Journal of Hospital Infection 86 (2014) 161–168

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

Lowbury Lecture 2013

Cultural determinants of infection control behaviour: understanding drivers and implementing effective change

M.A. Borg*

Mater Dei Hospital and University of Malta, Msida, Malta

ARTICLE INFO

Article history:
Received 18 December 2013
Accepted 28 December 2013
Available online 14 January 2014

Keywords:
Behaviour change
Empowerment
Hofstede
Professional culture

SUMMARY

Despite dealing with biomedical practices, infection prevention and control (IPC) is essentially a behavioural science. Human behaviour is influenced by various factors, including culture. Hofstede's model of cultural dimensions proposes that national cultures vary along consistent dimensions which can be grouped and scored as specific constructs. Studies have reported that three Hofstede constructs — power distance, uncertainty avoidance, and masculinity — show significant association with several key performance indicators relevant to IPC and antibiotic stewardship. In addition, national meticillin-resistant *Staphylococcus aureus* (MRSA) levels within Europe correlate well with general quality-of-care indices, including preventive strategies and patient rights. This suggests that IPC may be simply a microcosm of overall quality and safety standards within hospitals and countries. Effective improvement would therefore need to address underlying and embedded core cultural values relevant to patient safety and quality of care. Successful IPC strategies are likely to be those that are compatible with the cultural background where they are implemented. To this end, content analysis of many current IPC improvement tools identifies elements of strong compatibility with cultures that are low in uncertainty avoidance and power distance, and high in individualism and masculinity. However, this cultural combination is largely restricted to Anglo-Saxon countries, where most of the recent improvements in healthcare-associated infection (HCAI) incidence have taken place. There is a paucity of research on IPC behaviour change in different cultural backgrounds, especially countries that score high for power distance and/or uncertainty avoidance. This information is vital to inform IPC campaigns in these countries, which often show high HCAI prevalence.

Introduction

Despite dealing with biomedical practices, infection prevention and control (IPC) is essentially a behavioural science. This point of departure would offer a plausible explanation why IPC practices vary so remarkably between hospitals and countries, despite an overwhelming volume of evidence-based literature and a plethora of low-cost improvement tools.[1] Considerable variations in key performance indicators (KPIs) — both process and outcome — relevant to infectious diseases even occur within geographical regions exhibiting similar socio-economic denominators. This is particularly the case for the countries of the European Union (EU) where a threefold variation in ambulatory care antibiotic consumption has been

* Department of Infection Control, Mater Dei Hospital, Msida, Malta. Tel.: +356 2545 4528; fax: +356 2545 7474.
E-mail address: michael.a.borg@gov.mt.

0195-6701/$ — see front matter © 2014 The Healthcare Infection Society. Published by Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.jhin.2013.12.006

reported.[2] EU countries with higher antibiotic utilization tend to use wider-spectrum formulations.[3] They also have greater levels of non-prescribed use, as well as incongruous prescribing for colds, 'flu, and sore throat.[4,5] This inconsistency is not restricted to the community. A recent point prevalence study (PPS) undertaken by the European Centre for Disease Prevention and Control (ECDC) found very wide differences in antibiotic surgical prophylaxis beyond 24 hours, despite this practice being ineffective.[6] Variation is also evident in outcome indicators of healthcare-associated infections (HCAIs). For more than a decade, comparable surveillance of MRSA proportions in blood cultures has been ongoing in the majority of EU countries. The results from the European Antimicrobial Resistance Surveillance System (EARSS), now EARS-Net, have consistently shown a low prevalence of MRSA in almost all Northern European countries, which then increases into central Europe and reaches its highest levels in the Mediterranean region.[7] The southern and eastern countries of Europe concurrently show high prevalence of other multiresistant nosocomial pathogens, including *Klebsiella pneumoniae* and *Acinetobacter baumannii*.[8]

