





Attitudes and self-efficacy towards infection prevention and control and antibiotic stewardship among nurses: A mixed-methods study

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Abstract

Aims: To gain a comprehensive understanding of nurses' infection control practices, antibiotics stewardship attitudes and self-efficacy when caring for patients with multidrug-resistant bacterial infections in a hospital setting.

Background: Multidrug-resistant bacteria cause a substantial health burden by complicating infections and prolonging hospital stays. Attitudes and self-efficacy can inform professional behaviour. Nurses' attitudes and self-efficacy concerning multidrug-resistant bacteria, infection prevention and control and antibiotic stewardship are vital in keeping patients safe.

Design: A descriptive and convergent mixed-methods design involving quantitative and qualitative approaches was used.

Methods: Two hundred and seventeen nurses working in clinical practice at seven different hospital wards (i.e., general medicine, surgical, haematological and oncology) at a Norwegian university hospital were invited to participate. Data were collected in February and March 2020 via two questionnaires: the Multidrug-Resistant Bacteria Attitude Questionnaire and the General Perceived Self-Efficacy Scale ($n = 131$) and four focus group interviews ($n = 22$). The data were analysed using descriptive statistics and systematic text condensation.

Results: Most nurses showed moderate knowledge, adequate behavioural intentions towards infection prevention and antibiotic stewardship, and high self-efficacy. However, they reported negative emotions towards their knowledge level and negative emotions towards nursing care. The nurses appeared uncertain about their professional influence and role in antibiotic stewardship practices. Organisational and relational challenges and ambivalent perceptions of nurses' role were potential explanations.

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Conclusion: Nurses report moderate attitudes and high self-efficacy when caring for patients with multidrug-resistant bacterial infections. This study suggests that nurses experience organisational and relational factors in their work environment that challenge their attitudes towards infection prevention and control and antibiotic stewardship practices. Measures that strengthen their knowledge and emotional response underpin correct infection prevention and control behaviour. A role clarification is needed for antibiotic stewardship.

No Patient or Public Contribution.

Relevance to clinical practice: Measures to increase attitudes towards infection prevention and control, antibiotic stewardship and multidrug resistance is recommended. Measures should be taken to overcome organisational challenges. A clarification of the nurses' role in antibiotic stewardship is needed.

KEYWORDS

antibiotic stewardship, attitudes, infection control, infectious diseases nursing, Infection prevention and control, medication management, mixed methods, multidrug resistant bacteria, self-efficacy

1 | INTRODUCTION

Multidrug-resistant bacteria (MDRB) are resistant to two or more antimicrobial agent classes and are found in all regions globally (Wiley & Villamizar, 2018). However, MDRB prevalence is stable and even declining in countries with strict antibiotic prescriptive policies, such as those in Scandinavia (Wiley & Villamizar, 2018). MDRB cause substantial health burdens worldwide by complicating infections, prolonging hospital stays and increasing morbidity, mortality and healthcare costs (Murray et al., 2022). The most prominent MDRB are methicillin-resistant *Staphylococcus aureus* (MRSA), extended-spectrum beta-lactamase (ESBL)-producing bacteria including carbapenemase-producing bacteria and vancomycin-resistant enterococci (VRE).

Nurses in hospital settings may prevent MDRB development and spread through two main strategies (Gotterson et al., 2021). The first is infection prevention and control (IPC), the foundation for preventing infections and a cornerstone for combating MDRB spread (Murray et al., 2022). IPC is a practical approach to prevent patients and healthcare workers from being harmed by avoidable infections (World Health Organization, 2019). In addition, preventing infections reduces the need for antibiotics, a well-known driver for resistance development (Murray et al., 2022). Nurses must ensure that IPC measures are implemented (WHO, 2020). Research has consistently shown that IPC knowledge and compliance are inadequate among healthcare personnel, including nurses, despite potentially exposing themselves, their colleagues and their patients to possibly life-threatening bacteria (Cox & Simpson, 2016; Nasiri et al., 2019).

Antibiotic stewardship (AS) is the second important strategy to prevent MDRB spread relevant to nurses (Murray et al., 2022). AS refers to a collection of coordinated, interprofessional, focussed strategies to optimise antibiotic use by ensuring that every patient receives

What does this paper contribute to the wider global community?

- Multidrug-resistant bacteria cause a substantial health burden by complicating infections and prolonging hospital stays. Nurses are pivotal in infection prevention control (IPC) and antibiotic stewardship (AS) initiatives.
- This mixed-methods study reports on nurses' attitudes and self-efficacy towards IPC and AS, thereby broadening reflections and clinical explanations of these topics from nurses in clinical practice. This study indicates moderately positive attitudes and high self-efficacy towards IPC and AS among nurses caring for patients with multidrug-resistant bacteria.
- Measures should be taken to strengthen the challenging situations brought forth in this study, both the lack of knowledge and clinical challenges related to IPC and AS practices.

antibiotics only when clinically indicated and that they receive an antibiotic appropriate for their infection at the right dose, duration and administration route. The goal is to achieve the best clinical outcomes related to antibiotic use while minimising toxicity, other adverse events and the emergence of MDRB (Manning et al., 2016). When synthesising the contemporary evidence based on nurses' roles and responsibilities in the 21st-century health system, World Health Organization (2020) highlights the importance of nurses in AS initiatives. For example, monitoring patients for clinical deterioration and detecting medical errors and near misses. However, research shows a gap between AS and nursing practices (van Huizen et al., 2021).

2 | BACKGROUND

Attitudes are often defined as responding to a stimulus or an object (Breckler, 1984). Three attitude components are usually identified: affect, behaviour and cognition (Breckler, 1984). Affect refers to an emotional response towards the object; behaviour includes apparent actions, intentions or prior behaviour; and cognition refers to knowledge structures, information, thoughts and evaluations (Breckler, 1984). Attitudes can inform how people interact with the world around them (Ajzen & Fishbein, 2005). Therefore, understanding nurses' attitudes may be crucial in promoting desirable IPC and AS practices.

Self-efficacy (SE) refers to belief in one's capabilities to organise and execute action courses needed to produce a given outcome, that is what people believe they can do (Bandura, 1977). It is believed to be one of the most influential variables related to behavioural change (Stanley & Pollard, 2013). SE theory can represent a useful framework when studying nurses' IPC and AS practices since there is strong evidence indicating efficacy beliefs are predictive of professional behaviour (Bohman et al., 2014).

Nurses' attitudes and SE concerning MDRB and IPC are thus vital to keeping patients safe. An example of this is a study assessing intensive care nurses' compliance with hand hygiene found that nurses with negative attitudes towards time-related barriers appeared to be less compliant (De et al., 2010). The same study found that low SE was independently associated with noncompliance (De et al., 2010). These findings support the assumption that attitude and SE influence IPC behaviour.

de Oliveira Dourado et al. (2017) suggested that healthcare personnel with adequate knowledge about hand hygiene practices fail to implement that knowledge (de Oliveira Dourado et al., 2017). Nasiri et al. (2019) found that nurses generally had a positive attitude towards IPC but highlighted the need for more descriptive studies providing a broader understanding of everyday obstacles nurses face to identify possible causes for incompliance (Nasiri et al., 2019). Nurses' attitudes and SE towards IPC and AS are crucial in understanding their actual behaviour when caring for patients with MDRB. To our knowledge, no studies have described nurses' attitudes and SE in a hospital context.

3 | THE STUDY

3.1 | Aims and objectives

This study's overriding aim was to gain a more comprehensive understanding of nurses' IPC and AS attitudes and SE when caring for patients with MDRB in a hospital setting.

Descriptive question: What attitudes and SE do nurses in clinical practice at a Norwegian university hospital report towards IPC and AS when caring for patients with MDRB, and what do they describe as factors affecting their attitudes and SE?

Mixed-methods question: How do the results confirm, discord and expand understanding of nurses' IPC and AS attitudes and SE when caring for patients with MDRB in a hospital setting?

Our research questions convey both quantitative and qualitative aspects and seek to provide a more complete understanding of the study questions.

4 | METHODS

4.1 | Design

A descriptive and convergent mixed-methods (MM) design involving quantitative and qualitative methods was used to map nurses' attitudes and SE in clinical practice (Creswell & Clark, 2017). The MM design included independent collection and analysis of quantitative and qualitative data, hereafter referred to as the quantitative and qualitative strands. Quantitative data collection comprised a cross-sectional survey, followed by qualitative data collection using focus group interviews. The data from both strands were merged to compare and contrast the results (Creswell & Clark, 2017) and were given equal interpretation weight (see Figure 1). The GRAMMS checklist is provided as a Supporting Information.

4.2 | Context and study settings

The study was conducted between February and March 2020 at a university hospital in Southwestern Norway across seven different wards, including five surgical, one haematology and one oncology ward. The university hospital has a primary catchment population of approximately 380,000 individuals and is a workplace for approximately 2500 nurses. The hospital has an IPC department and an IPC programme (i.e. a description of IPC measures and surveillance).

