A qualitative exploration of physician attitudes toward implementing protocol-based prescribing for empiric use of antimicrobials for common infections in a tertiary Intensive Care Unit

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Signed statement of sources

I, Karlee Johnston declare the work presented in the thesis is, to the best of my knowledge and belief, original and my own work, except as acknowledged in the text, and that the material has not been submitted, either wholly or in part, for a degree at this or any other university.
Abstract

Aim: To describe the attitudes, facilitating factors and barriers that Intensive Care Unit (ICU) and Infectious Diseases (ID) physicians identify regarding prescribing empiric antimicrobial therapy according to protocols in an ICU.

Methods: ICU and ID consultants were interviewed individually using a semi-structured interview and ICU junior doctors were surveyed regarding their thoughts on protocol based prescribing. Thematic analysis using an integrated approach based on grounded theory identified primary themes.

Results: Two primary themes that emerged from the data were clinical and cultural.

The clinical factor that all groups thought would facilitate compliance with protocols was education at the time of the introduction of protocols. The consultant cohort felt the clinical enablers were: a strong evidence base and physician involvement in their development, along with regular audit and feedback, whereas the junior medical officers felt clear formatting and ease of access would aid compliance.

The cultural enabling factors were: consensus amongst physicians of the merit of the protocol, and the provision of ongoing reminders to use them. The consultant cohort felt that a collaborative relationship between the developers and users of the protocol was also important.

The primary clinical barrier was a perceived inflexibility for patients that the medical officers considered should be exempt from the protocols. The cultural barriers identified by ICU and ID consultants were the reduction of prescribing autonomy, as well as organisational governance.

Conclusion: Factors influencing the implementation of and compliance with protocols in the ICU differs with varying medical grades and specialties. These factors can be categorised as either clinical or cultural. The knowledge and management of these factors is valuable for tailoring the protocol implementation process to meet the needs of the different stakeholders and increase the likelihood of success.
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Introduction/Background

The role of clinical protocols and guidelines is to assist in the clinical application of evidence based medicine to the care of individual patients in order to improve patient outcomes.\textsuperscript{1,2} This has been demonstrated in many different clinical settings, particularly in the Intensive Care Unit (ICU).\textsuperscript{3,4,6,7,8} Syndromes in the ICU where protocols have been successful in improving clinical outcomes are: management of ventilator associated pneumonia (VAP)\textsuperscript{9}, sepsis\textsuperscript{7,8}, nutrition\textsuperscript{2} and early weaning from mechanical ventilation.\textsuperscript{7,9} Additionally, protocol based prescribing of antimicrobials improves antimicrobial use and reduces the emergence of multi-resistant organisms.\textsuperscript{10}

Standardised prescribing of antimicrobials in Australia is supported by Therapeutic Guidelines: Antibiotic (edition14).\textsuperscript{11} ICUs are responsible for up to 25\% of any hospital’s total antimicrobial use, have over 50\% of their patients with demonstrated evidence of infection, and more than 70\% prescribed an antimicrobial at any one time.\textsuperscript{12,13} In the study institution, a recent point prevalence survey demonstrated that 60\% of all ICU patients were prescribed an antimicrobial, with over half of these patients receiving broad-spectrum therapy, figures that are consistent with published data.\textsuperscript{12,14} Healthcare acquired infection, which requires the empiric prescription of broad-spectrum antimicrobials, has been reported to affect 30\% of ICU patients and carries a significant burden of morbidity and mortality.\textsuperscript{15,16} The use of broad-spectrum antimicrobials is linked to the emergence of multi-resistant organisms (MROs), and as such ICUs have a higher rate of MRO emergence than other healthcare environments.\textsuperscript{17} A consistent approach to prescribing empiric therapy for common ICU infections, with the introduction of protocol based prescribing, is likely to reduce broad-spectrum antimicrobial use and consequently the emergence of MROs in the ICU.\textsuperscript{18}

Protocols and guidelines improve quality of care, reduce costs and encourage consistency in prescribing. However implementation and adherence of these evidence based recommendations into practice is limited.\textsuperscript{19-21} Studies suggest that the uptake of recommendations from guidelines and protocols occurs less than 60\% of the time and can reduce to zero percent once the implementation phase is complete.\textsuperscript{22-24} Physician factors, patient factors, unit and organisational factors and overall culture can all influence whether protocols are successfully implemented into practice.\textsuperscript{20,25} Identifying enablers and barriers before implementation is likely to reduce the risk of non-adherence.\textsuperscript{26,27} Given the unique environment of an ICU it is not known whether ICU
practitioners are concerned with the same factors in the implementation of protocols as health professionals in other fields.\textsuperscript{28,29} Considering the culture of autonomous prescribing in the study ICU, it is important to identify the potential barriers and facilitating factors, prior to the development and implementation of protocols into the unit.

Ensuring a protocol can be applied to individual practice, is relevant to common scenarios and supported by evidence, has been shown to enhance their uptake and use.\textsuperscript{1,27,29,2} The issue of accessibility is important and may be improved by electronic platforms that provide a simple and user-friendly format.\textsuperscript{1,28,29} Developers of protocols must have the respect and trust of the end-users in order for the protocols to be successfully implemented into practice, and having end-users involved in the development phase is desirable.\textsuperscript{28,1,2,29}

Consistent with other quality improvement initiatives the successful implementation of protocols depends upon education, audit and feedback and regular reminders to the users.\textsuperscript{2,28,7} Both education and reminder systems should be delivered using a multifaceted approach.\textsuperscript{2,28} This should involve tailoring education interventions to target audiences at both an individual and group level, and should be delivered using both active and passive strategies.\textsuperscript{2,28} The maximum benefit can be gained by utilising a combination of opportunistic education and reminders such as at the time of prescribing, as well as planned and structured sessions such as during medical officer orientation.\textsuperscript{2,28} Audit and feedback are also considered essential to the successful implementation of protocols, and should be used to measure the effect, compliance and usability of the protocol, particularly after the implementation phase when compliance may decrease.\textsuperscript{26}

The overall governance and culture of the organisation is also an important factor in protocol implementation. The organisation must support the introduction and use of protocols, and ensure that physician compliance is a priority to enhance their uptake into practice.\textsuperscript{30,28}

A barrier to implementation is the perceived risk of applying a protocol to a patient in whom individual clinical assessment suggests the protocol may be inappropriate. Some physicians are concerned that protocols may remove consideration of individual patient factors from decision making.\textsuperscript{30,31} Balancing the benefit of standardised care, with a reduced focus on individual patient considerations is a difficult task, particularly in the
high acuity setting of ICU which may have a particularly heterogeneous case mix of patients.

Individual acceptance of protocols by medical staff plays a considerable role in their successful implementation. Some studies suggest physicians find protocols inflexible and rigid, oversimplified and challenging to their autonomy, while contrary evidence also exists.\(^{30,28}\) Determining the importance that protocol rigidity and right to autonomy hold for physicians should be further investigated, as resistance by senior doctors to utilise protocols limits use by junior medical staff.