Incidence of MRSA bloodstream infections has been advocated to be an accurate marker of the effectiveness of IPC programmes.[9] To this end, several publications have looked at the epidemiology of MRSA within Europe. They have concluded that countries with lower MRSA proportions showed stricter implementation of IPC policies within hospitals, especially antibiotic prescribing, use of alcohol hand rub, and adoption of isolation policies.[10,11] Yet they do not explain why such differences should be present, especially considering the common initiatives and soft legislation related to antibiotic use and IPC spearheaded by the European Commission during the past decade.[12]

Hofstede's national culture models

Hofstede's model of cultural dimensions is one of the most accepted approaches for analysing behavioural differences between countries, with more than 800 citations in peer-reviewed journals. It defines culture as the collective programming of the mind that distinguishes the members of one group or category of people from another. Hofstede formulated a model which proposes that national cultures vary along consistent, fundamental dimensions that can be grouped and scored as specific constructs: power distance (PDI), individualism (IDV), masculinity (MAS) and uncertainty avoidance (UAI). Later, in collaboration with other colleagues, he identified two more dimensions: pragmatic long-term versus normative short-term orientation (LTO) and indulgence versus restraint (IVR) (Box 1).[13] Several of these have been reported to show significant association with KPIs relevant to IPC and antibiotic stewardship.[5,14–16]

Uncertainty avoidance

Uncertainty avoidance has consistently shown the highest level of correlation.[15,16] This concordance is backed by a strong theoretical plausibility. Of all the cultural constructs, UAI would be the one expected to impact heaviest on IPC and antibiotic-related behaviour. Hofstede describes UAI as a measure of the national ability to adapt to ambiguous situations.[13] Antibiotic prescribing can offer a subconscious reassurance of certainty to the clinician. It would therefore be anticipated that in high UAI countries, the likelihood is greater that antibiotics will be administered in dubious clinical presentations ('just in case'). For the same reasons, they are likely to be administered for longer durations and wide-spectrum formulations would be more popular. High UAI societies tend to be regarded as exhibiting above-average expression of cognitive dissonance, cognitive economy and unrealistic optimism.[17] All three psychosocial behavioural elements are well described as being non-conducive with effective IPC practice because the key to HCAI prevention is ultimately correct risk perception and management.[18] Paradoxically, high UAI countries show greater levels of risk tolerance because risk will only be addressed if it creates uncertainty. For example, high UAI countries are characterized by poor driving practices (e.g. exceeding speed limits) despite having higher traffic accident mortality rates.[19] Yet the association is ignored because it is not the driving behaviour that creates uncertainty but the stress caused by the anxiety of not arriving on time. Similarly, it is the effort and time that needs to be dedicated to IPC interventions that probably generates subconscious stress among healthcare professionals, in high UAI countries not — as might be expected — the far greater financial and human costs that would then be needed to treat patients who develop HCAIs. Personal unpublished research, using focus groups among nurses from such cultural backgrounds, has identified a very widespread perception that short-cuts are acceptable practice in order to get the work done and that documentation is an unnecessary chore that inteferes in the delivery of efficient patient care. High UAI countries respond best to situations of certainty; they tend to be predominantly reactive in their approach, often adopting unnecessary dogma and

Box 1
Hofstede's definitions for the six cultural dimensions

- Power distance (PDI) relates to the extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally. It suggests that a society's level of inequality is endorsed by the followers as much as by the leaders.
- Uncertainty avoidance (UAI) indicates to what extent a society tolerates uncertainty and ambiguity, and it shows how comfortable its members feel in unstructured situations which are novel, unknown, surprising or different from usual.
- Individualism (IDV) is the degree to which individuals are integrated into tight groups (collectivist) or loose groups (individualist).
- Masculinity (MAS) refers to the distribution of roles between the genders. In masculine cultures, ego needs, assertiveness and success are emphasized. In feminine cultures, caring for the weak and quality of life are more important.
- Long-term orientation (LTO) reflects long-term pragmatic attitudes versus short-term normative attitudes. Cultures scoring high on this dimension show emphasis on future rewards, notably saving, persistence, and adapting to changing circumstances.
- Indulgence (IVR) reflects societies that allow people to enjoy life and have fun versus societies where restraint is emphasized.

bureaucracy. Change is one of the greatest generators of uncertainty. Resistance to change tends to be more pronounced in high UAI countries, together with a greater tendency to ignore situations and information that are undesirable (and therefore uncertainty-generating). This does not imply that societies characterized by high UAI will resist change forever. If it becomes clear that the absence of change will lead to total failure, as would be the case in a crisis, then change may very well be realized quite quickly.