4.2.1 | Antimicrobial resistance and AS settings

Norway is a country with a low antimicrobial resistance prevalence. The European Centre for Disease Prevention and Control (ECDC) indicates that the proportion of resistant isolates found in Norway is consistently below The European Union (EU) and The European Economic Area (EEA) average and is often among the lowest (ECDC, 2019). In addition, the average antibacterial consumption for systemic use in Norway is lower than the EU/EEA average (ECDC, 2019).

The participating hospital has a dedicated team working with AS per the national action plan against antimicrobial resistance (Ministry of Health and Care Services, 2015). The team comprises nurses, pharmacists, medical doctors and high-ranking hospital leaders. The participating hospital's selected antimicrobial consumption decreased by approximately 20% between 2012 and 2019. Twenty-nine

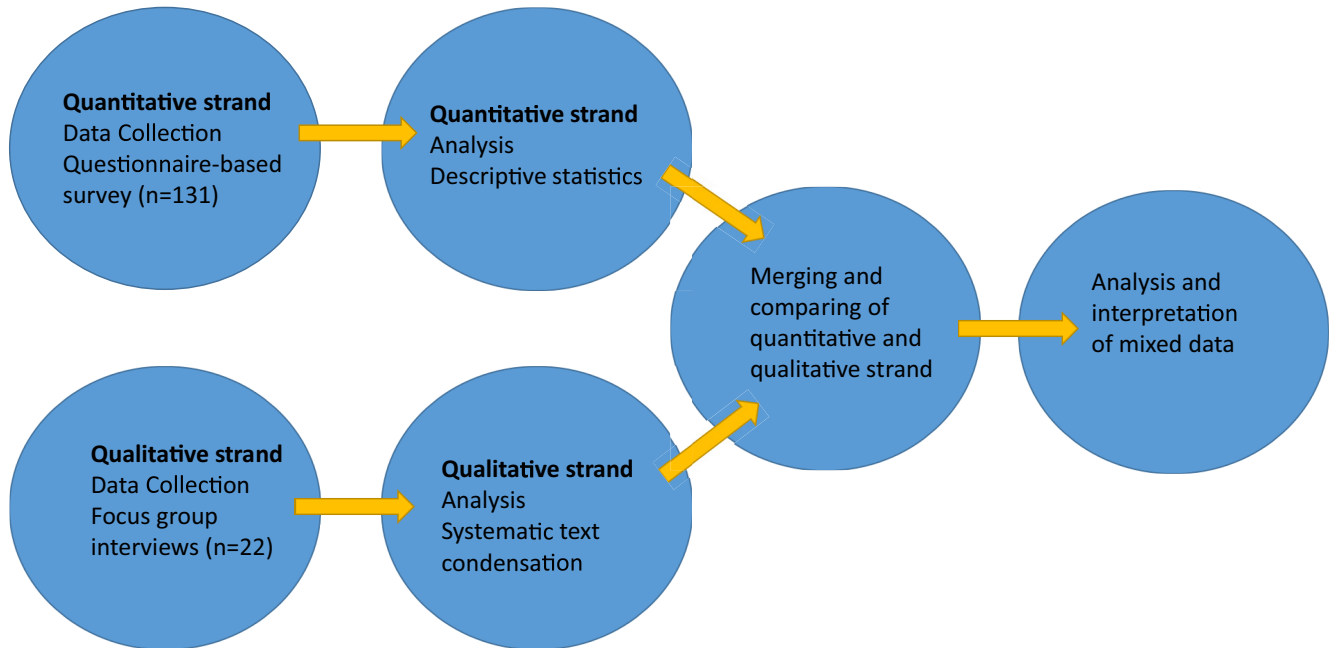


FIGURE 1 Convergent design (adapted from Creswell & Clark, 2017). [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/jocn.16657)]

BOX 1 Inclusion and exclusion criteria, quantitative and qualitative strand.

Inclusion criteria	Exclusion criteria
Registered nurses	Personnel in clinical practice without a bachelor's degree in nursing, including nursing students
Clinical, patient-related practice	Nurses in administrative positions, including department leaders and assistant leaders
Surgical and haematology-oncology wards	Nurses who work <20% in clinical practice
	Nurses performing outpatient work
	Nurses absent during the data collection period due to sick, annual, or parental leave

patients were admitted with either MRSA, ESBL-producing bacteria or VRE infections and hospitalised in the participating wards between January and March 2020, staying 332 days in total.

4.2.2 | Pandemic setting

During MM data collection (5 February to 5 March 2020), no coronavirus disease 2019 (COVID-19) cases were admitted to the participating hospital. The first suspected COVID-19-infected patient was admitted on 9 March 2020.

4.3 | Sampling and recruitment

Eligibility criteria (Box 1) were distributed to the nursing leaders of the participating wards. After receiving an oral presentation about the study, 217 eligible nurses clinically practising in these wards were invited to participate in the online cross-sectional study (i.e. the quantitative strand) by email. As Creswell and Clark (2017)

recommended, the two strands' participants came from the same population.

The focus group sample was drawn from the participating wards using purposeful sampling (Etikan, 2016). Following the same eligibility criteria as the cross-sectional study, the nursing leaders performed the sampling based on the nurses' availability according to their work schedule and the ward workload. The qualitative sample size was based on Malterud (2012).

4.4 | Data collection—Quantitative strand

Demographics were collected using a questionnaire developed for this study, including age, sex, education, employment and knowledge and experience of patients with MDRB (Table 1). The same questionnaire was used in the qualitative and quantitative strands.

Data were collected using Corproater Surveyor, an online data collection tool administered by the hospital's Information and Technology Department following the European General Data Protection Regulation and approved for use at the hospital. The

TABLE 1 Demographic characteristics of nurses participating in the quantitative ($n = 131$) and qualitative strands' ($n = 22$) cross-sectional survey.

Characteristics	Quantitative strand n (%)	Qualitative strand n (%)
Age ($n = 130$)		
<30	61 (47)	13 (59)
31–45	40 (31)	8 (36)
>45	29 (22)	1 (5)
Sex		
Male	6 (5)	2 (9)
Female	125 (95)	20 (91)
Years of experience in current ward		
0–4	61 (47)	9 (41)
5–14	48 (37)	12 (54)
>14	22 (17)	1 (5)
MRSA experience and knowledge		
Have experience	117 (90) ^{$n = 130$}	20 (91)
Attended lectures on MRSA	32 (24)	7 (32)
Know local procedures	121 (92)	20 (91)
Know national procedures	47 (36)	6 (27)
ESBL experience and knowledge		
Have experience	131 (100)	22 (100)
Attended lectures on ESBL	37 (29) ^{$n = 130$}	10 (46)
Know local procedures	123 (94)	20 (91)
Know national procedures	43 (33)	3 (15)
VRE experience and knowledge		
Have experience	118 (91) ^{$n = 130$}	2 (9)
Attended lectures on VRE	29 (22) ^{$n = 130$}	7 (32)
Know local procedures	119 (91)	19 (86)
Know national procedures	43 (33)	3 (15)
Have cared for patient with MDRB	120 (92) ^{$n = 129$}	21 (96)
Familiar with AS programme	54 (41)	4 (18)
Participated in the survey		19 (86)
Missing		1 (5)

Corporater Surveyor interacts with the hospital's email system, and the questionnaires were sent to the invited participants' employee email addresses. The participants had to answer the survey while logged on to a hospital computer. A reminder was sent by email to eligible participants to optimise the response rate.

4.4.1 | Instruments

The MDRB Attitude Questionnaire

'The MDRB Attitude Questionnaire' (MDRBAQ; Lindberg et al., 2012) is based on the three-component attitude model (i.e. knowledge, behaviour and emotional response; Breckler, 1984). The questionnaire explores nurses' attitudes when caring for patients

with MDRB infections. The Norwegian version has been used in two previous studies (Hansen, 2018; Lunde & Moen, 2014).

The current questionnaire comprises 71 items to map the components: 25 questions on knowledge, 32 statements mapping intended behaviour and 14 emotional response pairs mapping emotional responses. The questionnaires' knowledge and behaviour components were updated according to current IPC and AS guidelines for the current study. A case was added to the behavioural component to gain a greater clinical connection (Box 2).

At the time of study design, no existing validated instruments were used to measure nurses' attitudes towards AS. Therefore, the authors added four questions mapping knowledge, ten questions mapping intended behaviour and an AS component to the clinical case in close collaboration with experts in the field. Six assisting nurse leaders at the invited wards reviewed the questionnaire for face validity, and it was revised based on their feedback.

The knowledge component comprised yes/no and multiple-choice questions on relevant topics related to nurses caring for patients with MDRB. In this component, 'I don't know' and unanswered questions were considered incorrect. The behavioural component comprised a clinical case (Box 2). The participants were asked to indicate their agreement with behavioural statements using a six-item Likert scale from totally agree to totally disagree, with an 'I don't know' alternative. Totally agreeing or agreeing with the current infection prevention guidelines was deemed as correct behaviour and given a point. Disagreeing or not knowing was deemed incorrect behaviour and not given points.

A scale containing 14 items, using a seven-item Likert scale, was used to measure emotional responses. Higher scores indicated more positive emotions. The scale can, according to Lindberg, be divided into three subscales, competence, professional approach and mood (Table 4). This study made no changes to the emotional response scale. Cronbach's alpha coefficient for the emotional response scale used in this study was .878, consistent with an earlier study (Table 4; Lindberg et al., 2011).