Successful implementation of protocols requires identification and engagement of key stakeholders. In the ICU these internal stakeholders include medical staff of all levels of seniority, nursing staff, and allied health, particularly pharmacy staff. It is also critical to involve external stakeholders. For example, where antimicrobial prescribing is concerned, Infectious Diseases (ID) input would be essential given their regular consulting service in the ICU as well as their hospital role as a primary admitting service, and overarching role as antimicrobial stewards within the hospital.

There is noted variation between professions toward protocol based prescribing, particularly between medical and nursing staff.\(^{32,28,33,2}\) Divergent attitudes also exist between ICU and ID physicians in terms of approach and attitude toward evidence-based antimicrobial use in the ICU.\(^{19,18}\) ID physicians are more likely to utilise prescribing guidelines than their ICU colleagues, but the opinions about the barriers and facilitating factors of each specialty to using protocols have not been determined.\(^{19,18}\) Information about the issues important to each group could help with targeted interventions to improve the development and implementation of protocols into the ICU. The role of consultant medical officers compared with that of junior doctors in protocol development and implementation has not been well studied. It is known however, that during protocol development the consultant/experts on consensus groups contribute more than their less experienced counterparts.\(^{34}\) Junior doctors should contribute to quality improvement activities, as it is beneficial to their professional development, and increases their interest in quality improvement in the workplace, which benefits the organisation.\(^{35}\)

The existing literature has identified enablers and barriers to the successful implementation of, and compliance with protocols. Studies have clarified the differences in the priority that different craft groups such as medical and nursing staff
place on these factors, however the same has not been examined between the different levels of medical staff or between different specialties. This study seeks to investigate the different factors that consultant ICU and ID medical staff as well as junior medical staff consider important for protocol implementation and compliance, in the context of the unique setting of an ICU.

The differences between guidelines and protocols are not generally known or understood by those using them, and the non-standardized use of these terms in the literature fosters confusion. For the purposes of this study the terms have been used synonymously at the preference of the participants.

**Aims**

1. To assess the attitudes of physicians working in an antimicrobial prescribing protocol naive ICU toward the implementation of such protocols.
2. To identify potential barriers to the successful implementation of, and likely compliance with protocols for the prescribing of antimicrobials for common ICU infectious conditions.
3. To identify potential facilitating factors that may positively influence the successful implementation of, and likely compliance with protocols for the prescribing of antimicrobials for common ICU infectious conditions.

**Methods**

**Setting and participants**

The participating ICU is a 31 bed university affiliated unit, in a tertiary referral hospital, that admits just under 2000 patients per year. It is a mixed medical-surgical unit that cares primarily for adult patients, including trauma patients, neurosurgical patients and cardiothoracic surgery patients, and also has capacity to occasionally care for paediatric patients on a short-term basis. The ICU is a closed unit and as such the ICU team has the primary responsibility for the management of patients, and prescribing is exclusive to ICU staff, with the admitting team providing an advisory role to patient care. The unit is staffed clinically at any one time by two ICU consultants, each having a team consisting of a senior registrar, registrar and resident medical officer. Each team care for half of the admitted patients on any one day. Each consultant is rostered clinically...
on the unit during daytime hours, is on-call overnight every second day, and is rostered on for three to four days before handing over to the next incoming consultant. Each team completes a multidisciplinary ward round each morning, which the clinical pharmacist and nursing team-leader also attend, as well as an afternoon ward round which is usually less formal and not attended by all medical staff or the pharmacist. Overnight a team consisting of a senior registrar, registrar and resident medical officer are rostered, with one of the two clinical consultants on-call for support. For care of patients with ID issues, there is a paper ward round between the ICU team and the consulting ID team (consisting of ID consultant, registrar and medical microbiologist) twice weekly to discuss all ICU patients in relation to any ID issues, microbiology and antimicrobial prescribing. The ICU is a paperless unit, which utilises electronic medical records including electronic prescribing. The ICU does not currently have any ICU specific, strictly adhered to, clinical management guidelines or protocols, or prescribing restrictions, and as such individual medical staff have full autonomous prescribing privileges.

The ICU medical team consists of 10 ICU consultants with a mixture of full-time and part-time appointments, senior registrars, registrars and resident medical officers. For the purposes of this study all non-consultant medical staff have been considered junior medical officers.

Inclusion criteria for interview: Any part-time or full-time ICU consultant currently practising in the participating ICU, any part-time or full-time ID consultant currently practising at the participating hospital.

Inclusion criteria for survey: Any junior medical officer currently rostered to work in the participating ICU.

Exclusion criteria: Any ICU or ID medical officer meeting inclusion criteria who were unavailable to participate during the study period.

All ICU and ID consultants were invited to participate in an interview. The consultant arm of this study entailed in an in-depth semi-structured face to face interview. Both ICU and ID consultants were interviewed, as both are involved in the prescribing decisions regarding antimicrobial therapy in the ICU. The questions used to guide the face-to-face interviews were based on questions used in the previous study by Sinuff et al in Canada, where ICU clinicians were interviewed regarding their opinions on
protocol implementation. A copy of the interview template can be found in appendix 1.

The junior medical officers currently rostered in the ICU were given a paper survey consisting of open-ended questions, see appendix 2. The questions were based on those used to prompt in the face-to-face interviews with the consultants. A paper survey rather than face-to-face interview was used for this cohort due time limitations of the study period.

Data

The interviews were conducted and transcribed by a single investigator. The interviewer was the clinical pharmacist working in the ICU, and as such had a previous professional relationship with each of the interviewees. Having the same investigator responsible for all the interviewing and data collection ensured there was consistency within all aspects of data collection and collation. A paper survey was personally handed to each junior medical officer participant and they were asked to return the completed survey within 24-hours. The transcribed records from the interviews and the responses from the written survey were coded. Themes from the data from both written sources and interviews were combined and analysed using an integrated approach based on grounded theory as described by Bradley et al. This method utilises both inductive and deductive coding.

The following processes were used as described by Ibrahim. Coding was assigned based on the methodology described by Bradley et al.

1. Deductive coding: The codes that identified key themes used to guide the interview and survey questions were used to frame the data. For example participant perspective codes which identified the positive, negative and indifferent feelings of the participants such as enablers and barriers were used as overarching themes. These codes were assigned prior to data reduction
2. Data reduction: Microsoft word was used to document the data from the transcripts and survey results. These data were then read through multiple times and examined, and from the raw data key phrases were identified and coded. This coding was inductive and constant comparisons were undertaken to ensure that the codes were consistent within the data set. After reading through the key
phrases within the coded sets, analysis of these phrases lead to the extraction of key theories.

3. Data display: This process took place concurrently with the various stages of data reduction. As analysis and coding of key phrases took place and further reduction was required, these data were displayed in various ways, including schematic process mapping, as well as using word documents with key headings and tables to segregate relevant data and keep key concepts together.

4. Data drawing and conclusion: The final step of the data analysis was looking at the data as a whole and combining or separating some identified themes, and contextualising the findings back to the research aims.