Power distance

Power distance is another dimension that shows correlation with both MRSA prevalence as well as antibiotic prescribing.[14,15] High PDI countries in the Hofstede model are characterized by more strict and formal hierarchies in which subordinates are less likely to be consulted or involved in the decision-making process.[13] Ownership will therefore be more difficult to obtain, since less powerful stakeholders will defer implementation and responsibility to the power-holders who make all the decisions. Instruments of accountability (such as audits) would not be popular, indeed resented, as they are regarded as targeting only the less powerful. Power-holders in high PDI countries are often subject to lower accountability standards; this in turn can be used by the less powerful groups as a justification for their own non-conformity and to excuse discretion in the observation of regulations.

Masculinity

Masculinity is the third major construct associated with MRSA prevalence in Europe.[15] This Hofstede dimension measures the level of assertiveness and ambition within a society.[13] High MAS societies tend to be more ego-driven and motivated by well-defined tasks whereas feminine cultures tend to value good working relationships and co-operation. Therefore, genuine multi-disciplinary collaboration — so crucial for effective IPC programmes — has a greater likelihood of succeeding in feminine cultures. Furthermore there is a risk that if a particular outcome does not require the achievements of specific targets, high MAS societies will neglect it in favour of other, more pressing, concerns.

Cultural considerations

Hofstede emphasizes that these constructs refer to nations — not to individuals — and should not be interpreted as stereotyping of any form. As already mentioned for UAI, they quantify the overall societal prevalence of well-described psychosocial behavioural elements that are universal in human nature. National cultural dimensions are not black or white; rather, different shades of grey. Each country will have its own unique Gaussian distribution curve for any particular cultural dimension; national differences would then be determined by the position of the respective medians between the countries being compared. Finally, Hofstede's constructs should not be viewed individually or in isolation; it is the combined interplay of the different cultural dimensions that will ultimately reflect on overall behaviour.

Infection control and national culture

A statistical model incorporating UAI (and PDI) as well as MAS can predict almost half of the MRSA variance in European countries.[15] Low prevalence Scandinavian countries show very low scores for PDI, UAI and MAS, whereas those in the Mediterranean, where MRSA is very common, are conversely characterized by high PDI, high UAI and medium to high MAS scores. Incorporation of a cultural perspective allows for a better comprehension of studies whose results initially appear illogical; such as the highly significant correlation reported between national MRSA rates and the level of fair play of the respective national teams participating in the 2008 European football (soccer) championship.[20] A cultural element would also shed new light on studies showing significant associations between HCAIs and seemingly unrelated outcomes, such as infant mortality rates — independent of GDP per capita or healthcare expenditure.[21] Indeed, MRSA in EU countries correlates well with several non-infectious outcomes including undiagnosed diabetes mellitus, caesarean section rates and myocardial infarction mortality.[22] This could be explained by the fact that all are dependent on an underlying quality ethos and effective risk management, which in turn are likely to be culturally influenced.

Underlying quality considerations

The underlying cultural element assumes an even greater importance when analysing HCAI outcomes with quality indices that are not even remotely associated with hospital care.[22] European MRSA incidence rates show a significant correlation with the Eurohealth Consumer index scores for preventive services, incorporating parameters such as infant vaccination rates, levels of kidney transplantation, and elderly long-term care facilities. Even higher levels of association have been identified with indices based on levels of patient rights, involvement of patient organizations and ease of access by patients to their own records within European countries. It is again reasonable to conclude that an ethos of prevention — including IPC — will be more pro-active and prioritized in low UAI countries. Similarly, patient rights would be culturally more compatible with low UAI and low PDI cultures.