4.4.2 | General perceived self-efficacy scale

The 10-item Norwegian version of the 'General Perceived SE Scale' (Røysamb et al., 1998) was used to assess the nurses' optimistic self-beliefs in handling various difficult demands in nursing care. This scale contains 10 statements measuring SE belief using a Likert scale scored from one to four, where four indicates the greatest SE belief. Cronbach's alpha coefficient for the 'General Perceived SE Scale' used in this study was .864. In this survey, the participating nurses answered the 10 statements based on the same clinical case used in the previous questionnaire (Table 5 and Figure 4).

4.5 | Data collection qualitative strand

Qualitative data collection used four semistructured focus group interviews guided by a question route informed by the MDRBAQ

BOX 2 The survey's case study.

Kari, a 73-year-old woman, is admitted with a right-sided femoral neck fracture and needs surgery. She has urinary incontinence and high blood pressure. She receives spinal anaesthesia, and a urinary catheter is inserted preoperatively. The catheter is removed in the postoperative ward before she is returned to the ward where you work. Kari uses a walker and needs staff support to be able to walk to and from the toilet after surgery.

- *Imagine being Kari's nurse when you answer the questions on standard precautions (seven statements)*

Kari's catheter is removed the next day. Two days after surgery, Kari says it hurts when she urinates, and she urinates more frequently and in smaller amounts than usual. She has also developed a fever. You take a urine sample.

- *Imagine being Kari's nurse when you answer the questions concerning microbiological testing (three statements)*

The microbiologist calls a few days later with the test results. It turns out that ESBL-producing *E. coli* have been found in Kari's urine. She is isolated on contact precautions.

- *Imagine being Kari's nurse when you answer the questions on isolation measures (seven statements)*

Kari needs help with her evening care.

- *Imagine being Kari's nurse when you answer questions on standard precautions in an isolation room (eight statements)*

As Kari's nurse, you participate in the ward round with the physician.

- *Imagine being Kari's nurse when you answer the questions on antibiotic stewardship (seven statements)*

(Lindberg et al., 2012). Questions on challenges and solutions concerning practical IPC and AS were added to improve depth and better understand nurses' infection prevention work and engagement in AS. The interviews lasted 60–90 min and were moderated by the first author, with co-authors as observers.

4.6 | Data analysis

The quantitative and qualitative data were analysed independently (Creswell & Clark, 2017).

4.6.1 | Quantitative strand: Statistical data analysis

Quantitative data from the cross-sectional survey were analysed using SPSS Statistics for Windows software version 25.0 (IBM Corp, 2017). Categorical variables were summarised using counts and percentages (%), and for ordinal variables, we also report means and standard deviations (SDs).

4.6.2 | Qualitative strand: Systematic text condensation

Analysis of qualitative data obtained through interviews was performed according to systematic text condensation principles (Malterud, 2012). The first author conducted transcription from audio file to paper. The transcripts were checked for accuracy by comparing them to the audio records and field notes. The analysis aimed at gathering new descriptions and a deeper understanding of the chosen phenomena. All authors involved in the analysis are female, three have a nursing background, and one is a medical doctor specialised in microbiology. The first author primarily analysed the data in close cooperation with the co-authors. The first author's preconceptions

due to broad nursing experience from the research field might have influenced the data collection and analysis (Malterud, 2012).

4.6.3 | Merging

The quantitative and qualitative results were merged to achieve a more complete understanding of the studied phenomena (Creswell & Clark, 2017). The merging followed the primary data analysis integration procedures described by Creswell and Clark (2017). A joint display figure (Figure 2) was created as part of this procedure.

4.7 | Ethical considerations

The project was conducted according to the National Research Ethical Committee's (2016) general ethical guidelines and the Declaration of Helsinki (National Research Ethical Committee, 2016). It was approved by the hospital's privacy commissioner (approval IDs 807 and 1515). An information letter and consent form were provided to all invited participants, containing a description of their rights, including voluntary participation and that their consent could be withdrawn at any time and without reason. All information about the participants was kept confidential, and the collected data were made nonidentifiable.

5 | RESULTS**5.1 | Respondents**

Two hundred and seventeen nurses were invited to participate in this cross-sectional study. The response rate was 62.3% ($n = 131$). Their mean nursing experience in their current ward was 7.6 years ($SD = 7.43$). Further details are provided in Table 1.

Twenty-eight nurses were invited to join the four focus group interviews, of which twenty-two (78.6%) agreed to participate. Their mean nursing experience was 5.6 years (median = 5.0). Interviews one (FG1) and two (FG2) were conducted with nurses from three gastrointestinal surgical wards ($n = 9$). Interviews three (FG3) and four (FG4) were conducted with nurses from one haematology, one oncology, one urological surgical and one thoracic surgical unit ($n = 13$). Further details are shown in Table 1.

5.2 | Quantitative strand

5.2.1 | Knowledge

The results from surveying the nurses' knowledge of three different MDRBs (i.e. MRSA, ESBL-producing bacteria and VRE), antibiotics and IPC measures are shown in Table 2. There was a general lack of knowledge concerning MRSA, ESBL-producing bacteria and VRE. However, knowledge of antibiotics was generally high. For example, 98% ($n = 128$) answered that antibiotics do not work on viral infections. However, 36% ($n = 47$) answered that penicillin was a broad-spectrum antibiotic. Most participating nurses knew the use of personal protective equipment (PPE) when caring for patients with MDRB.

5.2.2 | Behaviour

Nurses' self-reported behaviour is portrayed in Table 3. Nearly 99% ($n = 129$) of participating nurses reported they always performed

hand hygiene before entering a patient's room. In addition, 63% ($n = 83$) reported they always wear gloves when helping a patient groom themselves, while 66% ($n = 87$) posited they only used gloves when indicated. Moreover, 75% ($n = 87$) stated they used a gown when helping a patient to wash.

Most nurses ($n = 122$; 93%) reported they administered a microbiological urine test when the patient developed symptoms. In addition, 121 (92%) answered they attempted to administer the test before administering antibiotics. Most nurses (97%) stated they know why their patient receives antibiotics. In addition, 120 (92%) reported they know what to observe when a patient receives antibiotics. Few nurses reported they followed national antibiotic guidelines (15%), asked the physician critical questions on antibiotic treatment (42%) or discussed oral versus intravenous treatment (24%).

5.2.3 | Emotional responses

The emotional response scores measured using the MDRBAQ are shown in Table 4. When presented with emotional response pairs on a Likert scale, the nurses scored their general emotions between 4.7 (lowest, most negative) and 6.1 (highest, most positive) out of 7. The emotional response pair with the lowest score was the feeling of being knowledgeable, while the highest scoring pair was their feeling of concentration. Due to missing data, 116 cases were considered valid for calculating the total emotional response score. Figure 3 shows the distribution of scores on each individual emotional response pair, where being careful and observant has a high score among many of the participating nurses.

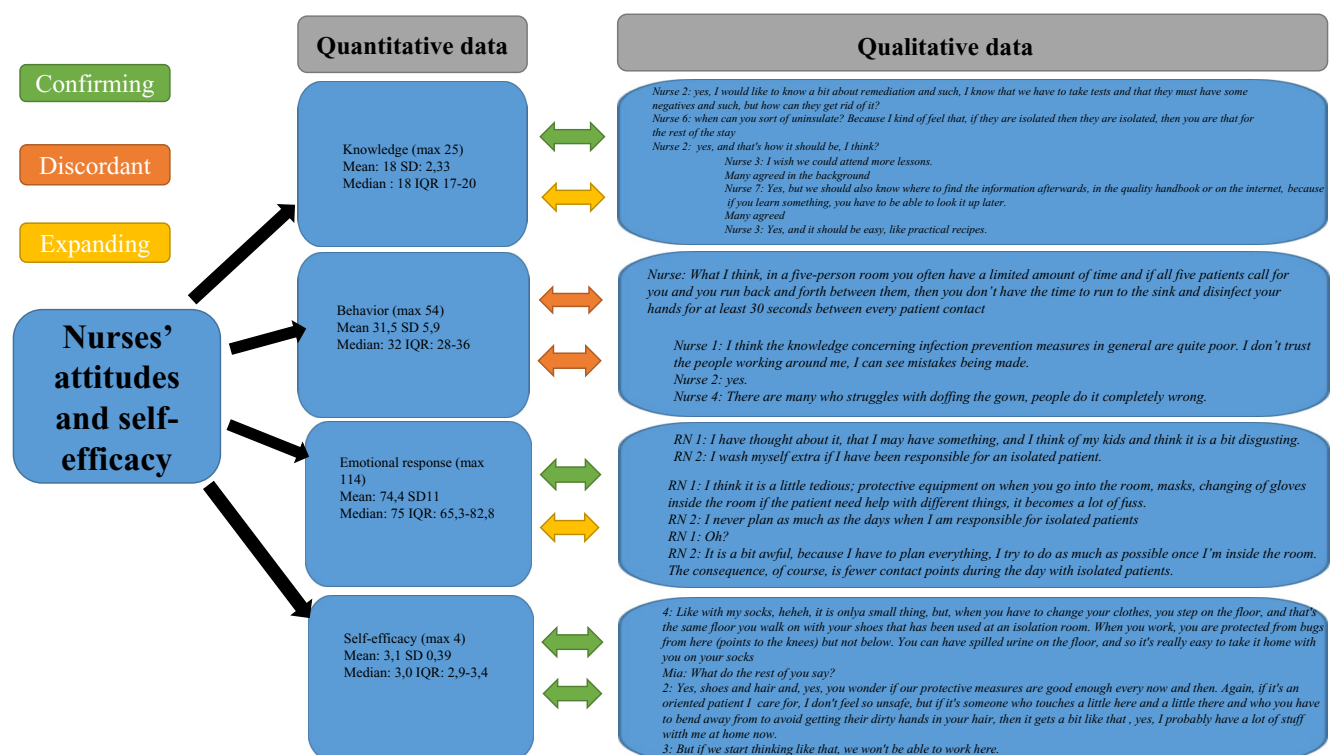


FIGURE 2 Joint display figure of qualitative and quantitative data. [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 2 Nurses' knowledge of MRSA, VRE, ESBL-producing bacteria and antibiotics based on the MDRBAQ, $n = 131$.