The Human Research Ethics Committees of both The University of Queensland (2013001398) and the participating organisation, Canberra Hospital and Health Services (CHHS) (ETHLR 13.226) approved this study, and the Survey Reference Group at CHHS approved the survey tool (ETHLR 13.237). Written consent was obtained from each of the interviewees prior to interview.

Results
All ICU consultants (n=10) were approached, consented, and interviewed. A total of six ID consultants were interviewed of seven possible. One ID consultant, despite having consented to interview, was unavailable at the time of interviewing and so was excluded. The transcripts from all of these 16 interviews were used in the thematic analysis. A total of eight responses out of a possible 33 were received from the survey given to the junior medical officers (25% response rate).

The consultant cohort ranged between 12 and 34 years of experience (mean 20 years) as a medical practitioner, and the junior medical staff between 3 and 10 years (mean 5 years) of experience. Some of the consultants held dual appointments, clinical ID or ICU, as well as Unit Director or Divisional Executive Director roles in the organisation.

Advantages and Disadvantages
Table 1 and 2 display the advantages and disadvantages that the participants identified to using protocol based prescribing in the ICU. The frequency (including percentage of total cohort) that these comments were made is also displayed.
Table 1.
Perceived advantages associated with protocol based prescribing in an ICU setting.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Frequency (percent of cohort)</th>
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<tbody>
<tr>
<td></td>
<td>ICU consultant n=10</td>
</tr>
<tr>
<td>Improve prescribing consistency and standardisation of practice</td>
<td>5 (50%)</td>
</tr>
<tr>
<td>Improve evidence based practice</td>
<td>5 (50%)</td>
</tr>
<tr>
<td>Facilitate education</td>
<td>5 (50%)</td>
</tr>
<tr>
<td>Improve decision making process leading to faster delivery of appropriate care</td>
<td>2 (20%)</td>
</tr>
<tr>
<td>Reduction in prescribing error</td>
<td>1 (10%)</td>
</tr>
<tr>
<td>Reduction in antimicrobial use</td>
<td>1 (10%)</td>
</tr>
<tr>
<td>Reduction in multi-resistant organisms</td>
<td>1 (10%)</td>
</tr>
</tbody>
</table>

Table 2.
Perceived disadvantages associated with protocol based prescribing in an ICU setting

<table>
<thead>
<tr>
<th>Disadvantages</th>
<th>Frequency (percent of cohort)</th>
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<tbody>
<tr>
<td></td>
<td>ICU consultant n=10</td>
</tr>
<tr>
<td>Not considering patients who don’t fit the protocol</td>
<td>9 (90%)</td>
</tr>
<tr>
<td>Might miss something if blindly following</td>
<td>7 (70%)</td>
</tr>
<tr>
<td>Inhibiting doctors inclination to learn “dumbing down”</td>
<td>4 (40%)</td>
</tr>
<tr>
<td>Consensus is difficult to obtain</td>
<td>4 (40%)</td>
</tr>
<tr>
<td>Miss new literature/evidence</td>
<td>1 (10%)</td>
</tr>
</tbody>
</table>
In addition to perceived advantages and disadvantages the participants were asked to identify potential facilitators of successful implementation of protocol and compliance with based prescribing for empiric antimicrobial use in the ICU. The two overarching themes that emerged and encompassed all the factors were clinical and cultural.

**Clinical facilitating factors:**

*Strong evidence base:*
The participation of a consultant physician in the development of a protocol was identified by the consultant cohort as an important factor, however not by the junior medical officers.

- ICU CONSULTANT: “needs to be up to date with evidence.”
- ICU CONSULTANT: “consultants to change practice might need convincing, evidence and bargaining.”
- ID CONSULTANT: “people are generally willing to take expert advice as much as possible based on evidence.”
- ICU CONSULTANT: “lack of evidence is a problem for implementation of protocol.”

The ICU consultants felt it was very important that there was adequate evidence, such as the availability of local microbiological epidemiology data to support the content of the protocol.

- ICU CONSULTANT: “… you need the appropriate information to write those guidelines and being told that we don’t have antibiograms by our microbiology department makes me question whether or not we can do that.”
- ICU CONSULTANT: “need feedback on prescribing and antibiogram.”

*Involvement in writing:*
The consultants also identified that they would like to be involved in the writing of the protocol. It was noted that in general, physicians prefer not to be told what to do, rather be involved in the change.

ID CONSULTANT: “People who are involved in the process from the beginning will invest themselves in it, as long as they feel as though they’ve been able to make their point, if the process has been well run…whereas if someone sits there and is told here is what you have to do then they often don’t.”

ICU CONSULTANT: “As long as I had some say in how the protocol came to be in the first place. So I wouldn’t like something for example that ID just went this is what will happen without consultation, I’d like to be involved, but I’m probably not the best brain to be involved. I’d just like to feel as though I was involved in the decision making.”

ICU CONSULTANT: “[whether a consultant uses a protocol] … depends on what was in the protocol and whether they agreed to the components of it.”

Regular audit and feedback:
Audit and feedback were identified by the ICU and ID consultants as activities that would potentially improve adherence.

ID CONSULTANT: “…you provide education as to the evidence behind what you’re doing, and the rationale behind what you’re doing, follow that up, you audit it, you feed it back those basic steps I think are necessary to ensure compliance…”

ICU CONSULTANT: “Problem of not doing them [audits] is then that you don’t know what you’re uptake and compliance actually is. And you do all the normal things like education.”

Clear format and ease of access:
It was identified, particularly by the junior medical officers, that a clear format and easy accessibility of the protocol, were an important factor to assist the applicability of the protocol at the bedside. Most ICU and ID consultants identified that they do not use other protocols or guidelines already available throughout the hospital, due to the difficulty with access at the time of prescribing.

ICU JUNIOR: “Making them more available…if I have to look up a computer and trawl through the internet, I won’t bother.”
ICU JUNIOR: “[making protocols] Easy to read [would help]”
ICU JUNIOR: “simplicity and accessibility – ie not buried away in a folder somewhere [would help]”
ID CONSULTANT: “The protocols might be hard to find sometimes we don’t always have them available and ready to go.”

\textit{Education:}

The use of protocols to facilitate education associated with general antimicrobial prescribing, as well as protocol specific education was mentioned by all respondents and identified as a necessary component of implementation.

ID CONSULTANT: “I do think they [protocols] have the ability to hopefully educate people about why they should be using different antibiotics in certain situations…”

ID CONSULTANT: “Educating about protocols and then perhaps a few other concepts when to use particular antibiotics and when you don’t use particular antibiotics gives them the basis to question what they do in other circumstances for antimicrobial prescribing so rather than specific syndromes it gives them a framework to make those larger decisions in future.”

ICU JUNIOR: “Need education sessions”

ICU JUNIOR: “Education at JMO orientation [would help]”

\textbf{Cultural facilitating factors:}

\textit{Relationship between developers and users:}

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Whether the consultant has respect for the people responsible for writing the protocol was identified as a factor that would influence that prescriber to adhere to a protocol.

ICU CONSULTANT: “Acceptance and respect for the people developing the guidelines, that’s a cultural issue, and I think the people who we have for our area developing these guidelines need to be respected and what they say has to be accepted.”