These findings suggest that IPC may simply be a microcosm of overall quality-of-care management within hospitals and countries. They shed a new light on the challenges facing IPC teams in high HCAI prevalence countries because change needs to address not just IPC-related practices but, above all, underlying and embedded core values relevant to patient safety and quality of care. It suggests that successful IPC strategies are likely to be those that are compatible with the cultural background where they are implemented. This is borne out by recent reports of improvement from EU countries. One of the most successful reductions in MRSA bacteraemia has been achieved in the UK. The campaign was strongly outcome-based and focused on achieving a target of 50% reduction within five years, arbitrarily set by the political establishment.[23] Such an approach, as well as the strategy methods adopted, were highly compatible with the UK's low UAI/high MAS national culture. Considering the low PDI score of the UK, it is not surprising that strong emphasis was made on ownership ('HCAI is everyone's responsibility') and on equitable accountability ('board to ward approach').[24] Root cause analysis, undertaken

by the care providers themselves, was cornerstone to identify and correct failures, despite its high uncertainty-generating potential. As would be predicted from the UK's cultural characteristics, once HCAI reduction became a national priority, improvement was achieved very rapidly. Indeed, MRSA targets were reached ahead of schedule and significantly exceeded.[25]

Nationwide reduction in MRSA bacteraemia has also been reported from France, a country with substantially higher UAI and PDI scores than the UK and lower MAS, especially in professional socio-economic classes. It is interesting how different the French campaign was from its neighbouring country. For a start, it set no outcome targets; it also required a much longer time-span. A concerted campaign was started in 1993, based on guidelines, barrier precautions and isolation, but this achieved no appreciable change.[26] Significant improvement only followed a central ministerial initiative in 2001 that implemented national quality indicators, particularly focusing on processes. Crucial among these KPIs was the central reporting of alcohol hand-rub consumption, which was then used to benchmark hospital hand-hygiene performance.[27] MRSA reduction in France was significantly slower compared with that reported in the UK and was achieved primarily in intensive care units. Unlike in the UK, improvement in general wards (especially medical departments) was relatively low.[25]

Cultural implications on IPC behaviour change

The key to improved IPC behaviour is effective education, motivation and system change.[28] However, all three interventions are potentially influenced by cultural elements. Guidelines are recognized as vital educational tools. Yet a survey of doctors from Italy, a country with high UAI and PDI, identified widespread perceptions that personal experiences were more important than evidence-based opinions and that guidelines were not transferable to the clinical situation (uncertainty avoidance). Guidelines were viewed as an externally imposed cost-containment exercise that threatened individual clinical freedom (power distance). Enthusiasm for multidisciplinary involvement was also low.[29] Motivational methods are also likely to be culturally influenced. Seto *et al.* replicated the SENIC study on social power techniques to improve IPC and found significant differences from the results reported in the USA.[30] Whereas Hong Kong nurses preferred 'informational power' (persuasive communication) as the tool to influence behaviour change, US nurses had opted for 'expert power' (attribution of superior knowledge and ability). The authors credited this difference to the short history of infection control in Hong Kong at the time of the study. However, it can just as likely, (if not more probably) be explained by the different cultures between the two countries, especially the emphasis on academic achievements in US culture, which possesses much higher MAS and IDV scores. This is evident in the routine inclusion of authors' academic degrees in American publications, a practice not normally followed by journals in Europe and elsewhere.

System change

The most obvious role of culture relates to system change. Organizational literature highlights how organizations function differently in different countries. Those in low UAI/low PDI countries tend to adopt Mintzberg's adhocracy configuration.[31] Mutual adjustment is the preferred co-ordinating mechanism, a concept which Hofstede refers to as the 'village market' (Figure 1).[13] Emphasis is placed on strategic planning and participative administration together with performance