Knowledge	Correct response n (%)	Incorrect response n (%)
MRSA		
Transmission route	69 (53)	62 (47)
Colonisation is usually treated with systematic antibiotics	68 (52)	63 (48)
MRSA and meticillin-sensitive <i>Staphylococcus aureus</i> have the same symptoms	49 (37)	83 (63)
Risk factors	5 (4)	126 (96)
Colonisation—usual locations	0(0)	131 (100)
ESBL and VRE		
Transmission route	128 (98)	3 (2)
Infections are usually treated with antibiotics	93 (71)	38 (29)
Who should be screened	71 (54)	60 (46)
Sampling location when screening	0 (0)	131 (100)
Antibiotics		
Antibiotics have no effect on viral infections	128 (98)	3 (2)
Broad-spectrum antibiotics are drivers for antibiotic resistance	128 (98)	3 (2)
Piperacillin-tazobactam is a broad-spectrum antibiotic	113 (86)	18 (14)
Penicillin is a narrow-spectrum antibiotic	84 (64)	47 (36)
Infection prevention measure use		
Gloves when patient has MRSA	126 (96)	5 (4)
Gloves when patient has ESBL	119 (91)	12 (9)
Gloves when patient has VRE	120 (92)	11 (8)
Hand hygiene is effective in preventing the spread of MRSA	99 (76)	32 (24)
Hand hygiene is effective in preventing the spread of ESBL	113 (86)	18 (14)
Hand hygiene is effective in preventing the spread of VRE	111 (85)	20 (15)
Mask when patient has MRSA	119 (91)	12 (9)
Mask when patient has ESBL	122 (93)	9 (7)
Mask when patient has VRE	109 (83)	22 (17)
Gown when patient has MRSA	129 (99)	2 (2)
Gown when patient has ESBL	112 (86)	19 (15)
Gown when patient has VRE	123 (94)	8 (6)

5.2.4 | Self-efficacy

The nurses' mean score for the SE scale was 3.1 (max = 4). The statement with the highest score concerned the belief in solving problems when an effort was made (3.3). The statement with the lowest score concerned being opposed and believing they could find ways to get what they want (2.5). Further details are portrayed in Table 5. Figure 4 shows the distribution of scores on each statement comprising the scale.

5.3 | Qualitative strand

The qualitative data analysis resulted in the three main themes with respective subgroups: 'organisational challenges', 'relational challenges' and 'professional considerations'. The themes, subgroups and corresponding participants' quotes are shown in Table 6.

5.3.1 | Theme 1: Organisational challenges

In all the interviews, organisational challenges concerning IPC, particularly related to isolated patients, were an inexhaustible topic. The challenges mentioned in the interviews were organised into three subgroups: (1) lack of resources, (2) incoherent guidelines and (3) lack of educational opportunities.

Subtheme 1: Lack of resources

Lack of resources was a topic of interest in all interviews, highlighted as an explanation for why nurses and other healthcare professionals do not maintain 100% compliance with all infection prevention measures. Lack of time and available patient rooms were two main challenges mentioned and discussed in all interviews.

The nurses expressed that infection prevention was generally time-consuming. One nurse argued that most infection prevention measures were invisible, which made it easier to take shortcuts.

TABLE 3 Nurses' self-reported infection prevention behaviour, n = 131.

Behaviour	Totally agree/agree n (%)
Standard precautions	
I perform hand hygiene when entering a patient room	129 (98)
I always wear gloves in patient contact	83 (63)
I wear gloves only when indicated	87 (67) ^{n = 130}
I change gloves between tasks	125 (96) ^{n = 130}
I perform hand hygiene after doffing gloves	128 (98)
I wear a gown when helping a patient having a wash	97 (74)
I inform the patient about hand hygiene	117 (89)
Microbiological samples	
I take bacteriological sample is taken when symptoms of infection occur	122 (93)
I try to take samples before administering antibiotics	121 (93) ^{n = 130}
I write clinical information on requisition	121 (92)
Contact precautions	
I give oral information about isolation regime to patient	129 (98)
I give written information about isolation regime to patient	60 (46)
I give information about infection prevention measures the patients can take themselves	101 (77)
I perform hand hygiene before entering the isolation room	127 (97)
I facilitate hand hygiene for the patient	120 (92)
I change gloves inside an isolation room	117 (89)
I change gown when dirty	126 (96)
Antibiotic stewardship	
I know why patient gets antibiotics	130 (100) ^{n = 130}
I know what to observe when a patient has an infection	120 (92)
I read microbiology results	108 (83) ^{n = 130}
I use national guidelines for rational use of antibiotics	20 (15)
I ask the physicians questions about antibiotic prescribing	55 (42)
I ask if the patient can switch to oral treatment after 72 h	31 (24)
Patients here are involved in their treatment	19 (15)

This perspective was affirmed by other nurses admitting to taking shortcuts. Among the measures that got downgraded on a busy day were disinfecting contact points, cleaning rooms and disinfecting equipment between patients. Some argued that the solution to cutting corners was high disinfection product availability and hand hygiene reminders. One nurse said that after they put disinfection gel on the venous catheter trolley, she multiplied her hand hygiene performances.

Nurses described having an isolated patient in the wards as especially time-consuming. Many mention the donning and doffing (taking on and off) of PPE as a time-consuming task associated with isolation rooms and caring for patients with MDRB. According to the nurses, the rooms used for isolating contagious patients were not optimal. They described how the rooms lacked anterooms, a decontaminator and dedicated bathrooms, which made them poorly suited for isolation. This issue leads nurses to deviate from IPC guidelines.

Another problem expressed in the interviews was the general lack of single rooms where patients can be isolated. In some wards, the isolated patients had to use bathrooms outside the isolation room. This issue, the nurses suggest, broke the barrier the isolation room is supposed to provide, making the isolation seem pointless to them.

Subtheme 2: Inconsistent and unavailable guidelines

Infection prevention control guidelines became a topic of interest in all the interviews, especially guidelines concerning isolated patients. One guideline frequently mentioned regarded caring for patients with MDRB. Patients carrying ESBL-producing bacteria were a hot topic among the focus group participants because the guidelines were, to them, inconsistent and illogical. In their experience, some patients carrying ESBL-producing bacteria were isolated, others not. According to the nurses, the cut-off between these two categories was difficult to understand.

TABLE 4 Emotional response total score, subscales and individual pairs with mean scores.

Emotional response pair	n	Mean (SD)	Cronbach's alpha
Emotional response total	116	5.3 (.7)	.878
Competence (1, 2, 3, 4, 11)	126	5.3 (1.0)	.851
1. Uncertainty–certainty	130	5.2 (1.3)	
2. Worried–not worried	129	5.3 (1.4)	
3. Unknowledgeable–knowledgeable	130	4.7 (1.3)	
4. Afraid–unafraid	129	5.8 (1.3)	
11. Anxious–unaffected	128	5.5 (1.3)	
Professional approach (5, 6, 7, 8, 10, 12)	121	5.5 (.9)	.796
5. Uninterested–interested	128	5.1 (1.3)	
6. Unenthusiastic–enthusiastic	130	4.9 (1.3)	
7. Not reflected–reflected	130	5.1 (1.2)	
8. Carefree–careful	127	5.9 (1.2)	
10. Annoyed–not annoyed	128	5.9 (1.2)	
12. Not concentrated–concentrated (observant)	127	6.1 (1.0)	
Mood (9,13,14)	127	4.9 (1.1)	.817
9. Negative–positive	128	5.0 (1.4)	
13. Sad–happy	129	4.8 (1.2)	
14. Frustrated–pleased	129	4.8 (1.2)	

Note: Range 1–7, 7 being the most positive.

One challenge also mentioned in all the interviews was guidelines availability. They were, according to the nurses, difficult to obtain. A collection of procedures is provided on the hospital's intranet, which was described as inaccessible in a busy clinical setting. Many nurses expressed not knowing all the procedures and how they needed to look up guidelines during their everyday work.

