor. The participants also indicated self-reflection as a learning tool. Self-reflection entails reflecting on decisions, what was done and why and how others perceived the decisions and how these affected others. Lastly, the participants stated that a working climate conducive to ethical discussion further enhances ethical learning (32).

1.4.2 Health care providers' knowledge of DNR orders

Assessed knowledge

Limited literature was identified addressing knowledge of anaesthetists and other health care providers regarding DNR orders in the perioperative period. This section will focus on the health care providers' knowledge of DNR orders.

Mullan et al (36), in 2002, in an upper Midwest United States region multicentre study, assessed knowledge of end-of-life care, which included the discussion and knowledge pertaining to advance directives and resuscitation orders of program directors, faculty and internal medicine trainees. A small but statistically significant mean score of 52.1% was obtained by the faculty and the residents. The faculty and the residents attained a mean score of 57.6% and 48.9% respectively (36).

Average knowledge of DNR orders was reported in three studies (37-39).

Schroder et al (37), in 2009 at five universities in Canada, assessed internal medicine residents' knowledge of end-of-life care including DNR orders. The mean score obtained by the residents was 64.6%, with no difference between the residents' years of training. Zhou et al (38), in a study among oncology advance

practice nurses in the United States of America in 2010, reported a knowledge score of 67%. The authors suggest that the low score may have been a barrier to implementing advanced care planning practices. In a single centre study in Chicago in 2017, Sharma et al (40), in a randomised control trial determined the baseline knowledge of hospitalists in the control arm of the study to be 63.2%.

Tchorz et al (39), in Ohio in 2013, assessed third-year medical students' knowledge of DNR orders among other palliative and end-of-life care topics. All 97 students passed with a mean score of 90.3%. Palliative and end-of-life care topics were included in these students' curriculum.

Self-reported knowledge

This section focuses on the health care providers' self-reported knowledge of DNR orders as part of palliative and end-of-life care and advance care planning.

Schroder et al (37), in 2009 at five universities in Canada, assessed internal medicine residents knowledge of end-of-life care including DNR orders. The residents rated their knowledge of end-of-life care as average, with a score of 3 out of 5. In a 2010 study by Ramírez-Rivera et al (41), in Puerto Rico, 25% of the internal medicine residents rated their knowledge of DNR orders as less than 7 out of 10.

Keon-Cohen et al (42), in a 2017 study of 290 junior and senior anaesthetists in Australia and New Zealand demonstrated that 75% of the anaesthetists reported having very low to moderate knowledge pertaining to DNR orders during the perioperative period.

1.5 Health care providers' comfort with treating patients with DNR orders

Studies have shown that health care providers experience discomfort when engaging with patients with DNR orders (43-48).

Minto and Strickland (45) reported that primary health care providers in a qualitative study in England stated that discussing advanced care plans and caring for patients with advanced care plans substantially affected them. Most of these

primary health care workers became distressed when applying advanced care plans. Some showed outward expression of emotions, such as shedding a tear, while others used avoidance tactics.

Nankundwa and Brysiewicz (49), relating the lived experiences of Rwandan intensive care nurses caring for patients with DNR orders, stated that the nurses experienced emotional distress and that the DNR orders became a barrier to delivering optimal intensive care. The nurses felt discouraged with feelings of stress, frustration, anger, sadness, helplessness and moral distress.

Health care providers have reported that experience in dealing with patients with DNR (45, 50) orders and learning from an experienced health care provider (45) does help emotional distress.

1.6 Summary

In this section, individual autonomy and health care choices in the South African context, DNR orders and the anaesthetist, ethical competence and DNR orders, learning and developing of ethical competence regarding DNR orders, health care providers' knowledge of DNR orders and health care providers' comfort with treating patients with DNR orders were discussed.

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Section 2: Author guidelines

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Journal references:

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Section 3: Draft article

Knowledge of anaesthetists in a department of anaesthesiology regarding “do not resuscitate” orders during the perioperative period

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Keywords: do not resuscitate orders, anaesthetists, knowledge

Abstract

Background

The ethical principle of autonomy is codified in the constitutional and legislative laws governing South Africa. Patients have the right to refuse life-prolonging or sustaining medical therapies; this is inclusive of their right to have directives indicating orders not to resuscitate in possible critical circumstances. The aim of this study was to assess the knowledge of anaesthetists regarding do not resuscitate (DNR) orders during the perioperative period in the Department of Anaesthesiology at the University of the Witwatersrand.

Methods

A cross-sectional, contextual research study design was followed using an anonymous self-administered online questionnaire. The study population consisted of anaesthetists working in the department. Convenience sampling was used. An online submission of the questionnaire implied consent. Adequate knowledge was defined as a score of $\geq 60\%$ as determined by the Angoff method.

Results

The participants mean (SD) score was 63.5% (11.8%), with seniors obtaining a score of 65.3% (12.4%) and juniors 62.4% (11.2%). This difference was not statistically significant ($p=0.262$). Of the 83 (57.2%) participants who achieved a pass score, 36 (59%) were seniors and 47 (56%) were juniors. This difference was not statistically significant ($p=0.100$).

Conclusion

A mean score of 63.5% was achieved by participants in this study indicating adequate knowledge. However, only 57.2% obtained a pass mark of $\geq 60\%$. The majority of participants had limited training and experience regarding DNR orders and therefore the feeling of discomfort while treating these patients as a finding was expected. With an estimated 15% of patients having a living will specifying DNR orders and still choosing to undergo surgical procedures, it is important for the anaesthetist to have training and adequate knowledge of DNR orders.

Introduction

Patients have a constitutional right to make informed decisions regarding their health care. According to the National Patients' Rights Charter (1), "a person may refuse treatment and such refusal shall be verbal or in writing provided that such refusal does not endanger the health of others". This right to consent to or refuse treatment is based on the ethical principle of autonomy. Autonomy or "self-rule" refers to the right of every individual to make their own decisions (2). Section 7 of the National Health Act of South Africa No. 61 of 2003 (3) encourages patients to be informed about the implications, risks and obligations of their decision to refuse hospital treatment.

The Health Professions Council of South Africa (HPCSA) (4) supports the notion of autonomy proposed by the National Patients' Rights Charter (1) and the National Health Act of South Africa No. 61 of 2003 (3) in its guidelines for the withholding and withdrawal of treatment. According to these guidelines, patients must be allowed to indicate their wishes regarding future treatments and to have, in writing, their directives regarding care in possible critical circumstances (4). The guidelines further reiterate the mandate proposed in the National Health Act of South Africa No. 61 of 2003 (3) in allowing the patient to have, in writing, a surrogate decision-maker when they are unable to make health-care related decisions for themselves.

Living wills, durable power of attorney and related DNR orders all fall under the umbrella term "advanced directives" (5). The aforementioned are all legal instruments through which a patient makes decisions about future life-sustaining treatments, which should be respected and implemented when the patient is no longer mentally competent (6).

DNR orders are a form of passive euthanasia (7) and only apply to withholding or withdrawing of cardiopulmonary resuscitation (CPR) (4, 7). DNR orders are written by the treating physician, and the decision may be based on the following: the patient's wishes in an advance directive, informed refusal for treatment by the surrogate decision-maker, the futility of CPR and when the benefits of CPR are outweighed by the burdens and risks (7, 8).

The exact nature of what constitutes futility is not defined, but the American Medical Association (9) has suggested that it is when there is only a 0 – 13% chance of treatment success. In patients with DNR orders, aggressive medical therapy and appropriate end-of-life care should still be pursued (8, 10) unless the physician deems this futile or the patient or their surrogate has a directive indicating their care limitation preference (11-15).

