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Prolonged perioperative surgical prophylaxis within European hospitals: an exercise in uncertainty avoidance?

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Objectives: Socio-cultural factors have been hypothesized to be important drivers for inappropriate antibiotic prescribing in ambulatory care. This study sought to assess any potential role in perioperative surgical prophylaxis (PAP) administered for >24 h (PAP>24). Within hospitals, PAP continues to be administered for longer than 24 h, despite unequivocal evidence of ineffectiveness beyond this period. A recently published European Centre for Disease Prevention and Control (ECDC) point prevalence survey (PPS) has reported that in 70% of participating countries, PAP>24 was administered in more than half of the surgical operations surveyed.

Methods: Correlation and simple linear regression modelling was performed using the PAP>24 proportions for the countries in the ECDC PPS report and the respective scores for the cultural construct of uncertainty avoidance (UA), as detailed by Hofstede.

Results: Pearson correlation analysis produced a moderately strong coefficient (*r*) of 0.50 (95% CI 0.16–0.74; P=0.007). Simple regression yielded a model of PAP>24=29.87+0.40UA (R^2=0.25; P=0.007).

Conclusions: Cultural factors, namely UA, appear to be an important driver for PAP>24. Any strategy aimed at improving prolonged PAP should be informed by clear knowledge of local socio-cultural barriers, so as to achieve the most successful intervention possible.

Keywords: culture, Hofstede, Belgium, antibiotics

Introduction

As part of a bundle of measures, perioperative surgical prophylaxis (PAP) is a valuable tool to reduce post-operative surgical site infections.[1] It has long been acknowledged that the duration of PAP should not exceed 24 h and that excessively prolonged PAP beyond this time period offers no additional benefit.[2] Indeed, prolonged PAP has been shown to be a driver for the development of antimicrobial resistance.[3] Nevertheless, a recently published European Centre for Disease Prevention and Control (ECDC) point prevalence survey (PPS) of healthcare-associated infections and antimicrobial use in European acute care hospitals reported that, in 70% of participating countries, PAP beyond 24 h (PAP>24) was administered in more than half of the surgical operations surveyed.[4] In seven countries, PAP>24 was administered to >75% of patients.

Cultural factors have been proposed as important drivers for inappropriate antibiotic prescribing within community care.[5,6] These studies have identified the cultural anthropological dimension of uncertainty avoidance (UA) as being particularly relevant in explaining why doctors in some European countries have a greater propensity to prescribe antibiotics for predominantly viral conditions such as colds, flu and sore throat, in the face of clear scientific evidence. UA is described in Geert Hofstede's model of cultural dimensions as a construct estimating the extent to which a society tolerates uncertainty and ambiguity.[6,7] Such cultures often try to counteract the unease created by situations of uncertainty through the adoption of dogmatic and excessive measures, even where there is no evidence of cost-effectiveness or risk attenuation. Outcome uncertainty related to post-operative surgical site infection complications could offer a theoretically plausible behavioural explanation for PAP>24 practices. The study therefore sought to identify correlations between PAP>24 and the respective national UA scores reported by Hofstede.

Methods

For the purpose of the study, data on PAP>24 were extracted from the ECDC PPS 2011–12 report. These related to the proportion of PAP given for more than 1 day as a percentage of the total antimicrobials prescribed for PAP, by country. Proportions from two countries (Denmark and Sweden) were excluded since they were indicated in the PPS report as having very poor national representativeness in terms of numbers and characteristics. Individual scores for UA were collated for each country from Hofstede's publicly available resource accessed at http://www.geerthofstede.nl/research--vsm. Respective data per country were then inputted in Excel (Microsoft Excel

2003, Microsoft Corp.) for preliminary evaluation. Pearson correlation was used to compare proportions of PAP>24, arranged hierarchically, versus their respective UA country scores. A simple linear regression model was subsequently constructed using the same two sets of data. Analyses were performed in Medcalc, version 12.5.0.0 (Medcalc Software, Mariakerke, Belgium). A P value of 0.05 was taken to indicate statistical significance.