Consensus by key stakeholders:
All respondents both ID and ICU consultants and junior staff identified that a critical component to the successful implementation and ongoing adherence to protocols was consensus amongst senior staff.

ICU CONSULTANT: “Intensive care doctors tend to be relatively individualistic in the way of making decisions tend to be relatively against following protocols, and they’ve got very different backgrounds so that makes it difficult to obtain consensus… being forced to do something when you are against it is associated with poor compliance so need to be part of the decision making.”

The junior staff were concerned that if this consensus was not attained that it would significantly impact the success of protocols in the ICU

ICU JUNIOR: “Consultant agreement to use the protocol [would help adherence] (good luck)”
ICU JUNIOR: “consultant variability [will be a challenge]”
ICU JUNIOR: “personal practice choices of the supervising specialist/medical officer [will be a challenge]”
ICU JUNIOR: “Needs to be a unit policy ie if some consultants use it then 3 days later it changes will make it far less useful”

Ongoing reminders:
All levels of ICU doctors identified that in order to continue to adhere to protocols that are introduced along with education, they would need ongoing reminders. The key
intervention that was thought to improve compliance was regular reminders from the multidisciplinary team and in particular by the clinical pharmacist.

   ICU CONSULTANT“…the pharmacist is the continuous person on the ward round, they’re the executive memory and they are the one’s saying what about the protocol and so then all the junior staff that then change over they go oh yeah of course.”

   ICU JUNIOR: “If there is a pharmacist on the ward round [that would help]”

Barriers to the adherence to protocols were also discussed, and again the primary overarching themes that emerged were clinical and cultural.

**Clinical Barriers:**

*Patients in whom the protocol would be inappropriate:*

From a clinical perspective concern was raised about the potential rigidity of the protocol. The primary concern of the ICU and ID consultants was for the group of patients that didn’t fit into a particular protocol, such as a patient who has a fever of unknown origin, but has a recent history of overseas travel.

   ICU CONSULTANT: “Because then you don’t have JMO’s thinking about what they’re doing then the knee jerk is that the patient then gets whatever has been protocolised even if it’s not appropriate for that patient…”

The junior medical officer respondents also identified this potential risk to patient care.

   ICU JUNIOR: “Most patients are so complex that they don’t fit into a protocol.”
   ICU JUNIOR: “Potential for inappropriate prescribing not considering patient factors eg previous MROs, travel, risk factors.”
   ICU JUNIOR: “…Clinical factors need to be taken into consideration when prescribing antibiotics.”
ICU JUNIOR: “While protocols are generally sound- not appropriate for all patients and in that case can be potentially harmful, ie needs to be some degree of thought when commencing antibiotics for patients”

From an ICU consultant perspective in order to cater for these patients that don’t fit into protocols they wanted the protocols to be flexible enough to allow for deviation if a conscious decision was made to do so based on clinical circumstances.

ICU CONSULTANT: “Genuine issue with making protocols strong enough that they impact on people getting things when they should but not so rigid that they’re applied inappropriately”

The junior staff also identified the importance of a flexible protocol with opt-out option if clinically necessary.

ICU JUNIOR: “Allow scope for clinician preference/choice given complex/varying nature of patients.”

ICU JUNIOR: “ICU patients are often critically ill and may have comorbidities that require the clinician to break protocols.”

**Cultural Barriers:**

*Organisational Governance:*

The issue of a lack organisational governance in this area was identified primarily by the more experienced consultants and in particular those with high level positions in the organisation.

ICU CONSULTANT: “No overarching premise that people should follow policy within this hospital”.

ID CONSULTANT: “…there’s no leadership by enforcement and I don’t know why that is”.
ID CONSULTANT: “…so it’s actually a performance issue that the organisation is not usually willing to take on because of you know the relative lack of those positions, it probably requires peer pressure within a group.”

Prescribing preferences:
The potential unwillingness of medical staff to surrender individual prescribing preferences to follow a protocol was a barrier identified by both ICU and ID consultants, and junior medical officers.

ID CONSULTANT: “All the doctors think this is interfering with my right to be an individual to do what they like when they like…”

ID CONSULTANT: There’s a lot of senior views that I can do anything I like and my view should prevail and I’m an autonomous clinician.”

ICU CONSULTANT: “Part of it [non-compliance] is ego driven, and part of it personally would be ego driven I don’t want to be told by a protocol what to do, none of us do.”

ICU JUNIOR: “Personal practice choices of the supervising specialist/medical officer [would limit success of protocols]”

ICU JUNIOR: “Unwillingness to change [would limit success of protocols]”

ICU JUNIOR: “Consultant variability [would limit success of protocols]”

ICU JUNIOR: “Consultant choice/preference [would limit success of protocols]”

Figure 1: Facilitating factors and barriers identified by each cohort
**Discussion**

Previous studies have noted that different professions identify different barriers and facilitators for the implementation of protocols or guidelines, but none have investigated the disparity between senior and junior medical staff and specialties.\(^\text{18}\) The attitudes of ICU and ID consultants, as well as those of the junior medical staff in ICU have been investigated in relation to both the implementation of and compliance with prescribing protocols for empiric treatment with antimicrobials in this study. The two overarching themes that were used to categorise the enablers and barriers were clinical (knowledge and behaviour related directly to the actual application of the protocol to patient care) and cultural (attitudes and behaviours influenced by professional relationships).

This study shows that in general, protocols or guidelines are viewed positively by all physicians, which is a consistent theme in the literature.\(^\text{1}\) In the ICU studied, currently there are no clinical prescribing protocols that are consistently used. Therefore the positive attitudes canvassed in this study toward antimicrobial prescribing protocols are based on perception, rather than actual experience. This should be kept in mind as most studies investigate the thoughts of physicians familiar with using protocols in their practice rather than a prospective assessment.\(^\text{28}\) In this study, the advantages perceived by the ICU and ID consultants were improvement in evidence base and consistency of practice, whereas the junior medical officers thought that protocols might reduce prescribing errors. The disadvantages perceived by all groups were related to the applicability of protocols to the complex ICU patient population and gaining protocol consensus prior to protocol implementation. These perceptions indicate that the consultants see an advantage of developing protocols as a way to align unit practice
with current evidence, whereas the junior medical officers see the advantages relating more to the usability of protocols. The ID consultants perceive that protocols might have the advantage of more timely delivery of appropriate antimicrobials, with the trade-off of possibly “dumbing down” the medical staff and reducing their inclination for self-directed learning. It may be that the different practice environments of the ID and the ICU consultants influence their perception of likely advantages and disadvantages of protocols, and may account for the disparity between them. The ID consultants mention issues that are relevant both within and outside the ICU environment, and particularly consider the impact when patients leave ICU to go to a general ward where the level of supervision of junior medical officers changes to relative autonomous prescribing. The ICU consultants consider the use of protocols within their unit exclusively, where the consultants are making the majority of the prescribing decisions. The junior medical officers similarly to the ID consultants have experience in other areas of the hospital and this is reflected in their consideration of the advantages and disadvantages of using protocols.