It is estimated that 15% of patients with a living will specifying DNR orders still choose to undergo surgical procedures (16-18). Adherence to DNR orders in the perioperative period has not gained widespread momentum within the medical fraternity (12). One argument explaining this can be divided into two main categories: concerns regarding the validity and reliability of the DNR order itself and difficulties related to the nature of the operating room environment (19). Regarding the validity and reliability of the DNR orders, Ewanchuk and Brindley (19) argue that the anaesthetist is usually not the primary health care provider; thus, there may be some scepticism regarding this order. The authors further argue that the DNR orders may either be overly vague or restrictive, thus making their usage in the operating room challenging. Anaesthesia involves deliberate disruption of cardiopulmonary homeostasis followed by resuscitation, including ventilatory support (19, 20). Thus, resuscitation is the primary role of the anaesthetist and does not constitute extraordinary intervention. What could be considered extraordinary may be the use of chest compressions or electrical cardioversion (19). Therefore, requiring anaesthetists not to resuscitate may be fundamentally flawed, and they may find it morally distressing to provide care to patients with DNR orders (21).

There is a plethora of literature regarding perioperative DNR orders. However, limited literature assessing the knowledge of anaesthetists regarding DNR orders in the perioperative period were identified. The aim of this study was to assess the knowledge of anaesthetists regarding DNR orders during the perioperative period in the Department of Anaesthesiology at the University of the Witwatersrand (Wits).

Methods

A cross-sectional, contextual research study design was followed. Approval to conduct the study was obtained from the Wits Human Research Ethics Committee (Medical) (M200321).

The study population consisted of anaesthetists working in the Department of Anaesthesiology. Convenience sampling was used, and the sample size was determined by the response rate. The department consisted of 80 consultants, 10 career medical officers, 110 registrars and 38 medical officers. Questionnaires were distributed to all anaesthetists in the department via an online platform. A minimum response rate of 60% (143) of anaesthetists in the department was considered representative (22). Interns working in the department were excluded from the study. Junior anaesthetists included medical officers and registrars in their first three years of training. Senior anaesthetists included consultants and registrars with more than three years of training.

Following a review of the literature, a publication by McQuoid-Mason (7) was identified as appropriate to guide the development of the questionnaire. The ethical and legal framework that was used to inform the draft questionnaire included:

- the Constitution of the Republic of South Africa Act No. 108 of 1996 section 27 (23)
- the National Patients' Rights Charter (1)
- the National Health Act of South Africa No. 61 of 2003 (3)
- the HPCSA Guidelines for the Withholding and Withdrawing of Treatment, Booklet 7 (4)
- the South African Medical Association Guidelines on Living Wills and Advance Directives (24)
- the World Medical Association Declaration of Venice on Terminal Illness (10).

To ensure content and face validity, the draft questionnaire was reviewed by a senior anaesthesiologist with a postgraduate degree in bioethics, and the suggested changes were incorporated into the final questionnaire. The

questionnaire consisted of two sections. Section 1 requested participants' characteristics and training, experiences and comfort related to DNR orders. Section 2 contained a clinical scenario with 17 knowledge questions and a question relating to self-perceived knowledge.

Due to the regulations pertaining to public gatherings during the COVID-19 pandemic, anaesthetists were invited via email to participate in the study using an online platform. The email included an information letter and a link to the questionnaire. Online submission of the questionnaire implied consent.

Response from the anaesthetist completing the questionnaire was not linked to the email address used for the study invitation, thereby ensuring anonymity. Data collected through the electronic platform is housed in the Google Forms database and is password protected. A reminder was sent to all anaesthetists 7, 14 and 21 days after the initial email. Questionnaires took approximately 15 minutes to complete. The modified Angoff method (25) was used to determine adequate knowledge (pass mark) of $\geq 60\%$.

Data were analysed in consultation with a statistician using the statistical program R software (R version 3.4.2; <https://www.r-project.org>). Categorical variables were described using numbers and percentages and continuous variables using means and standard deviations. Comparison between the knowledge scores of junior and senior anaesthetists was made using an independent t-test. The comparisons between level of comfort and between passing and failing of junior and senior anaesthetists were made using Chi-square tests. A p-value ≤ 0.05 was considered statistically significant.

Results

Electronic survey questionnaires were sent to 238 anaesthetists, and 145 (60.9%) completed survey questionnaires were returned. The characteristics of the participants are shown in Table 1.

Table 1: Characteristics of participants

Characteristic	Overall (n=145)	Seniors (n=61)	Juniors (n=84)
	Number (%)		
Age (years)			
20 – 30	30 (20.7)	0 (0.0)	30 (100.0)
31 – 40	86 (59.3)	37 (43.0)	49 (57.0)
41 – 50	21 (14.5)	16 (76.2)	5 (23.8)
≥51	8 (5.5)	8 (100.0)	0 (0.0)
Gender			
Male	51 (35.2)	19 (37.3)	32 (62.7)
Female	94 (64.8)	42 (44.7)	52 (55.3)
Designation			
Medical officer	33 (22.8)		84 (57.9)
Registrar year 1	14 (9.7)		
Registrar year 2	14 (9.7)		
Registrar year 3	23 (15.9)		
Registrar year ≥4	16 (11.0)	61 (42.1)	
Consultant	45 (31.0)		

The training, experience and comfort of participants with DNR orders are shown in Table 2.

Table 2: Training, experience and comfort with DNR orders

	Overall (n=145)	Seniors (n=61)	Juniors (n=84)
	Number (%)		
Training received			
Yes	38 (26.2)	19 (31.1)	19 (22.6)
No	107 (73.8)	42 (68.9)	65 (77.4)
Type of training			
Formal	31 (81.6)	13 (68.4)	18 (94.7)
Informal	7 (18.4)	6 (31.6)	1 (5.3)
Treated patient with DNR order			
Yes	59 (40.7)	28 (45.9)	31 (36.9)
No	86 (59.3)	33 (54.1)	53 (63.1)
Number of DNR order patients treated			
1 – 3	32 (54.2)	13 (46.4)	19 (61.3)
4 – 6	10 (16.9)	3 (10.7)	7 (22.6)
7 – 9	5 (8.5)	4 (14.3)	1 (3.2)
≥10	12 (20.3)	8 (28.6)	4 (12.9)
Comfort with DNR order			
Very uncomfortable	13 (9.0)	4 (6.6)	9 (10.7)
Somewhat uncomfortable	33 (22.8)	15 (24.6)	18 (21.4)
Uncomfortable	44 (30.3)	9 (14.8)	35 (41.7)
Comfortable	12 (8.3)	5 (8.2)	7 (8.3)
Somewhat comfortable	39 (26.9)	24 (39.3)	15 (17.9)
Very comfortable	4 (2.8)	4 (6.6)	0 (0.0)

The mean (SD) score obtained was 63.5% (11.8%), with seniors obtaining a score of 65.3% (12.4%) and juniors 62.4% (11.2%). This difference was not statistically significant ($p=0.262$). Of the participants, 83 (57.2%) achieved a pass score of $\geq 60\%$. Of those who passed, 36 (59%) were seniors and 47 (56%) were juniors. There was no significant difference between the number of senior and junior participants who achieved a pass score ($p=0.100$). A brief description of the questionnaire scenario and other questions is shown in Table 3. The number of correct answers per question is indicated.