Results

PAP>24 in the countries performing the ECDC PPS ranged from 29.1% in UK (England) to 92.3% in Romania (Table 1). Pearson correlation analysis between PAP>24 proportions and UA scores for the same country produced a coefficient (r) of 0.50 (95% CI 0.16–0.74) and a P value of 0.007. Simple regression yielded a model of PAP>24=29.87+0.40UA (R^2=0.25; P=0.007). All the data points fitted into the 95% prediction interval with the exception of Belgium (Figure 1). When the regression model was repeated without the Belgian data, the model achieved a coefficient of determination (R^2) of 0.34 and P=0.001.

Table 1. PAP>24 proportions as reported in the ECDC PPS report together with concomitant UA scores for the respective countries (sourced from http://www.geerthofstede.nl/research--vsm, unless otherwise indicated)

Country	UA score	PAP>24 (%)
Austria	70	77.2
Belgium	94	35.0
Bulgaria	85	79.5
Croatia	80	67.3
Cyprus	112[a]	76.3
Czech Republic	74	49.6
Denmark	poor PPS representativeness	
Estonia	60	62.9
Finland	59	42.7
France	86	68.4
Germany	65	70.2
Greece	112	79.5
Hungary	82	53.5
Iceland	49[b]	37.2
Ireland	35	46.7
Italy	75	63.5
Latvia	63	55.4
Lithuania	65	55.0
Luxembourg	70	59.4
Malta	96	82.7
Netherlands	53	53.6
Norway	50	30.1
Poland	93	43.5
Portugal	104	66.5
Romania	90	92.3
Slovakia	51	81.5
Slovenia	88	58.3
Spain	86	53.3
Sweden	poor PPS representativeness	
UK (England)	35	29.1

Additional data sources:
[a]http://www.econ.uniurb.it/materiale/7716_Dimitratos%20et%20al%202011.pdf.
[b]http://web.cs.wpi.edu/~kal/elearn/elearn05.pdf.

Discussion

The regression model suggests that up to a third of the variation in PAP>24 in Europe can be predicted from the national cultural dimension of UA. Considering that these are totally dissimilar measurements, such an association appears highly remarkable. However, as in all such models, it should be pointed out that correlation does not automatically infer causality and potential confounders must always be kept in mind. Confounding from economic factors is unlikely since no correlation was identified between PAP>24 and GDP per capita or healthcare expenditure in the countries studied. However, the socio-demographic characteristics of the participating hospitals were not available for analysis; nevertheless, the considerable number of hospitals involved in the ECDC PPS would make such confounding unlikely. In addition, the percentage of prolonged PAP is by design overestimated in any PPS, but, due to the standardized PPS protocol, any overestimation would be uniform across all participants. This means that the inter-hospital and inter-country comparisons of the indicator will remain valid.[4]

The identified correlation suggests a strong and plausible indication of concomitant variation. Just as community doctors in high-UA countries have been hypothesized to prescribe antibiotics for viral respiratory infections as a defensive response to their inherent cultural unease with ambiguity,[5,6] it is logical to surmise that hospital doctors in the same countries would similarly prescribe PAP beyond its recommended 24 h duration out of uncertainty of outcome. Indeed, it is not uncommon to hear anecdotes of 'just in case' approaches to hospital antibiotic prescribing during conversations in Mediterranean regional meetings, where most countries have high UA scores.