The advantages and disadvantages perceived by participants in this study are similar to those noted in the literature, and rely on appropriate and consistent implementation and application of the protocols.\textsuperscript{2,10,41}

The described potential advantages and disadvantages link strongly to the participants perceived facilitating factors and barriers to protocol implementation and compliance. The factors identified in this study, can be classified into two primary themes, clinical and cultural. Previous studies have identified similar types of themes, in particular a review performed by Cabana et al that identified barriers to protocol implementation describes themes related to physician knowledge, attitudes and behaviour.\textsuperscript{29}

Although this study has identified similar clinical and cultural themes as already in literature, this study has the benefit of demonstrating the common factors, as well as the different perspectives placed on each of them by different grades of medical officers and different medical specialties.\textsuperscript{(see figure 1)}.

**Clinical Facilitators**

*Strong Evidence Base:*
A strong evidence base was an important factor to the ICU and ID consultant cohort, and is mirrored in the literature.\textsuperscript{1,42} One important consideration raised by both specialties was the need for a local antibiogram to support the evidence based recommendations of the protocols. The role of local microbiological epidemiology in the form of an antibiogram is used to guide empiric antimicrobial therapy, and should be used for guideline production.\textsuperscript{43,10} A survey performed on Australian ICU and ID physicians in 2000 identified the importance of local microbiological data to both specialties.\textsuperscript{18} Currently the hospital does not have access to an antibiogram, and this is a concern to the ICU consultants, and recognised by ID consultants to be a key piece of evidence required to enhance the compliance with protocols. In order to enact change a practitioner has to see there is benefit over current practice, and without an antibiogram to support recommended changes, the benefit might be difficult to demonstrate.\textsuperscript{43} The introduction of microbiological data specific to the unit would be a significant facilitator to implementing empiric antimicrobial therapy in protocols.

It is recommended by the Australian Commission on Safety and Quality in Healthcare (ACSQH), that every hospital have local microbiological data available to them including antibiograms, and is a component of the National Safety and Quality Health Service Standard 3.14.3.\textsuperscript{44} It is therefore likely that antibiograms will be available to the hospital in the future, and once offered will be available to ICU to guide empiric treatment and support the writing of related protocols.

The junior medical officers did not consider the evidence base of the protocols in their responses. This probably reflects their lack of involvement in developing guidelines, and a general trust in the content without question. For them it is not about what is in the protocol, but rather when it should be applied and how, which is why they are more concerned with usability and access. ICU is an area where the application of evidence based recommendations is done inconsistently despite it relating specifically to the ICU patient population,\textsuperscript{45} therefore the degree to which having an evidence based protocol would affect an ICU physicians practice is questionable. Although mentioned by the consultants as an important factor to enhance compliance, in practice when faced with an unwell patient, the evidence base of the protocol would probably have no influence on whether a consultant physician chose to comply. Why evidence based practice isn’t consistently applied to the ICU population may be due to unique patient specific factors, although this is not a valid explanation for not applying ICU specific guidelines, so the
question still remains as to the reasons behind this phenomenon, and although it deserves further investigation was not a central issue investigated in this study.

**Involvement in writing:**

The applicability and usability of protocols is enhanced by involving end users in the development and implementation by creating a sense of ownership.\(^{46}\) The ICU consultants would like to be involved in the process of writing the protocols, and made to feel that they had contributed in some fashion. The ID consultants identified that having suitable people involved in the writing was important, but each didn’t feel the need to be directly involved, whereas the ICU consultants did. There was a perceived lack of trust by the ICU consultants in their colleagues, with each consultant wanting direct involvement, whereas the ID cohort were happy for a single representative to be involved on their behalf. It is difficult to postulate based on this study the reason for this difference between specialties, but may be related to each ICU consultant wanting their practice to be prescribed consistently. Handing over to a new consultant every three to four days limits consistency of patient care if the practices of each consultant is different. The application of protocols aims to reduce this rapid change in prescription. It is possible that the ICU consultants each want to be involved so as to have their practice reflected in a protocol used to consistently manage patients, and consequently reduce the regular changing of prescriptions with physician change.

Again the junior medical officers clearly do not identify themselves as contributors to the actual development and writing of protocols, and presumably trust that the appropriate people have authored the protocol if it has been endorsed by the unit. It may also be a reflection of the short time they spend on a rotation through the unit, and the consequent lack of engagement in longer-term initiatives.

**Regular audit and feedback:**

Audit and feedback are an important part of any quality improvement process, and necessary in order to review the impact of an intervention.\(^{26}\) Both the ICU and ID consultant cohorts considered audit and feedback to be an important component of protocol implementation. It was felt that both pre and post-implementation audits of practice should be undertaken, and feedback be provided to the unit. The ICU
consultant cohort were interested in investigating their current practice and appropriateness of prescribing decisions in relation to local epidemiology and patient outcomes. Audit and feedback should be considered an essential component of any practice change intervention, and given it is time and resource intensive should be factored in before implementation. The process of formal audit of subjective measures such as antimicrobial use and MRO emergence are valid for determining the impact of the protocols on the unit. In addition quantifying compliance factors such as how many patients did not receive protocol therapy and why, when and why treatment changes occurred after patients were commenced on protocol, and other influencing factors is important to assess clinical applicability. Informal audit and direct prescriber feedback can assist in relaying fears that doctors might have about applying a protocol to a particular patient, and can be done at the time of decision making.

The junior medical officers did not consider audit and feedback in their responses which may indicate a lack of involvement in quality improvement activities early in their careers. Consideration should be given to engaging junior medical officers in the development, implementation and review of quality improvement projects such as prescribing protocols.

Audit and feedback are both simple factors that can be addressed and implemented with protocols in order to enhance their success.

*Clear format and ease of access:*

The format and accessibility of the protocol have been identified by many health professionals as important factors to aid in the usability of protocols and guidelines. The junior medical officers identified the need for easy access and readability of protocols in order to regularly use them. A number of ID consultants also identified these factors as important, where their ICU consultant colleagues did not. In the ICU the consultant will generally make a decision on what treatment to prescribe for a patient, and then the task of actually prescribing that treatment is assigned to a junior medical officer. Given this workflow the ICU consultants wouldn’t need to access the protocol, just ask for it to be enacted. The junior medical officer would need to know exactly where to find it, and be able to interpret the protocol in a timely manner in order to prescribe it. The ID consultants and junior medical officers know that on the general wards junior medical officers are responsible for many patients and supervision is
limited. Having fast access to a protocol that is easy to read and apply is critical. The junior medical officers do not have time to search for information and whether they can easily apply a protocol will be the difference between a patient receiving that therapy, or individual prescriber preference. The ID consultants identified that access may already limit adherence to existing protocols throughout the hospital for these reasons. Having access to protocols electronically has been identified as a factor that would encourage their uptake both within our study, and in others.\textsuperscript{46} The study ICU has a fully functioning electronic prescribing system, which has the capacity to support the addition of protocols, and could significantly improve the usability and access of new protocols in the ICU. Given that the medical staff use the electronic system for all prescribing, having the protocols as an order set that can be selected and enacted in just a few steps would mean that the prescriber does not have to leave the program to access the protocol, and would aid in timely prescribing.