Table 3: Ethical and legal knowledge questions pertaining to DNR orders

Description of question	Overall (n=145)	Seniors (n=61)	Juniors (n=84)
	Number (%) correct		
Ethical and legal questions based on a case scenario			
A 30-year-old chronically ill quadriplegic patient with an advance directive stating her DNR wishes presents for emergency surgery.			
Reconsider DNR wishes in consultation with patient prior to surgery.	111 (76.6)	46 (75.4)	65 (77.4)
Patient receives a general anaesthetic. Complications develop during the procedure requiring CPR, which appears successful.			
Honour DNR wishes in consultation with surrogate decision-maker and keep patient comfortable.	85 (58.6)	33 (54.1)	52 (61.9)
Patient transferred to ICU. Requires redo procedure under regional anaesthesia; further complications develop requiring CPR.			
Considering DNR wishes, CPR should not be commenced?	93 (64.1)	41 (67.2)	52 (61.9)
If CPR commenced, should it be limited?	95 (65.5)	38 (62.3)	57 (67.9)
If limited CPR commenced, should the ATLS/ACLS principle (6Hs and 6Ts) be followed?	18 (12.4)	3 (4.9)	15 (17.9)
After a protracted ICU stay, the patient is declared to be in a persistent vegetative state.			
Considering the DNR wishes, should artificial nutrition be commenced?	57 (39.3)	19 (31.1)	38 (45.2)
In consultation with two senior independent clinicians, continued life-sustaining care is deemed futile.			
Considering DNR wishes, should withholding/withdrawing life-sustaining treatment be recommended?	136 (93.8)	60 (98.4)	76 (90.5)
Surrogate decision-maker nominated by patient refuses to consent to withdrawing/withholding life-sustaining treatment			
Should life-sustaining treatment be withheld/withdrawn?	79 (54.5)	27 (44.3)	52 (61.9)
DNR orders lawful when			
Patient makes informed decision to refuse CPR	133 (91.7)	57 (93.4)	76 (90.5)
Patient with decisional incapacity has an advance directive stating DNR wishes	89 (61.4)	46 (75.4)	43 (51.2)
Decision to refuse CPR is made by surrogate decision-maker	79 (54.5)	29 (47.5)	50 (59.5)
Continuing medical care deemed futile	108 (74.5)	48 (78.7)	60 (71.4)
Burden and risk of CPR outweigh the benefits	126 (86.9)	54 (88.5)	72 (85.7)
Euthanasia and DNR orders			
Are DNR orders a form of euthanasia?	18 (12.4)	3 (4.9)	15 (17.9)
Is passive euthanasia legal in South Africa?	58 (40.0)	28 (45.9)	30 (35.7)
Is active euthanasia legal in South Africa?	144 (99.3)	60 (98.4)	84 (100.0)
Is there a legal distinction between active and passive euthanasia?	98 (67.6)	42 (68.9)	56 (66.7)

Participants' rating of their self-perceived knowledge pertaining to the laws and ethical principles that guide DNR orders is shown in Table 4. When comparing the level of self-perceived knowledge between seniors and juniors, significantly more senior selected average knowledge regarding the National Health Act of South Africa No. 61 of 2003 (3), compared to juniors who mostly selected poor knowledge.

Table 4: Self-perceived knowledge regarding the laws, guidelines and ethical principles of DNR orders

	Overall (n=145)	Seniors (n=61)	Juniors (n=84)	p-value
	Number (%)			
Constitution of the Republic of South Africa Act No. 108 of 1996 section 27				
None	35 (24.1)	8 (13.1)	27 (32.1)	0.054
Poor	73 (50.3)	34 (55.7)	39 (46.4)	
Average	34 (23.4)	18 (29.5)	16 (19.0)	
Good	3 (2.1)	1 (1.6)	2 (2.4)	
National Patients' Rights Charter				
None	14 (9.7)	4 (6.6)	10 (11.9)	0.624
Poor	56 (38.6)	23 (37.7)	33 (39.3)	
Average	61 (42.1)	29 (47.5)	32 (38.1)	
Good	13 (9.0)	5 (8.2)	8 (9.5)	
Excellent	1 (0.7)	0 (0.0)	1 (1.2)	
National Health Act of South Africa No. 61 of 2003				
None	19 (13.1)	4 (6.6)	15 (17.9)	0.002
Poor	50 (34.5)	14 (23.0)	36 (42.9)	
Average	64 (44.1)	35 (57.4)	29 (34.5)	
Good	12 (8.3)	8 (13.1)	4 (4.8)	
Health Professions Council of South Africa, Guidelines for the Withholding and Withdrawing of Treatment, Booklet 7				
None	25 (17.2)	6 (9.8)	19 (22.6)	0.059
Poor	77 (53.1)	31 (50.8)	46 (54.8)	
Average	40 (27.6)	23 (37.7)	17 (20.2)	
Good	3 (2.1)	1 (1.6)	2 (2.4)	
South African Medical Association Guidelines on Living Wills and Advance Directives				
None	30 (20.7)	8 (13.1)	22 (26.2)	0.138
Poor	67 (46.2)	28 (45.9)	39 (46.4)	
Average	46 (31.7)	24 (39.3)	22 (26.2)	
Good	1 (0.7)	1 (1.6)	0 (0.0)	
Excellent	1 (0.7)	0 (0.0)	1 (1.2)	
World Medical Association Declaration of Venice on Terminal Illness				
None	56 (38.6)	21 (34.4)	35 (41.7)	0.053
Poor	67 (46.2)	25 (41.0)	42 (50.0)	
Average	21 (14.5)	14 (23.0)	7 (8.3)	
Good	1 (0.7)	1 (1.6)	0 (0.0)	

Discussion

Interest in ethical competence has increased over the past two decades, largely due to the exponential growth in the availability of ethical guidelines and legislature (26). Eriksson et al (26) suggest a communicative model of being, doing and knowing to address ethical competence. The ethics of being or virtue ethics refers to the good character traits that the health care provider needs to be ethically competent in addition to having knowledge about ethics (26). The ethics of doing refers to how the health care provider should act in certain ethical circumstances (27); this is well defined in the South African context (1, 3, 4, 10, 23, 24). Eriksson et al (26) emphasise that although being and doing are important components of ethical competency, the health care provider also needs the knowing component to be ethically competent. This study addressed the knowing component.

The participants in this study obtained a mean score of 63.5% and 57.2% obtained a pass mark of $\geq 60\%$. This is better than the mean of 52.1% achieved by the internal medicine residents and their faculty members in an upper Midwest United States region multicentre study (28). The mean score obtained in this study is similar to; the 64.6% obtained by internal medicine trainees in a multicentre Canadian study (29), the 67% achieved by advanced practice oncology nurses in an American single centre study (30) and the 63.2% baseline knowledge of hospitalists in the control arm of a randomised control trial in America (31). However, it is not as good as the 90.3% mean score obtained by third-year medical students in Ohio (32). It is important to note that palliative and end-of-life care topics were included in these students' curriculum.

In this study, only 26.2% of the participants received training regarding DNR orders. Pettersson et al (27) reported that physicians and nurses in their qualitative study in Sweden expressed the need for more formal ethics training programs to better prepare for clinical practice. Although theoretical ethical education is essential, the authors highlighted that the participants interviewed believed theoretical education alone is not enough, as it will not make engaging with difficult situations less difficult. The participants suggested that the best way to learn was by gaining experience while supervised by an experienced supervisor (27).