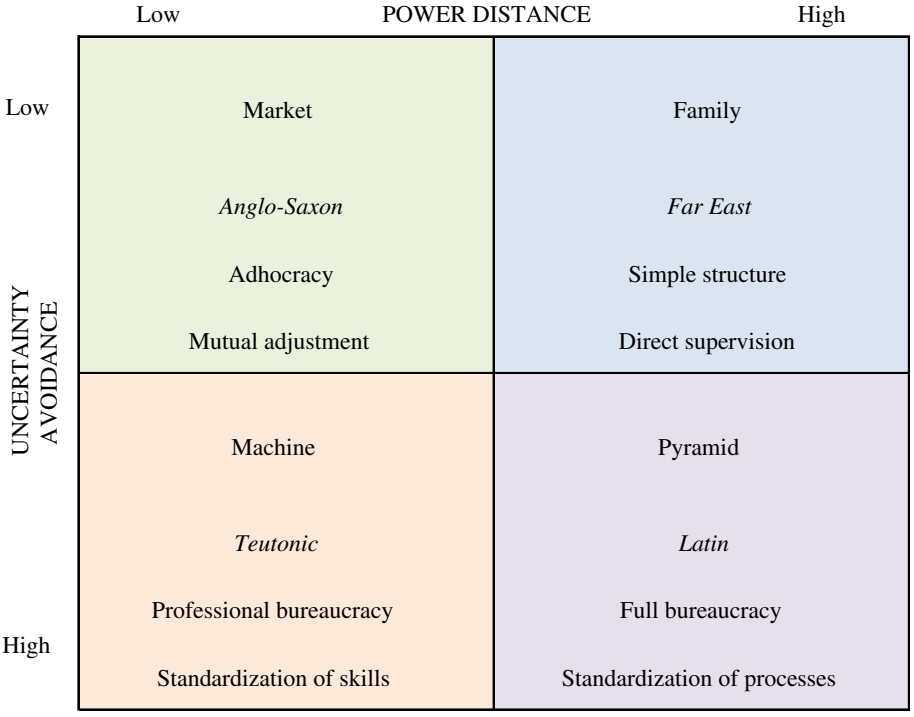

Figure 1. Configuration of organizations according to power distance (PDI) and uncertainty avoidance (UAI) cultural dimensions. Adapted from Hofstede *et al.*'s projections of Mintzberg's organizational structures.[13]

appraisal and management by objectives. As highlighted by Hofstede, these approaches require conducive cultural backgrounds: high performance needs to be seen as a critical goal (high MAS), staff must be prepared to accept a degree of ambiguity (low UAI), and subordinates and leaders need to have a meaningful dialogue and be equally accountable for performance (low PDI). Surveillance of IPC outcomes and processes, borne out from the SENIC study, is one such example.[32] It follows the 'burning platform' approach common to US management which presupposes that all stakeholders are sufficiently motivated to believe that persistence of poor performance will have negative consequences that impact them directly (high MAS). Additionally, service providers must not react defensively to suboptimal results (low UAI) and, most importantly, all stakeholders need to be accountable, irrespective of their power status (low PDI). More recent strategies from the USA, especially the concept of zero tolerance, show an even greater fit with this cultural mindset.[33] Cultural influences can also be identified within the methodology of care bundles (as opposed to simple checklists). The 'all-or-nothing' approach and the empowerment of nurses to stop doctors from continuing a procedure if they deemed it as non-compliant with bundle requirements, all fit in perfectly with high MAS, high IDV, low UAI, low PDI cultures.[34] However, this cultural combination is largely restricted to Anglo-Saxon countries. Unpublished data from the EU-funded Implement study suggest that widespread national introduction of care bundles within European hospitals has been mainly restricted to the UK and Ireland.

Patient empowerment

Empowerment initiatives in IPC have not been limited to the nursing professions. Patient empowerment has been proposed as a useful tool in order to improve hand hygiene compliance in many parts of the world. Yet, other than from Geneva, a recent literature review on the subject could only identify publications originating from Anglo-Saxon countries.[35] This is not surprising. For a patient to actively remind a caregiver to perform hand hygiene, the PDI needs to be very low. Confronting a power-holder in a high PDI society does not come without consequences. In addition, it is a circumstance that elicits uncertainty in any situation, let alone in high UAI cultures where professionals and knowledgeable authorities are held in greater esteem. Above all, it requires a significant level of assertiveness which is particularly present in high IDV cultures. It is poignant to read respondent replies in the 2009 World Health Organization global survey of patient experiences in hand hygiene improvement.[36] A US respondent is quoted as saying, 'If the doctor said remind me, I would find it quite easy to say, you asked me to remind you to wash your hands … it would be similar to … giving the doctor an update on my medication.' On the other hand, the survey respondent from Slovenia replied, 'First it is necessary to change the cultural barriers: patients have no right to tell physicians what to do.' Slovenia has high PDI, high UAI and low IDV cultural dimensions — the opposite of what is found in the USA (Figure 2).