The possible role of inherent cultural factors has significant relevance in terms of appropriate strategies to address PAP>24 in high-UA countries. Corrective initiatives are usually focused on the production of guidelines, development of multidisciplinary teams and emphasis on education.[8] However, less than optimal perceptions about guidelines have been reported among doctors in high-UA countries. In such countries, personal experiences can be regarded as more important (and a greater source of certainty) than evidence-based literature and genuine enthusiasm for multidisciplinary involvement may also often be absent.[9]

It is interesting to note that the only country to fall outside the regression model was Belgium. This country has a high UA score of 94 yet reported low proportions (35%) of PAP>24. However, this was not always the case. In the 1980s, consistent with its UA score, >50% of PAP given in Belgian hospitals exceeded even 48 h. It was only following a new refund system for perioperative administration of antibiotics, introduced by Royal Decree in 1997, that a sustained improvement was achieved.[10] The new system limited reimbursement of antimicrobial drug prophylaxis to specific agents and only for a 24 h period after surgery. It also established a fixed fee for antimicrobial costs attributable to each type of intervention.[11] Such a top-down intervention would have been highly compatible with culture change in high-UA settings. It can be hypothesized that the direct uncertainty of financial losses from lack of reimbursement, introduced by the intervention, would have immediately become the most important element of

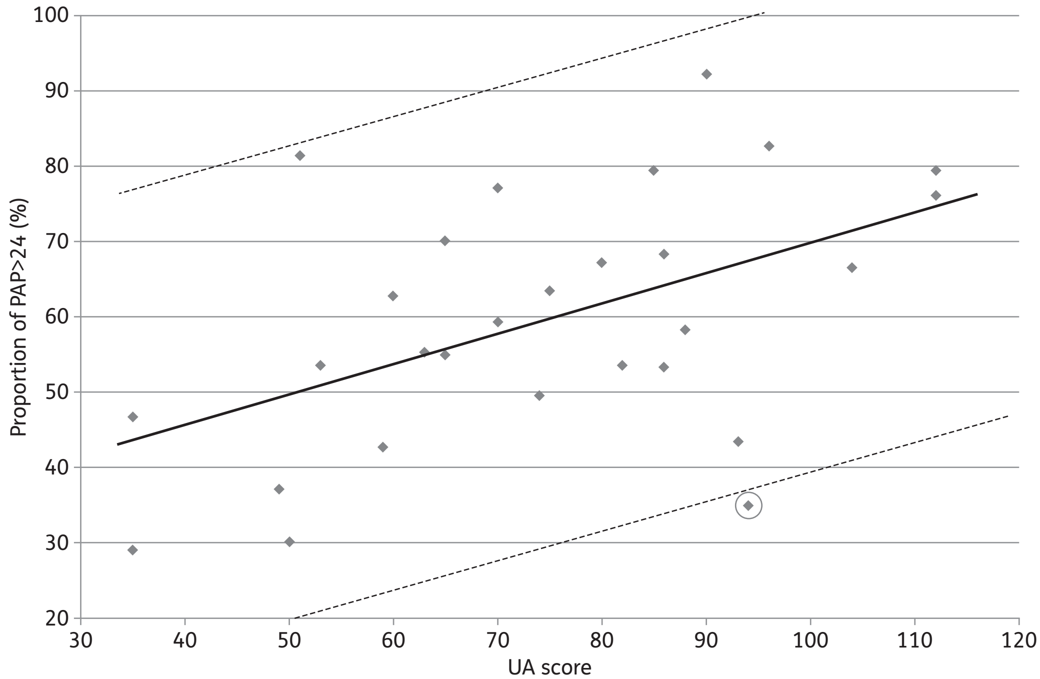

Figure 1. Scatter diagram of UA scores and PAP > 24 percentages for ECDC PPS countries with regression (continuous) and 95% prediction (broken) lines. The circled outlier corresponds to Belgium.

ambiguity in the antibiotic decision-making process and would have overcome the dogma of unnecessarily prolonged PAP.

Cultural drivers have been shown to correlate with healthcare-associated multiresistant infection outcomes.[12] It should therefore not be unexpected to identify a similar link to related processes, such as antibiotic prescribing. After all, both antibiotic stewardship as well as infection prevention and control practices deal as much with medical as with behavioural science. It is clear that there is no 'one size fits all' solution to address PAP > 24 in European countries. Any strategy must be informed by a clear knowledge of local socio-cultural barriers in order to achieve the most appropriate and effective interventions.

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Transparency declarations

None to declare.

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