Seniors and juniors in this study had similar levels of knowledge, 65.3% and 62.4%, respectively. Mullan et al (28) reported a small but statistically significant difference between the knowledge scores of the faculty members (57.6%) and internal medicine residents (48.9%). Only 45.9% of the senior participants and 36.9% of the junior participants in this study have treated patients with DNR orders. This is not ideal, as the seniors who teach and supervise juniors did not have much more knowledge and experience than the juniors.

Studies have shown that health care providers experience discomfort when engaging with patients with DNR orders (33-38). Of the participants in this study, 62.1% rated themselves as experiencing discomfort when managing patients with DNR orders during the perioperative period. Nankundwa and Brysiewicz (39), relating the lived experiences of Rwandan intensive care nurses caring for patients with DNR orders, stated that the nurses experienced emotional distress and that the DNR orders became a barrier to delivering optimal intensive care. The nurses felt discouraged with feelings of stress, frustration, anger, sadness, helplessness and moral distress. Minto and Strickland (35) in England reported that most of primary health care providers became distressed when applying advanced care plans. Some showed outward expression of emotions, such as shedding a tear, while others used avoidance tactics (35).

This study was limited by only having assessed the knowing component of ethical competence. It is recommended that future research should focus on the being component of ethical competence. A further limitation of this study was that it was done contextually and may not reflect the knowledge of other anaesthetists. A national study assessing knowledge of DNR orders is recommended. With increasing litigation in the perioperative period, culturally sensitive and legally and ethically sound training addressing a holistic approach to patients with DNR orders in the perioperative period should receive more emphasis in the anaesthetic training programme.

Conclusion

A mean score of 63.5% was achieved by participants in this study indicating adequate knowledge. However, only 57.2% obtained a pass mark of $\geq 60\%$. The

majority of participants had limited training and experience regarding DNR orders and therefore the feeling of discomfort while treating these patients as a finding was expected. With an estimated 15% of patients having a living will specifying DNR orders and still choosing to undergo surgical procedures (16-18), it is important for the anaesthetist to have training and adequate knowledge of DNR orders.

Conflict of interest

The authors declare that we have no financial or personal relationships, which may have inappropriately influenced us in writing this paper.

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Section 4: Proposal

Knowledge of anaesthetists in a department of anaesthesiology regarding “do not resuscitate” orders during the perioperative period

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4.1 Introduction and problem statement

Patients have a constitutional right to make informed decisions regarding their health care. According to the National Patients' Rights Charter (1), "a person may refuse treatment and such refusal shall be verbal or in writing provided that such refusal does not endanger the health of others". This right to consent to or refuse treatment is based on the ethical principle of autonomy. Autonomy or "self-rule" refers to the right of every individual to make their own decisions (2). Section 7 of the National Health Act of South Africa No. 61 of 2003 (3) encourages patients to be informed about the implications, risks and obligations of their decision to refuse hospital treatment.

The Health Professions Council of South Africa (HPCSA) (1) supports the notion of autonomy proposed by the National Patients' Rights Charter (4) and the National Health Act of South Africa No. 61 of 2003 (3) in its guidelines for the withholding and withdrawal of treatment. According to these guidelines, patients must be given the opportunity to indicate their wishes regarding future treatments and to have, in writing, their directives regarding care in possible critical circumstances (1). The guidelines further reiterate the mandate proposed in the National Health Act of South Africa No. 61 of 2003 (3) in allowing the patient to have, in writing, a surrogate decision-maker when they are unable to make health care related decisions for themselves.

Living wills, durable power of attorney and related "do not resuscitate" (DNR) orders all fall under the umbrella term "advanced directives" (5). The aforementioned are all legal instruments through which a patient makes decisions about future life-sustaining treatments, which should be respected and implemented when the patient is no longer mentally competent (6).

DNR orders are a form of passive euthanasia (7) and only apply to withholding and/or withdrawing of cardiopulmonary resuscitation (CPR) (1, 7). DNR orders are written by the treating physician, and the decision for the order may be based on the following: the patient's wishes in an advance directive, informed refusal by a surrogate decision-maker, the futility of CPR, and when the benefits of CPR are outweighed by the burdens and risks (7, 8).

The exact nature of what constitutes futility is not defined, but the American Medical Association (9) has suggested that it is when there is only a 0 – 13% chance of success of treatment. In patients with DNR orders, aggressive medical therapy and appropriate end-of-life care should still be pursued (8, 10) unless the physician deems that continuing aggressive medical care is futile or the patient or their surrogate has a directive indicating their care limitation preference (11-15).

It is estimated that 15% of patients with a living will specifying DNR orders still choose to undergo surgical procedures (16-18). Adherence to DNR orders in the perioperative period has not gained widespread momentum within the medical fraternity (12). One argument explaining this can be divided into two main categories: concerns regarding the validity and reliability of the DNR order itself and difficulties related to the nature of the operating room environment (19). Anaesthesia involves deliberate disruption of cardiopulmonary homeostasis followed by resuscitation, including ventilatory support (19, 20). Thus, resuscitation is the main role of the anaesthetist and does not constitute extraordinary intervention. What could be considered extraordinary may be the use of chest compressions or electrical cardioversion (19). Therefore, requiring anaesthetists not to resuscitate may be fundamentally flawed, and anaesthetists may find it morally distressing to provide care to patients with DNR orders (21).

There is a plethora of literature regarding perioperative DNR orders. However, there is a scarcity of literature assessing the knowledge of anaesthetists regarding DNR orders in the perioperative period. In a self-reported survey in Australia and New Zealand, Keon-Cohen et al (11) reported that 75% of anaesthetists had very low, low or moderate knowledge regarding DNR orders. In a study conducted in Saudi Arabia aimed at assessing perspectives of interns and residents regarding DNR orders, it was shown that there was a lack of familiarity regarding DNR policies, with the residents demonstrating more familiarity with the policies than the interns (22).

There is a paucity of South African literature regarding DNR orders. Anecdotally DNR orders are less commonly used in the public sector than in the private sector. However, anaesthetists work in both the public and private sectors. Also, patient profiles and expectations constantly evolve and DNR orders may be used more

frequently in the future in both the public and private sectors. Therefore, anaesthetists need to be knowledgeable regarding DNR orders. At the University of the Witwatersrand (Wits) the knowledge of anaesthetists regarding DNR orders is not known.

4.2 Aim and objectives

4.2.1 Aim

The aim of this study is to assess the knowledge of anaesthetists regarding DNR orders during the perioperative period in the Department of Anaesthesiology at Wits.

4.2.2 Objectives

The primary objective of this study is to describe anaesthetists' knowledge of DNR orders in the perioperative period.

The secondary objectives of this study are to:

- compare the knowledge of DNR orders in the perioperative period between junior and senior anaesthetists
- compare comfort levels when managing patients with DNR orders in the perioperative period between junior and senior anaesthetists
- describe anaesthetists self-perceived knowledge of the South African ethical and legal framework governing advanced directives.

4.3 Research assumptions

The following definitions will be used in this study.

Anaesthetist: is any qualified doctor working in the Department of Anaesthesiology, including medical officers, registrars and consultants.

Medical officer: is a qualified doctor practising in the Department of Anaesthesiology under specialist supervision. Medical officers with more than 10 years of experience are career medical officers.

Registrar: is a qualified doctor who is registered with the HPCSA as a trainee anaesthesiologist.

Anaesthesiologist: is a qualified doctor who is registered with the HPCSA as a specialist anaesthetist.

Consultant: is an anaesthesiologist or career medical officer.