The nurses had many suggestions on how to solve the guidelines' problems. They wished for short, simple and practical guidelines available where they work. Some suggested a pocket card or a poster with practical routines for caring for patients with MDRB described using simple wording and language. One nurse said that she had learned a lot from reading the information meant for the patients, and the group emphasised a straightforward approach to writing procedures.

Finally, the nurses expressed concern regarding conflicting interests between IPC guidelines and organisational issues, such as cost and lack of resources. They generally believed that the rules and guidelines in place to prevent infections were down-prioritised by hospital leaders when they conflicted with other hospital activities and economic considerations. One example was isolation room availability. Sometimes, when a patient needed to be isolated on contact precautions according to protocol, but no adequate rooms were available, they were deemed no longer in need of isolation, a decision made by a patient flow supervisor and not the clinical personnel.

Subtheme 3: Lack of educational opportunities

The nurses generally wished for more IPC, MDRB and AS knowledge. They argued that more knowledge might give them a better understanding of the guidelines they had to use daily. The general answer was 'no' when asked if they had participated in any IPC, MDRB and AS lessons. Some nurses working on the haematology ward said they had received many brief instructions on hygienic measures from their ward's infection prevention link nurse. In two interviews, the infection prevention link nurse was mentioned as an important contributor to the wards' general engagement in infection prevention and educational avenues on IPC and AS.

In all interviews, nurses argued the need for practical lessons on how to don and doff PPE and perform hand hygiene. Short movies, quizzes and light boxes were mentioned as good learning tools. Simple overviews describing common bacteria and antibiotics were other suggestions. It was important to the nurses that they understood the lessons' practical use.

5.3.2 | Theme 2: Relational challenges

The results showed that nurses' IPC and AS practices were influenced by their relationships with patients, the patient's relatives and their colleagues.

Subtheme 1: Patients and relatives challenging infection prevention measures

The feeling of having to continuously monitor patients' normal hygienic conduct, including hand hygiene, was frequently highlighted in the interviews. The nurses described an active effort to inform isolated patients. They were often made responsible for informing isolated patients about IPC measures, although it was acknowledged as the physician's responsibility. The patients' relatives also needed more information when visiting an isolated patient. The nurses described this situation as challenging since relatives seldom understood the importance of following the rules.

Subtheme 2: Collegial relationships challenging infection prevention and AS

Nurses being mainly responsible for implementing infection prevention measures in their wards was mentioned in all interviews. Other professionals, such as physicians, were explained as dependent on nurses' guidance. For example, nurses had to tell them what PPE to wear in an isolation room.

The relationship between nurses and physicians related to AS appeared unclear among the participants. First, the nurses expressed uncertainty about in which AS part they should be actively involved. Second, they felt they would encroach into the physicians' territory and were unsure whether the physicians would appreciate nurses being more involved in antibiotic use. However, some nurses felt they had to monitor the physicians' actions regarding patients' antibiotic treatment, making them involved, although not acknowledged as AS prosecutors.

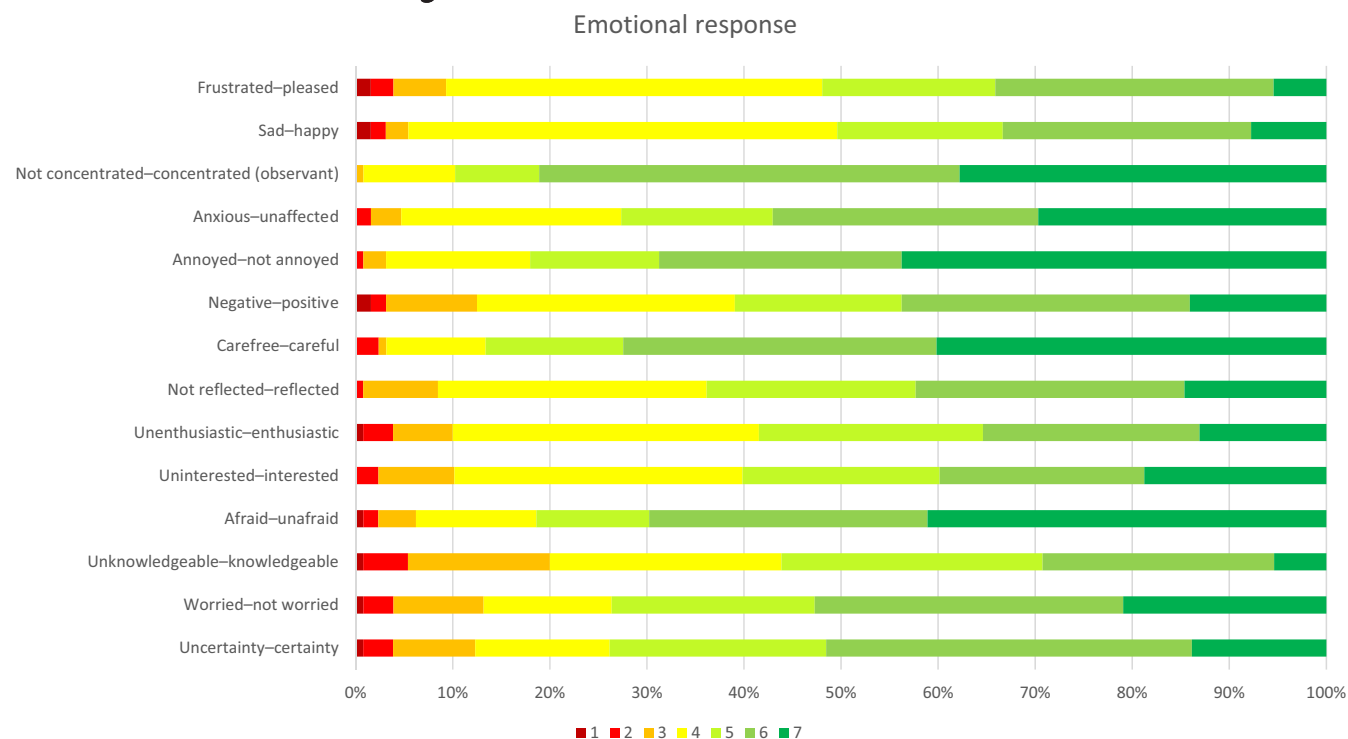


FIGURE 3 Bar chart showing the distribution of scores on each emotional response pair (1–7, 7 being the most positive). [Colour figure can be viewed at wileyonlinelibrary.com]

Statement	N	Mean score (SD)
I can always manage to solve difficult problems if I try hard enough	131	3.2 (.6)
If someone opposes me, I can find the means and ways to get what I want	131	2.5 (.8)
It is easy for me to stick to my aims and accomplish my goals	131	3.0 (.6)
I am confident that I could deal efficiently with unexpected events	131	3.2 (.6)
Thanks to my resourcefulness, I know how to handle unforeseen situations	131	3.2 (.5)
I can solve most problems if I invest the necessary effort	128	3.3 (.5)
I can remain calm when facing difficulties because I can rely on my coping abilities	131	3.3 (.5)
When I am confronted with a problem, I can usually find several solutions	131	3.2 (.6)
If I am in trouble, I can usually think of a solution	130	3.3 (.5)
I can usually handle whatever comes my way	131	3.2 (.6)

TABLE 5 Self-efficacy statements with mean scores (range 1–4, 4 indicates the greatest SE).

5.3.3 | Theme 3: Ambivalence in nurses' IPC and AS practices

This theme is based on focus group discussions on how the nurses' views on IPC as an important nursing task evoked ambivalent feelings among them. They shared how they worked to prevent infections and their role in AS programmes.

Subtheme 1: Indecisive role perceptions

The interviewed nurses agreed that IPC measures are important in their daily work. They emphasised that IPC measures are

something fundamental. They perceived them as work tasks always on their minds, such as practising hand hygiene, preventing surgical wound infections by wearing clean gloves, and using clean equipment. The nurses in close contact with patients considered their potential role in spreading infections major and took IPC measures seriously.

The participants expressed somewhat different views on nurses' general role and function in AS. They were generally not familiar with the term 'antibiotic stewardship'. When the moderator explained, most nurses expressed some recognition but did not have any training on the subject.