\textit{Education:}

All participants recognise the potential for protocols to enhance education, and the need for educating the staff on protocol implementation. The ICU has a structured education program which would support a protocol related education initiative. It is recognised that the implementation of protocols could offer an opportunity to deliver education on general antimicrobial prescribing, in addition to education regarding the protocols specifically. Using a multi modal approach has been identified as an effective method for the delivery of education and could include platforms such as direct feedback, academic detailing, reminders, and audit.\textsuperscript{1,20} The ICU and ID consultants were concerned that the junior medical officers may use protocols to avoid self-directed learning regarding antimicrobials. Interestingly this was contrary to the opinions of the junior staff as they identified that they would like additional education with the implementation of protocols. A survey conducted of ICU staff in Australia and New Zealand in 2007 assessed the effectiveness of different interventions to aid in practice change.\textsuperscript{47} They noted that interventions should be individualised to the needs of the target audience and identifying potential barriers in each stakeholder group aids in this individualised approach.\textsuperscript{47} The most effective educational strategy remains unknown, and probably changes with different settings.\textsuperscript{47} In-services, academic detailing, written communication such as flyers, clinical leaders and informal ‘chats’ are some initiatives that have been successfully employed in an ICU setting, and a combination of
these interventions is probably the best approach. Providing appropriate education to a diverse workforce such as in ICU including nursing, medical and allied health, and the varying levels of experience within these groups can be challenging. To manage this issue a flexible model of education is required and different strategies may need to be employed. The fast turnover of junior medical staff in the ICU and the large volume of education and information they are exposed to means, education provided to them should be succinct, and the content easy to retain. It is important to have a structured education plan, and identify the needs of the target audience before providing education. Any educational strategy is likely to be time and resource intensive, but obviously crucial to the successful implementation of protocols.

Cultural facilitating factors:

Relationship between developers and users:

In keeping with other factors important in the development of protocols, the ICU consultants also wanted to ensure that the people contributing to the writing of protocols were considered experts, in order to gain the respect of the users. This was important to avoid the issue of the ICU consultants feeling like they were being commanded to follow something rather than choosing to. The ICU and ID consultants all identified that engagement of the ICU physicians was necessary, but how to optimally achieve this is unknown. It is impossible to ensure that there is mutual respect between every user and developer given the complexity of interpersonal relationships, and so the degree to which this factor would influence each physician is unclear.

Identifying who should contribute to the writing of the protocol is a very important task, and ensuring that this group have the necessary skills and expertise is critical. Given that the development and writing is one of the first steps to implementation the overall success of the protocol is dependent on this stage. The ICU consultants have identified their desire to be involved in the writing, it could be considered that the notion of a positive relationship between users and developers is another mechanism for them to express the perceived importance of their direct involvement. It is interesting that the ICU consultants consider it important that experts write the protocols, whilst also wanting direct involvement themselves. It seems that their desire to be involved indicates that they may be a highly individualistic specialty and not want anyone else to write the protocols, despite placing importance on this factor.
Consensus by key stakeholders:

The ability to gain general consensus amongst ICU consultants, and also with external specialty units is a very difficult task, but considered an important one by all participants. The impact of variable prescribing practices within units limits the ability to obtain consensus amongst all stakeholders. The concept of variable prescribing among prescribers is not unique to the ICU, and occurs commonly at all levels of the healthcare system. Gaining consensus was considered one of the most important factors necessary to facilitate adherence to protocols in this study. It is common for consultant physicians to use their experience to aid their decision making, and as such it is difficult to change that behaviour and gain consensus, as this experiential prescribing has been successful in the past. The complexity and varied nature of the patient population in the ICU makes it an area where obtaining consensus amongst prescribers is particularly difficult. The fact that ICU lacks the application of strong evidence for many practices, invites individual interpretation of the available literature and related variable prescribing practices. The junior medical officers recognise the difficulty in obtaining consensus among the ICU consultants, given their individual prescribing preferences. They recognise that if not all consultants are on board with the protocols, and deviate from them then the overall use and acceptance by the junior medical officers will be limited. Without consultant consensus and a commitment to consistently follow protocols, the junior staff will simply not comply at the risk of appearing insubordinate. It would seem that there is a fine balance between gaining consensus for standardisation of patient care, without limiting the physicians’ autonomy which may be difficult to achieve. Although consensus is considered important by the ICU consultants it demands compromise, and given the importance placed on their autonomy it is difficult to envision how compromises might be attained. The ability to gain consensus presumably also relies on the other aforementioned factors such as evidence base, and a desire to be involved in the writing of protocols. Without evidence to support a change in practice, it may be difficult to convince some physicians to compromise on their experiential prescribing practices.

Ongoing reminders:
Regular reminders were considered an important part of implementation, identified by all levels of ICU participants, and reflective of reports in the literature.\textsuperscript{2,25,22} Given the ICU clinical pharmacist is a consistent member of the team on ward rounds, there was suggestion that they are well placed to offer a personalised reminder to physicians about protocols. One key role of the clinical pharmacist on the ICU ward round is to make evidence based prescribing recommendations, and therefore reminding the medical staff of the protocols is a task well within their scope of practice.\textsuperscript{51} In the past a factor that lead to the lack of consistent adherence to protocols in the study ICU, such as nutrition and bowel protocols was a lack of reminders. The rapid turnover of clinical team, and also junior medical officers means that they may not be aware of, or forget about the existence of protocols, which is a phenomenon described in the literature.\textsuperscript{2}

When implemented as part of a multifaceted educational strategy reminder systems enhance protocol compliance.\textsuperscript{20,47} Different types of reminders including written, verbal and visual reminders should be employed, as a mixture of both passive and active interventions.\textsuperscript{47} Active interventions such as reminders on ward rounds and casual interactions with medical staff at the point of prescribing are particularly effective, and the clinical pharmacist is well placed to offer these.\textsuperscript{25,47} Passive reminders such as having the protocol visible around the unit, checklists and lanyard cards are all useful activities to aid protocol utilisation, and the use of electronic systems to display reminders is also of particular benefit.\textsuperscript{2,47,20} One factor to consider when interpreting the importance placed on reminders in this study, is the fact that the data collector was an ICU clinical pharmacist, who was known to all participants, and simply by being there might have influenced the responses regarding the role of the pharmacist in the reminder system.\textsuperscript{39}

\textbf{Clinical Barriers:}

\textit{Patients that need exclusion:}

One barrier that was identified by all participants both junior medical officers and ICU and ID consultants was the fact that some patients would fall outside of the scope of the protocols. Given the acuity and heterogeneity of the patient population in the ICU, this is potentially a significant problem. The ICU and ID consultant cohort were concerned that the junior medical officers may not think about patients who are “outside the box” and may blindly start these patients on protocol therapy without thinking about
suitability. The junior medical officers recognised that there would be a number of ICU patients who would not be suitable for protocol based therapy, and suggested that the protocols include inclusion and exclusion criteria to assist in identifying those patients. The junior staff were concerned with being able to identify which patients should and shouldn’t receive the protocol, whereas the senior ICU staff want to be able to control it.