Junior anaesthetists: include medical officers and registrars in their first three years of training.

Senior anaesthetists: include consultants and registrars with more than three years of training.

Adequate knowledge: in this study adequate knowledge will be determined using the modified Angoff method (23).

South African ethical and legal framework: in this study will include:

- the Constitution of the Republic of South Africa Act No. 108 of 1996 section 27 (24)
- the National Patients' Rights Charter (1)
- the National Health Act of South Africa No. 61 of 2003 (3)
- the HPCSA Guidelines for the Withholding and Withdrawing of Treatment, Booklet 7 (1)
- the South African Medical Association Guidelines on Living Wills and Advance Directives (25)

the World Medical Association Declaration of Venice on Terminal Illness (10).

4.4 Demarcation of study field

The study will be conducted in the Department of Anaesthesiology, affiliated with the Faculty of Health Sciences at Wits. The staff complement of the department is 80 consultants, 10 career medical officer, 110 registrars and 38 medical officers. The department's training platform consists of the following core hospitals.

- Charlotte Maxeke Johannesburg Academic Hospital is a 1200-bed central hospital.
- Chris Hani Baragwanath Academic Hospital is a 2888-bed central hospital.
- Helen Joseph Hospital is a 500-bed tertiary hospital.
- Rahima Moosa Mother and Child Hospital is a 338-bed regional hospital.
- Wits Donald Gordon Medical Centre is a public-private hospital with 190-beds.

4.5 Ethical considerations

Approval to conduct the study will be obtained from the Human Research Ethics Committee (Medical) and the Graduate Studies Committee at Wits. Approval to conduct this study has been obtained from the Head of Department of Anaesthesiology (Appendix A).

Following approval of the study, anaesthetists will be approached at academic meetings. After an explanation of the study, an invitation to participate in the study will be extended to all anaesthetists attending the meeting. All the anaesthetists attending the meeting will be given an information letter (Appendix B) and a questionnaire (Appendix C). The return of the completed questionnaire will imply consent. Upon completion, the questionnaire will be folded by the anaesthetists and inserted into a sealed collection box at the door of the venue. To ensure anonymity and confidentiality, no identifying information will be requested from the participants. The data will be stored securely in a locked cupboard for six years following the completion of the study. Only the researcher and supervisors will have access to the raw data.

However, in light of the current ongoing COVID-19 pandemic, should academic meetings still be held virtually when data collection for this study is due to commence, the study will be conducted via an online platform. An email (Appendix D) will be sent to invite anaesthetists to participate in the study; the email will include a link to completing the questionnaire (Appendix C). The online submission of the questionnaire will imply consent.

Response to the anaesthetist completing the questionnaire through the link will not in any way be linked to email address used for the study invitation or completion of the questionnaire, thereby ensuring anonymity. Data collected through the electronic platform will be housed in the Google Forms database and will be password protected and under the care of the researcher.

The study will be conducted according to the principles of the Declaration of Helsinki (26) and the South African Guidelines for Good Clinical Practice (27).

Should the level of knowledge not be adequate, this will be reported to the Head of Department, and educational interventions will be recommended.

4.6 Research methodology

4.6.1 Research design

A cross-sectional, contextual research study design will be followed.

A cross-sectional study is a type of observational study that examines the relationship between variables at a single point in time (28, 29). In this study, data will be collected from anaesthetists at a single point in time to determine their knowledge regarding DNR orders during the perioperative period.

Contextual studies are studies that are conducted in a specific environment (29). This study will be conducted among anaesthetists in the Department of Anaesthesiology at Wits.

4.6.2 Study population

The study population consists of anaesthetists working in the Department of Anaesthesiology at Wits.

4.6.3 Study sample

Sample size

The sample size will be determined by the response rate. The department consists of 80 consultants, 10 career medical officers, 110 registrars and 38 medical officers. Questionnaires will be distributed to all interested anaesthetists at

academic meetings or sent to all anaesthetists in the department via an online platform. A minimum response rate of 60% (143) of anaesthetists in the department will be considered representative (30).

Sampling method

In this study, a convenience sampling method will be used. Convenience sampling also called “accidental sampling”, is when a researcher includes study participants based on the ease of their availability and accessibility (31). In this study, participants will be approached at academic meetings in the Department of Anaesthesiology or emails will be sent to all anaesthetists.

Inclusion and exclusion criteria

The inclusion criteria for this study are:

- anaesthetists attending the academic meetings
- anaesthetists who give consent.

The exclusion criteria in this study are:

- interns working in the department
- anaesthetists who helped in evaluating and editing the questionnaire
- all questionnaires where only the demographics have been completed.

4.6.4 Data collection

Questionnaire development

Following a review of the national and international literature, a national publication by McQuoid-Mason (7) was identified as appropriate to guide the development of the questionnaire. Permission to use the article to develop a questionnaire was received from the author (Appendix E). The South African ethical and legal framework was used to inform the draft questionnaire.

To ensure content and face validity, the draft questionnaire was reviewed by a senior anaesthesiologist with a postgraduate degree in bioethics, and the suggested changes were incorporated into the final questionnaire (Appendix C).

The questionnaire consists of the following sections:

- Section 1: demographics
- Section 2: a clinical scenario with knowledge questions and a question pertaining to self-perceived knowledge regarding the ethical and legal framework informing DNR orders in South Africa.

Data collection

An invitation to participate in the study will be extended to all the anaesthetists in the Department of Anaesthesiology at Wits, at the departmental academic meetings. Before the commencement of the meeting, the researcher, with permission from the convener, will address the anaesthetists giving a brief explanation of the study. All the anaesthetists attending the meeting will receive an information letter (Appendix B) detailing the study and the self-administered questionnaire (Appendix C). The researcher will be present during the completion of the questionnaire to address any queries that may arise and to prevent data contamination. Upon completion, each participant will be asked to fold their questionnaire in half and place it in a sealed box at the exit of the meeting room, even if it is not complete.

If regulations pertaining to public gatherings have not been eased, anaesthetists will be invited to participate in the study using an online platform. Following approval of the study, all anaesthetists in the Department of Anaesthesiology at Wits will be invited to participate in the study by email. The email will include an information letter (Appendix D or F) and a link to completing the questionnaire (Appendix C). An online submission of the questionnaire will imply consent.

Response to the anaesthetist completing the questionnaire through the link will not in any way be linked to email address used for the study invitation or completion of the questionnaire, thereby ensuring anonymity. Data collected through the electronic platform will be housed in the Google Forms database and will be password protected, and under the care of the researcher and supervisors.

Date	Action
Initial email	An email will be sent to all anaesthetist in the Department of Anaesthesiology at Wits. This email will include an information letter (Appendix D) and a link to the questionnaire (Appendix C).
Approximately 7, 14 and 21 days after initial email	An email reminder will be sent to all anaesthetists in the Department of Anaesthesiology at Wits as it will not be known to the researcher who has or has not completed the questionnaire. The reminder email will include a thank you note to those who may have already completed the questionnaire and a request to complete the questionnaire to those who have not yet done so. This email will include an information letter (Appendix F) and a link to the questionnaire (Appendix C).

Questionnaires will take approximately 15 minutes to complete. Questionnaires returned blank will be excluded from the study and questions not answered will be considered incorrect.

The modified Angoff method (23) will be used to determine adequate knowledge (pass mark). This method uses a panel of at least five experts to review test items and estimate the probability of a minimally qualified performer answering a test item correctly (23). The estimates for each test item is averaged and the averages are used to determine the cut-off score (23). If necessary, this will be done during an online meeting.

