

Cultural dimensions relevant to antimicrobial stewardship: the contribution of individualism and power distance to perioperative prescribing practices in European hospitals

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Abstract. Antimicrobial prescribing practices are influenced by many factors, including culture and societal norms. Sociological researchers have previously proposed dimensions by which cultures may be defined. We sought to examine the association between cultural dimensions and the proportion of surgical prophylaxis inappropriately continued for longer than 24 h (PAP >24) by evaluating published European Centre for Disease Prevention and Control point-prevalence data from European countries. A negative correlation between individualism and PAP >24 was evident, whereas power distance and PAP >24 were positively correlated. A positive correlation was also observed between uncertainty avoidance and PAP >24. Findings imply that prolonged surgical antibiotic prophylaxis is associated with collectivism viz. a preference for a tight-knit societal framework. The impact of societal and cultural factors on antimicrobial prescribing has not been thoroughly evaluated in Australia, and these potential influences require further consideration in formulating targeted interventions for improved prescribing practices.

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Introduction

Infection prevention strategies frequently seek to modify the behaviour of healthcare workers, and antimicrobial stewardship interventions have traditionally focused on academic detailing of prescribers to enhance prescribing practices.^{1,2} However, individual behaviours are influenced by many upstream factors, including culture and societal norms.³ Sociological researchers, particularly Geert Hofstede, have suggested various dimensions in which cultures may differ.⁴ The European continent, with its diversity of cultures as well as variation in healthcare outcomes, provides an ideal milieu to study these differences.

Prompted by research findings of Borg *et al.* who found an ecological correlation between cultural measures of uncertainty avoidance and the proportion of surgical prophylaxis inappropriately continued for longer than 24 h in European countries,⁵ we sought to examine the association between other cultural dimensions and this measure of inappropriate prescribing.

Methods

Cultural dimensions defined by Hofstede were applied for the purposes of this study,⁴ given possible relationships between these cultural dimensions and practice surrounding

delivery of surgical antibiotic prophylaxis. These cultural dimensions are defined in Table 1. Given the potential for each to influence or impact prescribing practices, they were all included as possible explanatory variables. Individualism may influence the degree to which prescribing relates to the individual patient, compared with the degree to which antibiotics may impact on the wider community of patients. Masculinity may relate to the degree to which antibiotics are continued to reduce the perceived chance of failure (infection). Power distance may contribute to the degree to which antibiotic prescribing decisions are made by senior medical staff and unchallenged by emerging evidence. Prescribers with high uncertainty avoidance would be more likely to administer antibiotics in dubious clinical scenarios and for a more prolonged duration, whereas prescribers with a dominant long-term orientation may be more inclined to use appropriate antibiotics because of their consciousness of the development of resistance in the future.

As an evaluable marker of inappropriate antibiotic prescribing, we used the measure of the proportion of surgical antibiotic prophylaxis continued for longer than 24 h (PAP >24) in European centres.

To explore correlations between defined cultural dimensions and PAP >24, we used the European Centre for Disease

Implications

- Hofstede's framework may be applied to describe societal culture according to dimensions of individualism, power distance, uncertainty avoidance, masculinity and long-term orientation.
- Point-prevalence data from European countries demonstrated a negative correlation between individualism and inappropriately prolonged surgical antibiotic prophylaxis. Conversely, power distance and uncertainty avoidance were positively associated with inappropriate prescribing practices. Findings imply that prolonged surgical antibiotic prophylaxis is associated with collectivism.
- The impact of cultural factors on antimicrobial prescribing has not been thoroughly evaluated in Australia, and these potential influences require further consideration in formulating targeted interventions for improved prescribing practices.

Table 1. Definitions of cultural dimensions relevant to antimicrobial stewardship (adapted from Hofstede⁴)

Cultural dimension	Definition
Power distance	The degree to which less powerful members of a society accept and expect that power is distributed unequally.
Individualism	The preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families.
Masculinity	A preference in society for achievement, heroism, assertiveness and material rewards for success.
Uncertainty avoidance	The degree to which the members of a society feel uncomfortable with uncertainty and ambiguity.
Long-term orientation	The degree to which a society encourages thrift and efforts in modern education as a way of preparing for the future.

Prevention and Control (ECDC) point-prevalence data published by Borg *et al.* but excluded Sweden and Denmark (because of poor representativeness in the 2011 ECDC Point Prevalence Survey⁶) and Cyprus and Iceland (as cultural measures were drawn jointly from community and hospital sectors). A linear regression analysis was performed using comparable methods to the previous study by Borg *et al.*⁵ Stata 13 (StataCorp, College Station, TX, USA) was used for statistical analyses. Population-level data only were analysed and ethics review was therefore not required for this study.

Results

Figure 1 summarises the relationships between studied cultural dimensions and PAP >24. A negative correlation between individualism and PAP >24 (co-efficient -0.55 , 95% CI: -0.87 , -0.23 , $r^2 = 35\%$) was evident, whereas power distance and PAP >24 (co-efficient 0.35 , 95% CI: 0.05 , 0.66 ,

$r^2 = 19\%$) were positively correlated. A positive correlation was also observed between uncertainty avoidance and PAP >24 (co-efficient -0.36 , 95% CI: 0.04 , 0.68 , $r^2 = 19\%$). There were no significant associations between masculinity (co-efficient 0.14 , 95% CI: -0.12 , 0.41 , $r^2 = 5\%$) or long-term orientation (co-efficient -0.08 , 95% CI: -0.90 , 0.74 , $r^2 = 0.2\%$), and PAP >24.

Discussion

Our findings bring further insight to potential cultural influences relevant to prescribing practices, as we employed a multi-dimensional approach. Surprisingly, we identified a negative correlation between individualism and prolonged surgical antibiotic prophylaxis. This would imply that prolonged surgical antibiotic prophylaxis is associated with collectivism viz. a preference for a tight-knit societal framework. This unexpected association may be confounded by the known positive relationship between individualism and national wealth,⁴ where education and dissemination of guidelines may be more effective in wealthier countries. In support of a confounding influence of wealth and education, others have found associations between socioeconomic indicators and antibiotic use and resistance.^{7,8} Consistent with previous evaluation of European prescribing patterns,⁹ we found a positive correlation between uncertainty avoidance and prolonged surgical antibiotic prophylaxis. Similarly, our finding of a correlation between power distance and prolonged surgical antibiotic prophylaxis is consistent with European studies of prescribing practices.¹⁰

And what of Australia? Not surprisingly, on Hofstede's index, Australia has similar characteristics as the United Kingdom – highly individualistic, a relatively low power distance, competitive and meritocratic ('masculine') and with an intermediate tendency to uncertainty avoidance.¹¹ The impact of societal and cultural factors on antimicrobial prescribing has not been thoroughly evaluated in Australia, and these potential influences require further validation. Recently released national standards for antimicrobial prescribing within Australian hospital and community settings¹² usher the need for greater understanding of factors influencing prescribing patterns to inform future interventions for improved antimicrobial prescribing. Prescribing behaviours outside of hospital settings have not been widely evaluated in Australia,¹³ and assessment of cultural dimensions would bring definition to potential interventions to improve prescribing practices in these settings.

A limitation of our study is the fact that our analysis may not fully account for complexity of inter-relationships between dimensions. Indeed, others have suggested that inter-relationships do exist.^{3,10} However, we believe that our findings are hypothesis-generating, and are a valid contribution to future research. Caution is also required in extrapolating correlations to individuals or organisations from the characteristics of a country, as this may represent an ecological fallacy. Nonetheless, it is interesting to speculate on how the culture of units, organisations and countries, and their

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