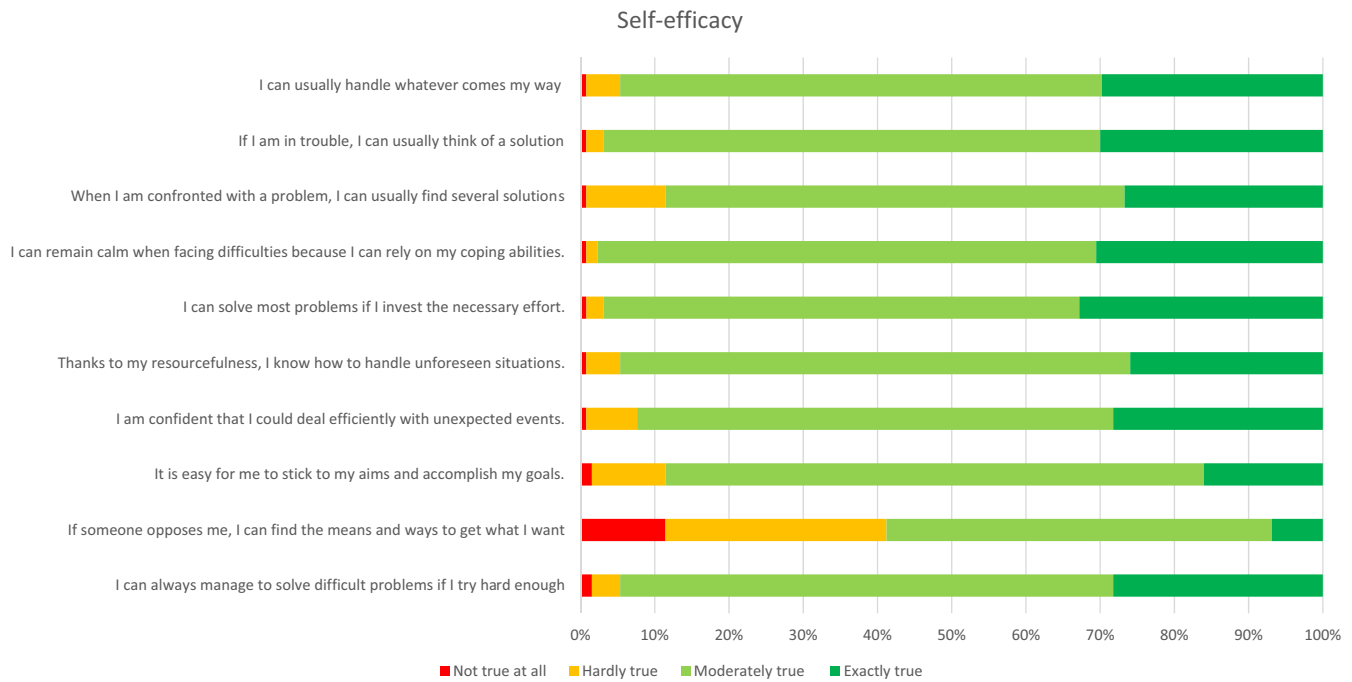


FIGURE 4 Bar chart showing the distribution of self-efficacy scores among statements. [Colour figure can be viewed at wileyonlinelibrary.com]

Moreover, participants in most group discussions appeared unsure about what role nurses should take in securing optimal antibiotic treatment. In all interviews, measures such as patient observation, observing treatment effects and taking samples were mentioned as vital nursing tasks in AS. However, many participating nurses were sceptical about taking on tasks generally associated with physicians' responsibility (see [Table 6](#) for illustrative quotes).

Subtheme 2: Ambiguous emotions towards caring for patients with MDRB

The general attitude portrayed in the interviews was that caring for patients, including those isolated with MDRB, was safe for nurses. However, some unpleasant emotions arose when working with isolated patients. One challenge making nurses feel unsafe was patients with uncaring behaviour and not understanding the isolation regimes, such as touching everything, including the nurses. Caring for patients with additional needs in an isolation room was described by many as intense.

Another factor making nurses feel unsure about their safety was uncertainty about guidelines on MDRB and isolation practices. One practical example provided working with isolated patients in rooms that lacked an anteroom. This situation causes nurses to doff inside the room with the contagious patient, raising questions about their safety.

Even though the nurses said they generally felt safe, they joked about being lifelong MDRB carriers; 'if we only got tested'. There was a serious edge to the jokes as they reflected on what they might bring home to their families (see [Table 6](#) for illustrative quotes).

5.4 | Mixed-method integration: Quantitative and qualitative result merging

5.4.1 | Confirmation of findings

Nurses report negative feelings towards their knowledge in both the survey and the interviews. The survey results also indicated that the nurses lack important knowledge on practical microbiology relating to MRSA, ESBL-producing bacteria and VRE, such as how MRSA spreads and where to screen for MDRB ([Table 4](#)). The interviews also indicated a lack of knowledge, where most nurses expressed a need for more information and knowledge on microbiology and IPC. Some facts concerning IPC mentioned by the nurses in the interviews are also incorrect. Both datasets indicate a need for more educational opportunities for nurses on themes associated with antimicrobial resistance.

The general SE score was high for all statements. This finding complements the interviews, where the nurses communicated a belief in their abilities to solve problems. They describe many challenging organisational and relational situations when providing nursing care to patients with MDRB. However, they also describe several solutions and how they actively solve complex situations in clinical practice. They describe feeling safe caring for patients with MDRB even though the situation is demanding and sometimes unpleasant. In the interviews, the participants expressed concern about caring for patients with MDRB, mostly relating to their families and what they might bring home. Nevertheless, they communicate a strong sense of humour towards challenging situations, reflected in the MDRBAQ emotional response subscale results where they ranked a carefree feeling high.

TABLE 6 Analysis of focus group data according to systematic text condensation (Malterud, 2012).

Theme	Subgroup	Illustrative quotes as single statements and dialogue	
Organisational challenges	Lack of resources	Nurse 1: <i>We lost two isolation rooms when the two orthopaedic wards merged; we went from four to two single rooms. It is a very noticeable change, and now we have isolated patients in unsuitable rooms weekly.</i>	
		Nurse 2: <i>Yes, definitely.</i>	
		Nurse 3: <i>Yes, so do we.</i>	
		Nurse 4: <i>Yes, I think all surgical wards experience this problem. (FG1)</i>	
	Inconstant and unavailable guidelines	Nurse 6: <i>I also generally think that it's a weird rule that you can't go to the kitchen because, if you go home and come back, you can...</i>	
		Nurse 3: <i>Yes, we have had a bit of a discussion about that at the ward. When you take care of an isolated patient and therefore are not allowed in the kitchen, then we probably shouldn't be allowed to go to the canteen either.</i>	
		Nurse 5: <i>It's strange that the guidelines are so unclear...</i>	
		Nurse 3: <i>It should certainly not be allowed to go to the canteen with an open salad bar when you can't go into the kitchen (FG4)</i>	
		Lack of educational opportunities	Nurse 3: <i>I wish we could attend more lessons</i>
			<i>Many agreed in the background</i>
Relational challenges	Patients and relatives challenging infection prevention measures	Nurse 1: <i>You have to inform the patient, yes, you have to disinfect your hands before taking food, and yes, you have to wash your hands after going to the toilet (...) Yes, it's like, when they're in a hospital they forget how to behave in a usual manner. (FG1)</i>	
		Nurse 7: <i>Yes, but we should also know where to find the information afterwards, in the quality handbook or on the internet, because if you learn something, you have to be able to look it up later.</i>	
	Collegial relationships challenging infection prevention and AS	<i>Many agreed</i>	
		Nurse 3: <i>Yes, and it should be easy, like practical recipes (FG3)</i>	
		Nurse 1: <i>Yes, I believe nurses are better than other professions. At least, that is my experience. We have to remind the physicians quite a bit about hand hygiene between patients and stuff like that. It is a bit scary how little some people know and how little they think about infection prevention.</i>	
	Ambivalence in nurse IPC and AS practices	Indecisive role perceptions	Nurse 2: <i>Yes, and they often ask what to wear during the doctor's visit; Do I have to wear a mask? Do I have to wear a gown? (FG2)</i>
			Nurse 1: <i>Honestly, I don't really care...</i>
		Ambiguous emotions towards caring for patients with MDRB	<i>[Laughter in the background]</i>
			Nurse 1: <i>It is the physicians' job, not mine, to assess the use of antibiotics; I just hope they know what they're doing.</i>
			Nurse 2: <i>Yes, this can easily become one of those areas where we have to look after them; we look after them enough as it is.</i>
Ambivalence in nurse IPC and AS practices	Indecisive role perceptions	Nurse 3: <i>Yes, we have enough responsibility (FG1)</i>	
		Nurse 3: <i>It's difficult, we have a lot of relatives who are in and out of the patient's rooms, and it's difficult; there's a lot of information, a lot of time that goes into informing them, and they don't always understand. It feels unsafe when the patient they are visiting has an infection that can somehow spread, and the relatives come out of the room without doffing; they walk into the hallway and into the kitchen and everything (laughter in the voice)</i>	
	Ambiguous emotions towards caring for patients with MDRB	Nurse 7: <i>Yes.</i>	
		Nurse 3: <i>Hehehe, yes...</i>	
		Nurse 7: <i>Or they go into the isolated patients' room without putting any protective equipment on...</i>	
Nurse 3: <i>Yes, hehe.</i>			
Nurse 7: <i>They don't understand what we say, they don't get it, they just don't get it. Yes, that makes it feel unsafe. (FG3)</i>			

5.4.2 | Discordant findings

The results from this cross-sectional survey indicate that the participating nurses know about IPC practices. They also report high compliance with IPC guidelines, including changing gloves and performing hand hygiene when indicated: an almost perfect picture of compliance. This result contradicts the interview findings, where nurses paint a more nuanced picture. They express uncertainty about knowing and understanding the guidelines regarding IPS. They also describe the guidelines as 'inconsistent and unavailable'. In the interviews, the nurses report observing colleges not following the guidelines. There is also a contradiction within the interviews. The participants expressed both being important infection prevention role models for other professionals and uncertainty and lack of knowledge towards parts of the same procedures.