A post implementation audit would need to investigate how many patients were unsuitable for protocol therapy, and how these situations were managed to ascertain whether this is a significant problem in the unit. The ICU consultant group were concerned about these patients, and identified that there would often be times where deviation from the protocol would be necessary. It was very important that the protocols had a degree of flexibility to allow for conscious violation of the protocol by a consultant physician with good clinical reason. The issue with protocol flexibility is not unique to this study and has been identified as an important factor for uptake of protocols in others.\textsuperscript{52,33} Allowing for flexibility of course is offset by allowing a physician not to comply with a protocol. Although there are times where patients are not suitable, an important question is what degree of flexibility should be tolerated before it is considered non-compliance?

\textbf{Cultural barriers:}

\textit{Organisational responsibility:}

The ICU and ID consultants noted a lack of governance and discipline of the senior consultant medical officers throughout the hospital, by the organisation, as a factor that limits protocol compliance. It is important for the success of protocols that the organisation support their use and enforce compliance.\textsuperscript{30} The culture of the study hospital is such that there are no direct consequences, particularly for the consultant medical officers, for non-compliance or non-adherence to hospital initiatives. This issue may be compounded by the fact that the institution as a whole, has a large visiting medical officer (VMO) workforce, and the governance of this group is unclear. This barrier is a very difficult one to address, and although many of the consultants identified this as a significant issue, it would be interesting to explore the ways in which they would envisage this enforcement to occur. If the organisation attempted to enforce compliance it may cause some discontent with senior medical staff, due to the issues identified in this study, such as their fear of loss of autonomy and importance of
allowing deviation from protocols when necessary. These issues are potentially not unique to the ICU setting and implementing a culture of consequences for actions would be a difficult adjustment for many consultant physicians in the current cultural climate. The junior medical officers were not concerned with the overall lack of institutional governance, presumably as their governance structure is perceived to be their senior doctors. The overall organisational culture however, does affect all staff, and influence their perception of what is and is not acceptable in terms of compliance.

Prescribing preferences:

Variable prescribing is an interesting concept that attempts to describe the fact that although many physicians may know the evidence for a particular therapy, there is still variation in prescribing practices. As already mentioned in the context of gaining consensus, variable prescribing preferences of consultants in the ICU may present a barrier to protocol adherence. The potential unwillingness of each consultant to surrender their right to prescribe their preferred therapy was identified by both the consultant and junior medical officers, although each group had a different reason for concern. The consultant ICU physicians were concerned about a loss of autonomy, and although the ID consultants were not concerned about their own autonomy, they identified that this would be an issue for their ICU colleagues who were aware that their prescribing preferences varied within the unit, however felt it was their right to prescribe autonomously. Experienced expert physicians are confident in their decision making and rely on their past experiences to guide their decision. Consequently, it is difficult therefore to change their behaviour. There is suggestion that any limitation to autonomous prescribing is detrimental to the practice of medicine, which clearly highlights the importance that physicians place on the loss of this privilege. Given that protocols do limit autonomy to some degree, thoughts such as these indicate that this is an important limitation to the compliance of protocols by senior medical staff. Recent studies suggest that when prescribing antimicrobials senior doctors feel that they should be exempt from complying with protocols and guidelines particularly in an organisation which fosters a culture of autonomy, and doesn’t interfere with physician practices. In the current ICU environment a consultant may prescribe their choice of therapy, only to have that changed by the next consultant 3 days later if they have a different preference. Such a variation in patient care leads to a lower quality of care, and consequently more adverse outcomes. The junior medical staff were not
concerned with a loss of their own prescribing autonomy, which may be due to the fact that they do not undertake much decision making prescribing in the ICU. The consequence of variable prescribing among the ICU consultants creates difficulty for the junior medical staff, who prescribe based on consultant preference, and will do so to maintain relationships and professional hierarchy even at the expense of best practice. They were concerned with differing consultant prescribing preferences, the likely reluctance of consultants to surrender their autonomy and the potential for this to hinder the consistent use of protocols in the unit. The lack of prescribing autonomy of the junior medical officers in ICU is different from their experience on the ward, where they are required to make prescribing decisions, often in the absence of supervision. The lack of opportunity to do this in ICU may limit the process of the junior medical officer developing their own prescribing practices, and the introduction of protocols may further inhibit that. This is an interesting concept that deserves further investigation.

This study has identified barriers and enabling factors considered by ICU and ID consultants and junior medical officers in the ICU, and although some of these factors are similar among these cohorts, the issues behind them are different.

Face to face interviews were the chosen methodology to investigate the opinions of the consultant cohort. The primary disadvantage of this method is the significant time it takes to undertake the interviews and the added time to transcribe them. Despite this disadvantage this method was chosen in order for the interviewer to gain extra information in the form of non-verbal communication such as body language, verbal language and tone, compared with non face-to-face techniques such as questionnaires and surveys. The other advantage to conducting face-to-face interviews is that they also force an immediate response, without giving the interviewee time to fully reflect on their answer, which may lead to a more honest response. Due to the disadvantage of the significant time and resource limitations associated with interviewing, it would be impractical to personally face to face interview all junior medical officers, and as such it was decided that this cohort were to be surveyed instead.

A semi-structured format was the chosen interview format to allow the interviewer more scope to probe and encourage open discussion around any subject that the interviewee
might mention. Exploration of themes, even if not considered before the interview, can take place and the freedom for the interviewee to express themselves in their own way is encouraged.\textsuperscript{56}

The mode of thematic analysis utilised in this study is based on an integrated approach as described by Bradley et al.\textsuperscript{38} This form of hybrid data analysis takes some of its methodology from grounded theory by using inductive coding, however unlike grounded theory the inductive coding is used in combination with some deductive coding. In this study using the standard form of grounded theory would have been an inappropriate method of data analysis, as some themes were known prior to the data collection, were used to design the interview and survey questions, and therefore required deductive coding.\textsuperscript{38} This hybrid form of thematic analysis allows flexibility and can help to identify relationships between different sets of data from different situations, such as interviews and survey data, whereas grounded theory is best used to analyse a single data set.\textsuperscript{40}

One limitation to this study was the fact that there was a single researcher, which means that there is no external validation of the data and the identified themes, to avoid researcher bias, as is recommended in thematic analysis.\textsuperscript{40} The fact that the interviewer was a clinical pharmacist with a background in this ICU and a particular interest in ID, and has a close professional relationship with all participants should be considered. The role of the researcher in this type of qualitative data collection is not passive and may influence the results obtained.\textsuperscript{39} When the interviewer is known to the participants, and particularly when they are professionally respected it is more likely that the interviewee will open up and offer more honest opinions.\textsuperscript{39} It may however influence the way that the interviewees respond, as they may be more likely to answer and offer opinions that they think the interviewer would prefer.\textsuperscript{39} Another limitation to this study is the fact that the survey response rate from the junior medical officer cohort was only 25%, which is significantly less than other similar studies, and limits the generalizability of the results of this cohort.\textsuperscript{28} In future it might be more beneficial to consider methodology utilising focus groups for this particular cohort in order to get more engagement and detailed responses and therefore more generalizable results. This study is a single centre and single unit study and the results may not be generalizable to other areas of the hospital or other organisations.
The setting and structure of the ICU and hospital environment should be considered contributing factors to the results.