4.6.5 Data analysis

A Microsoft Excel® spreadsheet will be used to capture data. Data will be analysed in consultation with a biostatistician using the statistical program STATA version 15 (StataCorp, USA). Categorical variables will be described using numbers and percentages and continuous variables using means and standard deviations or

medians and interquartile ranges depending on the distribution of the data. Comparisons between knowledge scores of junior and senior anaesthetists will be done using either an independent t-test or a Mann-Whitney test. The comparison between level of comfort and also between passing and failing of junior and senior anaesthetists will be done using Chi-square tests or Fisher's exact tests. A p-value of 0.05 or less will be considered statistically significant.

4.7 Significance of the study

Anaesthetists are at times confronted with patients presenting for surgery who have a DNR order in place. It is estimated that 15% of patients with DNR orders still choose to undergo surgical procedures (15-17). The results of this study will give insight into the knowledge of anaesthetists regarding DNR orders in the perioperative period. If the results show poor knowledge, measures can be put in place to improve this knowledge which may contribute to alleviating the uncertainty and moral distress often associated with caring for patients with DNR orders during the perioperative period (21).

4.8 Validity and reliability of the study

Validity refers to "the degree to which a measurement represents a true value" and reliability is the "consistency of the measure achieved" (28).

The validity and reliability of this study will be ensured by:

- using an appropriate study design
- having a representative study sample
- the researcher being present during data collection to answer any queries and to prevent data contamination
- checking every tenth data entry point for accuracy
- analysing data in consultation with a biostatistician.

4.9 Potential limitations

The study is contextual in nature as it will be conducted in the Department of Anaesthesiology at Wits and the findings may not be generalisable to other

departments. Data will be collected from more than one academic meeting, which may lead to data contamination. However, this has not occurred in previous studies conducted in the department.

The use of convenience sampling may result in selection bias, therefore, resulting in a sample that is not representative of anaesthetists in the department of anaesthesiology at Wits.

4.10 Project outline

4.10.1 Time frame

Activity	Jan 2020	Feb 2020	Mar 2020	Jul 2020	Aug 2020	Sep 2020	Oct 2020	Nov 2020	Dec 2021	Jan 2021	Feb 2021
Proposal preparation											
Literature review											
Proposal submission											
Ethics approval											
Postgraduate approval											
Data collection											
Data analysis											
Draft article											
Submission											

4.10.2 Budget

Item	Price per page	Number of pages	Copies	Total
Proposal	R 1	23	10	R 230
Postgraduate form	R 1	2	6	R 12
Information letter	R 1	1	210	R 210
Questionnaire	R 1	6	210	R 1260
Complete report	R 1	150	4	R 600
Grand total				R 2312

The Wits Department of Anaesthesiology will incur the costs of paper and printing for the proposal, postgraduate application, information letters and questionnaires. Printing of the information letter and the questionnaire may not be necessary if by the time data collection commences and academic meetings in the department are still being held virtually due to the COVID 19 pandemic, as the invitation to participate in the study will be through an online platform.

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4.12 Appendices

Appendix A: Approval from Head of Department of Anaesthesiology

 GAUTENG PROVINCE HEALTH REPUBLIC OF SOUTH AFRICA	 WITS UNIVERSITY				
Department of Anaesthesia – University of the Witwatersrand					
7 York Road, Parktown, 2193 South Africa • Telegrams "Witamed" • Telephone (011) 488-4344 • Fax (011) 488-4343					
Department of Anaesthesia Area 361 Charlotte Maxeke Johannesburg Academic Hospital Tel: 011 488-4344 19 February 2020					
Subject: Permission to conduct survey from Department of Anaesthesiology					
To whom it may concern,					
This letter stands to affirm that I, Dr PMV Motshabi, grant permission to Dr Tebogo B Monchwe HPCSA number MP 0767190, to conduct survey in Department of Anaesthesiology at University of Witwatersrand for his study "Knowledge of anaesthetists in a department of anaesthesiology regarding do not resuscitate orders during the perioperative period". The approximate period will be, but not limited to, the months of March 2020, until the sample size is obtained. The information obtained from the data will be used for Dr Monchwe research study for his Masters in Medicine only, and will include information and data relevant to his study. Yours sincerely, 					
<table border="1" style="width: 100%;"><tr><td style="text-align: center;"> WITS UNIVERSITY</td><td>Dr Palesa Motshabi <i>Academic Head: Department of Anaesthesia</i> <i>Head of Clinical Unit: Cardiac Anaesthesia</i> Tel: +27 (0)11 488 4344 Cell: 083 432 1994 Email: palesa.motshabi@wits.ac.za Website: www.wits.ac.za</td><td style="text-align: center;"> WITS SCHOOL OF CLINICAL MEDICINE</td><td style="text-align: center;"> FACULTY OF HEALTH SCIENCES</td></tr></table> Charlotte Maxeke Johannesburg Academic Hospital, 6th Floor, Area 361/10, Jubilee Road, Parktown, Johannesburg		 WITS UNIVERSITY	Dr Palesa Motshabi <i>Academic Head: Department of Anaesthesia</i> <i>Head of Clinical Unit: Cardiac Anaesthesia</i> Tel: +27 (0)11 488 4344 Cell: 083 432 1994 Email: palesa.motshabi@wits.ac.za Website: www.wits.ac.za	 WITS SCHOOL OF CLINICAL MEDICINE	 FACULTY OF HEALTH SCIENCES
 WITS UNIVERSITY	Dr Palesa Motshabi <i>Academic Head: Department of Anaesthesia</i> <i>Head of Clinical Unit: Cardiac Anaesthesia</i> Tel: +27 (0)11 488 4344 Cell: 083 432 1994 Email: palesa.motshabi@wits.ac.za Website: www.wits.ac.za	 WITS SCHOOL OF CLINICAL MEDICINE	 FACULTY OF HEALTH SCIENCES		

Appendix B: Information letter

Dear colleague

Hello, my name is Tebogo Benedict Monchwe. I am a registrar in the Department of Anaesthesiology at Wits. I would like to invite you to participate in my research study titled “Knowledge of anaesthetists in a department of anaesthesiology regarding “do not resuscitate” orders during the perioperative period”. This research report will be submitted to the Faculty of Health Sciences to fulfil the requirements for my M Med degree.

Anaesthetists may be confronted by patients with do not resuscitate (DNR) orders presenting for surgery. Management of these patients can be morally, ethically and legally challenging. This study aims to assess the knowledge of anaesthetists regarding DNR orders during the perioperative period.

Participation in the study is voluntary, and there is no penalty for refusal to do so. By completing the questionnaire, consent is implied. Information will be kept anonymous and confidential as none of your personal details will be required. My supervisors and I are the only people who will have access to the raw data. Completion of the questionnaire should take approximately 15 minutes. All questionnaires, complete or incomplete, must be placed in the sealed collection box at the door. Questionnaires, where only the demographics section has been completed, will be excluded from the study. Please do not share information during the completion of the questionnaire to allow an accurate reflection of anaesthetists’ knowledge.

The Human Research Ethics Committee (HREC) (M200321) and the Wits Graduate Studies Committee have approved the study. Should you have any questions, please contact me on 073 686 6662 or the Chairperson of the Human Research Ethics Committee, Prof Clement Penny, on 011 717 2301 or on the email Clement.penny@wits.ac.za. The Committee secretariat, Ms. Z Ndolvu or Mr R Mkansi can be contacted at 011 717 2700 and 011 717 1234 respectively or on the emails Zanele.Ndolvu@wits.ac.za and Rhulani.mkansi@wits.ac.za.