5.4.3 | Expanded findings

The quantitative and qualitative data indicate a lack of concrete knowledge about microbiology and microbial spread. In the qualitative data, the nurses expand on this notion, describing confusing and illogical guidelines and a need for more concrete procedures. The guidelines are also described as difficult to follow in an efficient and busy work environment. Some infection prevention measures feel overly time-consuming and 'invisible', making it easy for the nurses to take shortcuts during a hectic day. In the interviews, time and resources are used to explain noncompliance with guidelines. They also identify a busy work environment as negatively influencing their knowledge.

The survey's emotional response scores indicate a high concentration rate when caring for patients with MDRB. This result is contextualised by the focus group interview results, where ambivalent feelings are described. The nurses identified isolation rooms and other structural and organisational factors as hindering good clinical practice and, where they must make the best of the situation, requiring them to remain focused. The patients, their relatives and other cooperating professionals not understanding the importance of abiding by the rules were also described as obstacles to safety. In addition, mood scores were low, indicating nurses are not very happy about caring for patients with MDRB. This finding is also found in the interviews, where the nurses describe these feelings associated with confusing guidelines and caring for isolated patients as mentally tiring.

The quantitative data relating to AS indicate that nurses actively observe their patients, understand why they receive antibiotics, and read microbiology results. However, only 41% of participating nurses reported knowledge about their AS programme, and 42% of survey participants reported asking the physician about antibiotic treatment. This result is consistent with the qualitative findings, where nurses mention and describe vital nursing tasks, such as clinically observing patients for signs and symptoms of improving or deteriorating condition. However, they were sceptical about taking over

physician tasks and described the nurses' role in AS as unclear. In the survey, 36% of nurses knew that penicillin is a narrow-spectrum antibiotic. A potential explanation for this is found in one interview. Some interviewees talked about not caring about the correct antibiotics to use since they did not want antibiotics to be another area where nurses felt compelled to look after physicians.

6 | DISCUSSION

This study aimed at gaining a comprehensive understanding of nurses' IPC and AS attitudes and SE when caring for patients with MDRB infections in a hospital setting. Nurses adequately follow AS and IPC practices that are crucial in combating MDRB. This mixed-methods study reported on nurses' attitudes and SE towards IPC and AS and broadened reflections and explanations rooted in clinical practice to these topics from the participating nurses. The study indicates that the participating nurses' lack important knowledge but have a high self-reported understanding of behavioural measures and a moderate emotional response towards caring for patients with MDRB. They describe challenging clinical situations but generally with a sense of optimism and humour. Their SE score was mostly on the scale's high end, indicating a belief in their ability to solve problems.

6.1 | Confirming findings

This study's quantitative strand indicated a lack of knowledge about practical microbiology relating to MDRB among the participating nurses. The areas of knowledge where the nurses show deficiency are critical for nurses in clinical practice to achieve optimal IPC. For example, recognising whom to screen for MDRB based on national guidelines, usual colonisation locations, and how different bacteria spread is crucial knowledge in a clinical setting (Table 2; World Health Organization, 2019). This lack of fundamental knowledge of basic IPC principles is not a unique finding (Cox & Simpson, 2016). For example, a 2014 Norwegian study found that nurses lack important knowledge in their work with patients colonised or infected with MDRB (Lunde & Moen, 2014). Nasiri et al. (2019) found poor knowledge to be one of the most prominent causes of the high prevalence of healthcare-associated infections worldwide. Interestingly, Nasiri et al. (2019) also found that most studies used nonstandardised instruments when exploring nurses' knowledge and attitudes, potentially explaining the difference in findings about nurses' IPS and AS knowledge and attitude. This observation indicates a need for a standardised instrument to investigate nurses' knowledge and attitude towards IPC and AS (Nasiri et al., 2019). 'Adequate attitudes' for nurses in a clinical context is difficult to define in the absence of standardised and general instruments measuring nurses' IPC attitudes.

Overall, nurses' SE scores when caring for patients with MDRB were high in this study, confirmed by the nurses participating in the interviews. The nurses described both external (e.g. physical

environment and PPE access) and internal (e.g. worries about personal safety) challenges when caring for patients with MDRB. They describe situations in which they had to use numerous skills to find solutions in very challenging clinical situations. Nevertheless, they portray a belief that they can cope with unforeseen situations. SE refers to what people believe they can do (Bandura, 1977). Franklin and Lee (2014) argued that SE influences almost every aspect of a nurse's practice, including their ability to think optimistically, persevere through challenges and complete tasks. This study's merged SE results support these perspectives. Therefore, a high SE score among nurses is a positive finding and an important cornerstone for developing robust IPS and AS fundamentals.

6.2 | Discordant findings

This survey indicated that the participating nurses' knowledge of and intended behaviour towards using PPE was high. However, the interviewees described their IPC practices more nuancedly, where noncompliance is considered part of their daily routine. These discordant findings may indicate that nurses have the appropriate knowledge of PPE and isolation practices and intend to comply with the best practices but do not follow up on their good intentions. Here, knowledge, intentions and actual behaviour appear to diverge in clinical practice, indicating a gap between theory and practice. This behaviour can be explained by the organisational challenges described in this study's qualitative results, such as unattainable guidelines and a lack of educational avenues and resources. The gap between theory and practice is a well-discussed theme in nursing education, debating the hierarchical distinction between theoretical knowledge and its practical application (Marañón & Isla Pera, 2015). Salifu et al. (2019) reported that the theory-practice gap reflects difficulties in merging theoretical knowledge into actual nursing practice (Salifu et al., 2019).

This study found that nurses have high SE towards caring for patients with MDRB. SE is associated with motivation, learning and academic performance and considerations towards keeping and enhancing infection prevention-related SE may influence clinical practice (Cox & Simpson, 2016). Therefore, a relevant question is why nurses with high SE in this study describe noncompliant behaviour. Ajzen (2011) reported that intentions directly caused behaviours (Ajzen, 2011). Ajzen (2011) described intended behaviour as a proximal determinant of whether a person actually performs a given behaviour, such as hand hygiene. In turn, attitudes, subjective norms and perceived behavioural control (comparable to SE) determine intentions (Ajzen, 2020). Therefore, nurses' attitudes towards IPC and AS practices when caring for isolated patients can explain their noncompliance with IPC guidelines. We found a lack of knowledge (unfavourable), a generally high score on intended behaviour (favourable) and a low/moderate emotional response score (Tables 4–6; Breckler, 1984; Lindberg, 2012). These findings may indicate that nurses have unfavourable attitudes towards IPC and AS practices. These attitudes could explain nurses' descriptions from practice,

where both compliance and noncompliance to IPC guidelines are part of their daily routine (Ajzen, 2011).

In this study, a high-stress work environment was given as an explanation for noncompliance, where nurses do not follow IPC measures invisible to others (i.e. hand hygiene). Research has shown that external factors can challenge or prevent compliance regardless of the factors positively influencing an individual's intended compliance (O'Boyle et al., 2001). Moreover, a busy work environment with lower nurse staffing levels is associated with infection prevention risk behaviour and higher rates of hospital-associated infections (Arvidsson et al., 2022). Since nurses' scores on SE and behavioural intentions are adequate, this study indicates that measures taken to improve compliance should reflect upon their knowledge and emotional response in addition to the physical and organisational challenges described in the interviews.

The nurses participating in this study also mention the physical ward environment as an obstacle to IPC compliance. Patient rooms without anterooms, decontaminators and dedicated bathrooms made nurses deviate from IPC guidelines. Physical environments, including sufficient space, have previously been described as factors influencing healthcare workers' willingness to follow IPC guidelines when managing respiratory infectious diseases (Houghton et al., 2020). In this study, both creative solutions and scepticism towards personal safety were communicated during the interviews. Houghton et al. (2020) found that guidelines that did not agree with the physical reality made healthcare workers feel unprotected and undervalued. Together with our findings, this observation indicates that IPC professionals must consider actual realities when developing IPC guidelines, accounting for local differences in the physical environment.

6.3 | Expanded findings

This study found a lack of clinically important knowledge among the nurses. Some of the interviewed nurses explained their lack of knowledge by a busy work environment and lack of resources interfering with opportunities for attending courses and seminars. Nasir et al. (2019) recommend periodic training in IPC standards via relevant practical courses and conferences. Educational opportunities missed because of a fast-paced environment can negatively impact nurses' knowledge and IPC practices. However, Houghton et al. (2020) found that education, alone or with supplementary infection control support, only slightly improved healthcare workers' knowledge, indicating a need for alternative attitude-enhancing opportunities. McAleaney et al. (2021) provided one example of using a clinical narrative as a pedagogical tool when communicating IPC and AS guidelines. Storytelling using clinical cases can be a form of vicarious experience and may be an interesting addition to the traditional communicative tools in IPC education (Bandura, 1977). Since nurses described a lack of understanding by patients, their relatives and other professionals regarding the importance of abiding by the rules, educational opportunities should also be offered to them.