One strength of this study is that like others it explored the attitudes of different specialties, and identified similar themes, however unlike others, it also explored different levels of expertise. This has elicited a better understanding of the similarities and differences in the opinions of these key stakeholders. Another strength is that a large majority of the consultants from the two cohorts were interviewed, providing a good representation of the views held by the ICU and ID department in this organisation. Unlike other similar studies, this study looked at the opinion of participants in a relatively protocol naïve environment, where others generally describe participant’s thoughts on previous experiences with protocols. This offers the advantage of being able to apply these findings to the implementation of protocols to enhance their uptake. There is also the potential to re-examine these opinions to measure their perceived importance after implementation.

The ICU is a unique environment and the culture of the unit plays a significant role in the attitudes and opinions of the medical staff. The clinical applicability of what has been found in this study should be considered in this context. The ICU consultants were concerned about many factors in relation to protocol based prescribing, and identifying which of these truly influence the adherence to a protocol at the bedside of a critically ill patient is important. The ICU consultants are faced every day with a very vulnerable patient population in a high risk environment. The management of critically unwell septic patient can afford no error as the risk of mortality in this population is high. It is this high stakes environment where the physician may need to feel in control, and might fear the use of a protocol that doesn’t align with their usual practice. The fact that they have said that evidence base, consensus, and relationships are all important to their acceptance of protocols is probably true in many situations, but in that critical moment where the risk is high and the patient might die it may not be the critical deciding factor in prescribing choices. It is these situations where the consultants want the protocols to allow flexibility, in order to be in control of therapeutic choice. This is supported by literature that suggests that the sicker patient the less likely they are to receive evidence based care in the ICU, which indicates that retaining prescriber autonomy is particularly important in this setting. The issue with flexibility and the ability to deviate from standard protocols is that with enough deviation one could be considered to be non-compliant. It allows the consultant an opportunity to not comply
and have an excuse to do so, which limits the applicability of protocols and their advantage of standardising patient care.

Many of the identified factors such as audit and feedback, reminders, education and format and access should all be considered as a part of any quality improvement initiative. The importance of these factors to the participants is expected and not unique to this setting, and therefore relatively easy to address during the introduction of protocols.

The culture of the ICU is one where the consultants manage the unit, the extent to which is consultant dependent. The junior staff found factors related to access and usability important, and given their lack of decision making prescribing this is to be expected. The pressure of managing a critically ill patient affects the junior medical officers, and having the ability to prescribe a standard therapy for a particular patient in a timely manner, and know that the consultant will be happy does relieve some pressure from those situations.

The results from this study clearly indicate that the cultural factors that influence consultant physicians need to be addressed as a priority. The cultural factors including prescriber autonomy, the impact of trusting relationships between physicians, and the issue of organisational governance have to be managed before the clinical factors such as development and the quality improvement process can be considered.

The applicability of protocols to the management of critically unwell patients, including situations where they might be inappropriate, needs to be at the core of managing these factors, and the unique environment of ICU should be taken into account.

The knowledge of what influences different physicians is important to enable successful implementation of any practice change, and identifying particular motivators and deterrents unique to different grades of medical officers is valuable for tailoring interventions to these groups. Further study into understanding the thoughts and opinions of participants before and after the implementation of protocols warrants consideration. Using the results from this study to assist in the implementation of protocols to the ICU, and then reassessing and comparing post-implementation might offer insight to which factors are truly important at the point of prescribing rather than perceived to be. A system for supporting the ICU doctor at the point of decision making, should be employed for further study. Potentially having a trusted colleague present, who is not directly involved in the patient care, such as an ID physician or pharmacist, when the tough decision about whether to prescribe the protocol to a
critically unwell patient presents, might enhance uptake. At the very least prospective data collection regarding when and why (and under which consultant) a patient does not receive the protocol will help to understand what influences prescribing decisions in a critical setting, and whether this can be altered.

The unique feature of this study is the knowledge gained regarding the issues that are particular to the ICU, similar and dissimilar between different levels of medical officers and specialties. These discrepancies deserve further investigation, as does the complex and unique relationship between the senior and junior medical staff in the ICU, and the impact that it has on their thoughts and opinion towards protocols. A more in depth investigation of the junior staff should occur using interviews or focus groups in order to gain a deeper understanding of their opinions. Whether the junior staff outside of ICU have different opinions from those within the unit should be investigated.

There are specific factors that are important to different levels and specialties of medical staff in relation to protocol implementation and compliance. The cultural factors need to be considered and addressed, before any clinical factors in order to increase the likely successful implementation, and ongoing compliance with antimicrobial prescribing protocols in the unique setting of an ICU.
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Appendix 1

Interview template guide for consultant interviews

1. How many years’ experience do you have practising in any hospital as a medical officer?
2. Please describe in as much detail as possible your thoughts on prescribing protocols in the ICU
   a. What disadvantages/advantages are there to prescribing protocols
3. Would you use prescribing protocols for the empiric use of antimicrobials for common infections if they were implemented into ICU?
   a. Where do you see them fitting into your practice?
4. What challenges do you foresee that might limit the successful implementation of prescribing protocols?
5. In your opinion what could be done to encourage the successful implementation and uptake of prescribing protocols?
6. In your opinion what are the general limitations to protocol based prescribing?
7. What do you think would make your colleagues more likely to use a protocol in practice?
8. Any other comments
Appendix 2
Survey Questionnaire for junior medical staff

A qualitative exploration of physician attitudes toward implementing protocol based prescribing for empiric use of antimicrobials for common infections in a tertiary Intensive Care Unit.

1. How many years’ experience do you have practising in any hospital?

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

2. Please describe in as much detail as possible your thoughts about what
a. Helps the use of prescribing protocols in the ICU, both by yourself and others?

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

b. Hinders the use of prescribing protocols, both by yourself and others?

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

3. Would you use prescribing protocols for the empiric use of antimicrobials for common infections if they were implemented into ICU?
   a. If yes: Where do you see them fitting into your practice?
b. If no: Why not?

4. What challenges do you foresee that might limit the successful implementation of prescribing protocols for the empiric use of antimicrobials for common infections in ICU, both for you and others?

5. In your opinion what could be done to encourage the successful implementation and uptake of prescribing protocols for the empiric use of antimicrobials for common infections in the ICU?

6. In your opinion what are the limitations to protocol based prescribing?
7. What would make you or your colleagues more likely to use a protocol in practice?

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

8. Is it advantageous to implement and use protocols in ICU?
   a. Why or Why not?

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

   b. In what ways?

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

9. Is it disadvantageous to implement and use protocols in ICU?
   a. Why or Why not?
b. In what ways?

10. Any other comments