Thank you for taking the time to read this letter.

Yours Sincerely

Tebogo Benedict Monchwe

Appendix C: Questionnaire

**Knowledge of anaesthetists in a department of anaesthesiology regarding
“do not resuscitate” orders during the perioperative period**

Please mark the appropriate box with an X in the space provided

Section 1: Demographics

1. Age in years

20 – 30	
31 – 40	
41 – 50	
> 51	

2. Gender

Male	
Female	

3. Designation

Medical Officer	
1 st year registrar	
2 nd year registrar	
3 rd year registrar	
≥ 4 th year registrar	
Consultant	

4. Have you ever received training/teaching on advance directives?

(a)

Yes	
No	

(b) If **YES**, please specify: _____

5. Have you ever treated a patient with a DNR order?

(a)

Yes	
No	

(b) If **YES**, approximately how many patient(s) with a DNR order have you treated?

1 – 3	
4 – 6	
7 – 9	
≥ 10	

6. How comfortable are you treating a patient with a DNR order?

Very uncomfortable	
Somewhat uncomfortable	
Uncomfortable	
Somewhat comfortable	
Comfortable	
Very comfortable	

Section 2: Knowledge questions

Please answer the following questions within the South African ethical and legal framework

Case Scenario

Dr X is an experienced anaesthesiologist in an academic hospital.

A 30-year-old quadriplegic mother of two of sound mind, with an advance directive stating her **DNR order**, presents to Dr X's emergency operating room for a debridement of septic bedsore. She is known to have amyloidosis and bronchiectasis. She is currently receiving culture directed antibiotics for an active lobar pneumonia.

7. Considering her **DNR order**, should Dr X:
Choose only one option

Advise for her to keep her pre-existing DNR order in place during the perioperative period?	
Automatically suspend her pre-existing DNR order for a specified period of time during the perioperative period?	
Ignore her pre-existing DNR order and continue to deliver a cardio-stable balanced anaesthesia?	
Reconsider her pre-existing DNR order in consultation with her?	

Dr X decides to continue with the anaesthesia for the debridement of the septic bedsores. He induces anaesthesia and secures the airway with an endotracheal tube. During the course of the procedure, the patient develops autonomic dysreflexia with a severe hypertensive crisis. Dr X notices that on her 3-lead ECG, she has developed features consistent with myocardial injury. A 12-lead ECG confirms that she has suffered an antero-septal ST segment elevation myocardial ischaemia complicated by fast atrial fibrillation, worsening metabolic acidaemia on her arterial blood gas and has delayed emergence from anaesthesia at the conclusion of the procedure.

8. Considering her **DNR order**, should Dr X:
Choose only one option

On conclusion of the case, discharge the patient to an intensive care unit, where a postoperative bed has been confirmed to be available, for invasive monitoring and further management of the perioperative complications?	
In consultation with the surrogate decision-maker, consider withholding and/or withdrawing life-sustaining treatments and then optimise analgesia, anxiolysis and sedation to ensure she is comfortable and then continue end-of-life care in the appropriate postoperative destination (e.g. secluded post anaesthetic care unit or general ward, where a nurse will be allocated to address her end-of-life care needs or a high dependency care unit) where her loved ones would be allowed to spend time with her in her last hours of life?	
Discharge her to the general ward for continued management?	

9. Dr X decides to take the patient to the intensive care unit for continued resuscitation and further management of the perioperative complications. On day 10, after the index procedure, she is rebooked on Dr X's emergency list for a re-debridement. Dr X has opted to do an appropriate regional technique for the patient for this procedure. During the procedure, the patient develops pulseless electrical activity (PEA).

(a) Should Dr X commence cardiopulmonary resuscitation (CPR) according to ATLS/ACLS principles?

Yes	
No	

(b) If Dr X decided to commence CPR, should he consider limiting the CPR?

Yes	
No	

(c) If Dr X decided to commence a limited CPR, which of the following measure(s) should he include as part of the limited CPR?

Mark the ones that should be included with an X.

Shock delivery using a defibrillator if the patient develops a shockable rhythm	
Administration of potent vasoactive substances	
Chest compressions as per ATLS/ACLS principles	
Secure the airway with a definitive airway device with the intent to manage the impending respiratory arrest from the perioperative complication	
Initiate artificial ventilation to deliver intermittent positive pressure ventilation with the intent to manage the impending respiratory arrest from the perioperative complication	
Correction of the 6 H's and 6 T's as per ATLS/ACLS principles	

10. At the conclusion of the second procedure, after successful resuscitation, the patient is transferred back to ICU. A few weeks later, she is declared to be in a persistent vegetative state (PVS). As Dr X is familiar with this patient's history, he is consulted by the intensivist for advice on the management of this patient in a PVS. Considering her **DNR order**, should Dr X recommend commencement of artificial nutrition?

Yes	
No	

11. Dr X and two senior independent clinicians have now assessed this patient to be in a PVS, and it is concluded that continued life-sustaining care for this patient is physiologically, qualitatively and quantitatively **futile**.

- (a) Considering her **DNR order**, and in view of the PVS, after consultation with the surrogate decision-maker, should Dr X recommend withholding or withdrawing life-sustaining medical treatment to prevent the prolongation of the dying process by allowing the irreversible chronic underlying medical condition to take its natural course?

Yes	
No	

- (b) If the surrogate decision-maker nominated in writing by this patient in a PVS refuses to consent to Dr X's recommendation of withdrawing and withholding life-sustaining medical therapy. Should Dr X recommend continuing to withdraw and/or withhold life-sustaining medical therapy despite the lack of informed consent from the surrogate decision-maker?

Yes	
No	

12. Are DNR orders lawful when:

	Yes	No
(a) A patient makes an informed decision to refuse CPR?		
(b) A now mentally incompetent patient has an advance directive stating the DNR order?		
(c) The patient's surrogate decision-maker makes an informed decision to refuse CPR?		
(d) The clinical judgement of a medical practitioner concludes that CPR is futile?		
(e) After discussions with the patient and/or their surrogate decision-maker, it is agreed that the burden and risk of CPR outweigh the benefit?		

13. Regarding euthanasia:

	Yes	No
(a) Are DNR orders ethically and legally considered to be a form of euthanasia?		
(b) Is passive euthanasia legal in South Africa?		
(c) Is active euthanasia legal in South Africa?		
(d) Legally is there a difference between passive and active euthanasia?		

14. Knowledge pertaining to the following:

	None	Poor	Average	Good	Excellent
(a) Constitution of the Republic of South Africa Act No. 108 of 1996 section 27					
(b) National Patients' Rights Charter					
(c) National Health Act of South Africa No. 61 of 2003					
(d) Health Professions Council of South Africa, Guidelines for the Withholding and Withdrawing of Treatment, Booklet 7					
(e) South African Medical Association Guidelines on Living Wills and Advance Directives					
(f) World Medical Association Declaration of Venice on Terminal Illness					

Thank you for taking your time to complete this questionnaire

Appendix D: Initial email information letter

Dear colleague

Hello, my name is Tebogo Benedict Monchwe. I am a registrar in the Department of Anaesthesiology at Wits. I would like to invite you to participate in my research study titled "Knowledge of anaesthetists in a department of anaesthesiology regarding "do not resuscitate" orders during the perioperative period". This research report will be submitted to the Faculty of Health Sciences to fulfil the requirements for my M Med degree.