A second explanation for the nurses' lack of knowledge in this study concerned the IPC guidelines, which were perceived as confusing, inconsistent and lacking important information. Houghton et al. (2020) found similar results where informants described local IPC guidelines as lengthy and ambiguous. This opinion may indicate another problem in bridging theory and clinical practice in IPC, the challenge of overcoming the already discussed theory-practice gap. For example, Malik et al. (2015) found that information in policies and protocols was an important knowledge source for nurses, highlighting the importance of nurses being able to translate guidelines into actual nursing practice (Malik et al., 2015). Closing the theory-practice gap should be achieved using clear, clinic-related and understandable communication in IPC educational opportunities and guidelines.

The findings concerning the nurses' emotional response towards caring for patients with MDRB were both complementary and divergent. Most emotional scores were deemed moderate. The interviews expanded on this finding, where the nurses described ambiguous emotions. Negative emotions can have positive outcomes in IPC, with feelings of unpleasantness, discomfort and disgust leading to self-protection (De Wandel et al., 2010). Therefore, negative emotional responses can help improve individual attitudes towards good hand hygiene practices. However, Bandura (1977) reported that a positive emotional state is a source of SE. Therefore, nurses feeling positive emotions towards a situation may have greater belief in their ability to deal with the situation. High SE is associated with tolerating organisational constraints and preventing emotional exhaustion and cynicism about nursing tasks (Fida et al., 2018).

An interesting finding in the qualitative data was that humour is part of the participating nurses coping strategy when caring for patients with MDRB. Cooper et al. (2020) wrote that the stressful nature of nurses' work, both mentally and physically, places them at risk of burnout, depression, compassion fatigue and suicide. Resilience, an individual's 'ability to endure, adapt, and recover from adversity', is often associated with humour (Cooper et al., 2020). Having a sense of humour can moderate and reduce stress in challenging situations (Wilkins, 2014). The nurses in this study actively used humour when coping with difficult situations, which may be a sign of resilience.

It is evident in this survey and interviews that clinical observations, microbiological testing and administering antibiotics are tasks in AS where nurses actively participate. However, the results indicate that nurses feel only partly involved in AS. The qualitative data showed that the unclear distribution of roles between nurses and physicians challenged the nurses' engagement in AS. This unclear role distribution has previously been recognised as a major barrier to nurses' AS engagement (Sumner et al., 2017). Some studies characterise nurses' contributions to AS as a watchdog role towards 'changing the way clinicians use antibiotics' (Manning et al., 2016). The nurses in this study expressed scepticism towards taking responsibility for tasks primarily perceived as the physicians'. This perspective is consistent with Sumner et al. (2017), who reported that nurses commonly perceive AS as a task to be addressed by the prescribing physicians.

Our study suggests ambiguous and undefined roles when it comes to AS practices. Previous studies have defined role ambiguity as a problem among nurses in acute hospital settings that negatively affects professional identity, clinical performance and professional attitudes (Lam et al., 2019). Since nurses consider role ambiguity in a clinical context a major stressor, defining multidisciplinary roles is crucial. Similarly, this study indicates that AS communication within a multidisciplinary team should focus on independent nursing tasks associated with AS, such as observing patients, assuring microbiological cultures are obtained, administering antibiotics and patient education. In a stressed and time-effective working climate, nurses' engagement in AS should not simply be performing tasks delegated to them by physicians but as important, well-defined and independent nursing tasks, where their role is perceived as prominent and valuable within the multidisciplinary AS team.

6.4 | Strengths and limitations

This study's strength is its convergent MM design, which has provided a more complete understanding of this important topic (Creswell & Clark, 2017). Its merging of qualitative and quantitative data has provided expanded and complementary insights. This design has also shown that challenges remain concerning nurses' attitudes and SE when caring for patients with MDRB. Further studies exploring how to solve the challenges addressed in this study are advised.

This study had several limitations. First, the study was conducted among nurses working in surgical and haematological wards at a single hospital. Therefore, it is difficult to generalise its findings to other wards and hospital settings. Second, selection bias may have occurred since the authors have no information on the phenomenon from the nurses who, for some reason, declined to participate (Shadish et al., 2002).

Its qualitative and quantitative data sometimes diverged, which can indicate a lack of validity in one method used. However, the most probable cause might be that the questionnaire reflects how nurses wish to behave in optimal surroundings, while the interviews reflect their behaviour in the real world. Unfortunately, no standardised method for measuring compliance exists. There are also challenges when merging qualitative and quantitative data, potentially negating some of the strengths of the individual methods (Creswell & Clark, 2017).

The validity of the study's quantitative strand is threatened by construct confounding (Shadish et al., 2002). The MDRBAQ was validated using the Kaiser-Meyer-Olkin test, Bartlett's test of sphericity and Cronbach's alpha (Lindberg et al., 2012). However, the questionnaire may measure something other than nurses' attitudes when caring for patients with MDRB because of the construct's complex nature. Measuring attitudes through written responses is also subject to social desirability biases. For example, the response may reflect cultural stereotypes rather than actual personal attitudes (De Wandel et al., 2010).

When planning this study, we found a lack of standardised and general instruments measuring nurses' IPC and AS knowledge. Therefore, what is deemed 'adequate knowledge' and a 'positive attitude' for nurses in a clinical context is hard to define. Further research, such as observational studies, is needed to learn about actual behaviour related to IPC and AS. Further work should also pursue the need for standardised instruments for measuring IPC and AS practices and their related attitudes and SE. Furthermore, the SE questionnaire is a reliable tool for measuring nurses' general SE, not just their SE while caring for patients with MDRB.

7 | CONCLUSIONS

Our findings indicate that clinically practising nurses' attitudes towards IPC and AS while caring for patients with MDRB were only moderately positive. Considering the three normally recognised attitude components (cognition, behaviour and affect), we find that while nurses lack practical knowledge on MRSA, ESBL-producing bacteria and VRE, they report knowing correct IPC and AS guidelines (cognition). They also report complying with the guidelines (behaviour). However, their emotional response towards caring for patients with MDRB is moderate at best. This moderately positive attitude component is nuanced in the interviews, where the participating nurses describe relational and organisational factors challenging their IPC and AS compliance. For example, too few isolation rooms, a busy work environment and difficulty translating guidelines into nursing practice. Additionally, nurses discuss professional considerations such as an indistinct role clarification in AS practices as a factor negatively affecting their attitudes. The nurses report high SE in both the questionnaire and interviews, indicating a belief in their ability to solve problems. Therefore, a high SE score among nurses is a positive finding and an important cornerstone for developing robust IPS and AS fundamentals. Actions should be taken to overcome the challenges in clinical practice raised by the nurses participating in this study.

7.1 | Relevance to clinical nursing practice

Considering this study's findings, increasing nurses' attitudes towards IPC, AS and patients with MDRB is recommended. This study highlights a need for more educational opportunities on themes associated with antimicrobial resistance for nurses in clinical practice. Since the nurses' SE scores and behavioural intentions are adequate, this study indicates that measures taken to improve compliance should focus on nurses' knowledge and emotional responses. Educational opportunities may also be offered to other cooperating professionals, patients and their relatives.

Measures may be taken to overcome the organisational challenges described in the interviews. The description of a busy work environment with poor facilities and inconsistent guidelines should

be taken seriously. This issue could be overcome by ensuring a more understandable and clinically available approach to communicating guidelines where the actual clinical work occurs. The guidelines should also reflect the physical environment nurses work in, not the gold standard. Furthermore, it indicates a need for new strategies for communicating and encouraging IPC and AS knowledge and behaviour. Storytelling using clinical may represent an interesting addition to the traditional communicative tools in education on IPC and AS.

In the light of this study, clarifying the nurses' contribution to AS is also recommended. The focus should remain on independent nursing tasks associated with AS, such as observing patients and responding to changes in their condition, assuring that microbiological cultures are obtained, and administering antibiotics correctly.

AUTHOR CONTRIBUTION

Conceptualisation, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, visualisation, writing – original draft and writing – review and editing: Marte Johanne Tangeraas Hansen. Supervision, conceptualisation, formal analysis, methodology and writing – Review and Editing: Marianne Storm. Conceptualisation, supervision, formal analysis, methodology, investigation and writing- review and editing: Heidi Syre. Conceptualisation, formal analysis, validation and writing – review and editing: Ingvild Dalen. Supervision, conceptualisation, data curation, formal analysis, funding acquisition, investigation, methodology, validation and writing – review and editing: Anne Marie Lunde Husebø.

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CONFLICT OF INTEREST STATEMENT

None.

STATISTICS

We, the authors, have checked to make sure that our submission conforms as applicable to the Journal's statistical guidelines described here. There is a statistician on the author team and Ingvild Dalen. We affirm that the methods used in the data analyses are suitably applied to our data within our study design and context, and the statistical findings have been implemented and interpreted correctly. We agree to take responsibility for ensuring that the choice of statistical approach is appropriate and is conducted and interpreted correctly as a condition to submit to the Journal. Main statistical methods/approaches: descriptive, graphical methods, parametric and nonparametric tests, linear and logistic regression.

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