Anaesthetists may be confronted by patients with do not resuscitate (DNR) orders presenting for surgery. Management of these patients can be morally, ethically and legally challenging. This study aims to assess the knowledge of anaesthetists regarding DNR orders during the perioperative period.

Participation in the study is voluntary and there is no penalty for refusal to do so. By clicking on the link and proceeding to answering the questionnaire and clicking the "Submit" tab consent is implied. Information will be kept anonymous and confidential as none of your personal details will be required. My supervisors and I are the only people who will have access to the raw data. Completion of the questionnaire should take approximately 15 minutes. Questionnaires where only the demographics section has been completed will be excluded from the study.

If you agree to participate in this research study please click on the Google Form link at _____ and follow the research instructions.

The Human Research Ethics Committee (HREC) (M200321) and the Wits Graduate Studies Committee have approved the study. Should you have any questions, please contact me on 073 686 6662 or the Chairperson of the Human Research Ethics Committee, Prof Clement Penny, on 011 717 2301 or on the email Clement.penny@wits.ac.za. The Committee secretariat, Ms. Z Ndlovu or Mr R Mkansi can be contacted at 011 717 2700 and 011 717 1234 respectively or on the emails Zanele.Ndlovu@wits.ac.za and Rhulani.mkansi@wits.ac.za.

Thank you for taking the time to read this letter.

Yours Sincerely

Tebogo Benedict Monchwe

Appendix E: Permission from Author

RE: Permission to use article discussion framework to develop survey questionnaire

2 weeks ago at 23:27

From [David Mcquoid-Mason](#) >

[More](#)

Hi Tebogo

You may certainly use it – just refer to it somewhere in a footnote.

Kind regards

Prof Mason

From: Tebogo Monchwe <t.b.monchwe@icloud.com>

Sent: Tuesday, 11 February 2020 23:47

To: David Mcquoid-Mason <MCQUOIDM@ukzn.ac.za>

Subject: Permission to use article discussion framework to develop survey questionnaire

Good day Prof. McQuoid-Mason

I am a registrar in the Department of Anaesthesiology at the University of Witswatersrand.

I read and took an interest in your article in the South African Medical Journal titled: "Emergency medical treatment and 'do not resuscitate' orders: When can they be used?"

I would like to kindly request permission to use the above mentioned article in developing a questionnaire for my Masters in Medicine thesis. I plan on looking at the anaesthetists knowledge of living wills (advanced directives) in the preoperative period.

I hope this mail finds you well.

Kindest Regards

Dr T.B. Monchwe

Appendix F: Reminder email information letter

Dear colleague

Hello, my name is Tebogo Benedict Monchwe. I am a registrar in the Department of Anaesthesiology at Wits. If you have already participated in this research study by completing the questionnaire I would like to thank you.

If you have not yet participated in this research study, I would like to invite you to participate. My research study is titled "Knowledge of anaesthetists in a department of anaesthesiology regarding "do not resuscitate" orders during the perioperative period". This research report will be submitted to the Faculty of Health Sciences to fulfil the requirements for my M Med degree.

Anaesthetists may be confronted by patients with do not resuscitate (DNR) orders presenting for surgery. Management of these patients can be morally, ethically and legally challenging. This study aims to assess the knowledge of anaesthetists regarding DNR orders during the perioperative period.

Participation in the study is voluntary and there is no penalty for refusal to do so. By clicking on the link and proceeding to answering the questionnaire and clicking the "Submit" tab consent is implied. Information will be kept anonymous and confidential as none of your personal details will be required. My supervisors and I are the only people who will have access to the raw data. Completion of the questionnaire should take approximately 15 minutes. Questionnaires where only the demographics section has been completed will be excluded from the study.

If you agree to participate in this research study please click on the Google Form link at _____ and follow the research instructions.

The Human Research Ethics Committee (HREC) (M200321) and the Wits Graduate Studies Committee have approved the study. Should you have any questions, please contact me on 073 686 6662 or the Chairperson of the Human Research Ethics Committee, Prof Clement Penny, on 011 717 2301 or on the email Clement.penny@wits.ac.za. The Committee secretariat, Ms. Z Ndlovu or Mr R Mkansi can be contacted at 011 717 2700 and 011 717 1234 respectively or on the emails Zanele.Ndlovu@wits.ac.za and Rhulani.mkansi@wits.ac.za.

Thank you for taking the time to read this letter.

Yours Sincerely

Tebogo Benedict Monchwe

Section 5: Annexures

5.1 Ethics approval



R14/49 Dr TB Monchwe

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL) CLEARANCE CERTIFICATE NO. M200321

NAME: Dr TB Monchwe
(Principal Investigator)

DEPARTMENT: School of Clinical Medicine
Department of Anaesthesiology
Medical School
University

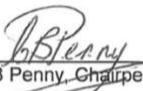
PROJECT TITLE: Knowledge of anaesthetists in a department of
anaesthesiology regarding "do not resuscitate" orders
during the perioperative period

DATE CONSIDERED: 2020/03/27

DECISION: Approved unconditionally

CONDITIONS:

SUPERVISOR: Dr B Bayingana; Prof J Scribante; Ms H Perrie

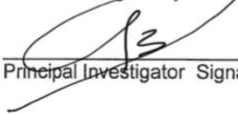
APPROVED BY: 
Dr CB Penny, Chairperson, HREC (Medical)

DATE OF APPROVAL: 2020/10/15

This clearance certificate is valid for 5 years from the date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and ONE COPY returned to the Research Office Secretary on the 3rd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.
I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to submit details to the Committee. I agree to submit a yearly progress report. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in March and will therefore reports and re-certification will be due early in the month of March each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).


Principal Investigator Signature

20/10/2020
Date

5.2 Graduate studies approval



Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172076

Reference: Mrs Sandra Benn
E-mail: sandra.benn@wits.ac.za

06 January 2021
Person No: 0704407M
PAG

Dr TB Monchwe
P O Box 4261
2735
South Africa

Dear Dr Tebogo Monchwe

Master of Medicine in Anaesthesia: Approval of Title

We have pleasure in advising that your proposal entitled *Knowledge of anaesthetists in a department of anaesthesiology regarding "do not resuscitate" orders during the perioperative period.* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

A handwritten signature in black ink, appearing to read 'S. Benn'.

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences



5.3 Turnitin report



12 July 2021

The Chairperson
Graduate Studies Committee
Faculty of Health Sciences
University of the Witwatersrand

Dear Professor Papathanasopoulos

Re: M Med: **Knowledge of anaesthetists in a department of anaesthesiology regarding "do not resuscitate" orders during the perioperative period**

Dr Tebogo Monchwe, student number: 0704407M, has submitted his research report to Turnitin which revealed a similarity index of 14%. These similarities appear not to be plagiarism but mainly the use of common terminology and phrases specific to the topic of the research.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'J. Scribante', is written over a light blue horizontal line.

Juan Scribante
Supervisor

ORIGINALITY REPORT

14%

SIMILARITY INDEX

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samj.org.za

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Submitted to University of Witwatersrand

Student Paper

2%

3

Judith O. Margolis. "Do Not Resuscitate (DNR) Orders During Surgery", Anesthesia & Analgesia, 04/1995

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Byrne, Susan M., Svetlana Mulcahy, Myra Torres, and Anita Catlin. "Reconsidering Do-Not-Resuscitate Orders in the Perioperative Setting", Journal of PeriAnesthesia Nursing, 2014.

Publication

1%