Evidence base of IPC

The relationship between IPC behaviour and national culture puts a new perspective on evidence-based IPC literature. The bulk of IPC research has originated from Anglo-Saxon countries. A recent Cochrane-type review studying optimization of IPC through behaviour change identified 14 exploratory studies.[37] Of these, four originated from the UK, three from the USA, two each from Canada and Australia with one study from Ireland and Sweden; all are countries characterized by low PDI and low UAI. The only study from a country without these cultural characteristics originated from Hong Kong, but took place before the British handover in 1997. Cultures combining

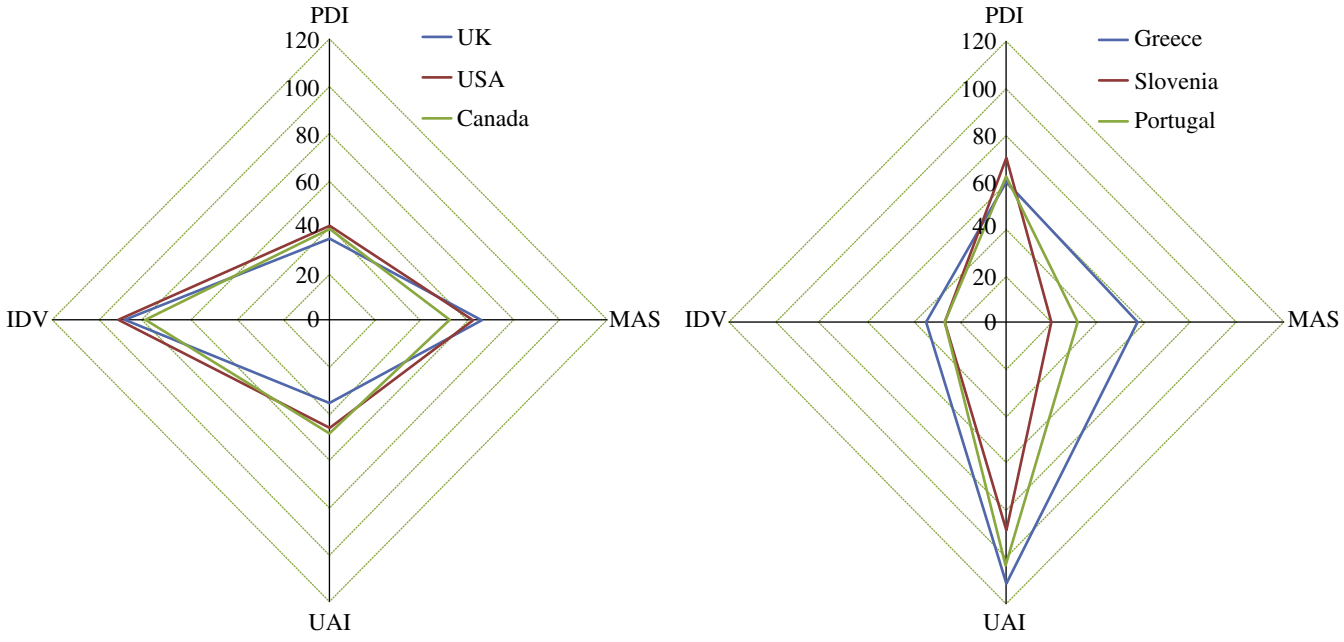

Figure 2. Graphical comparison of Hofstede scores of power distance (PDI) and uncertainty avoidance (UAI), individualism (IDV) and masculinity (MAS) for selected Anglo-Saxon and Southern European countries. From Hofstede *et al.*[13]

PDI	+	+	+	++	++	++	+++	+++	+++	No data
UAI	+	++	+++	+	++	+++	+	++	+++	No data

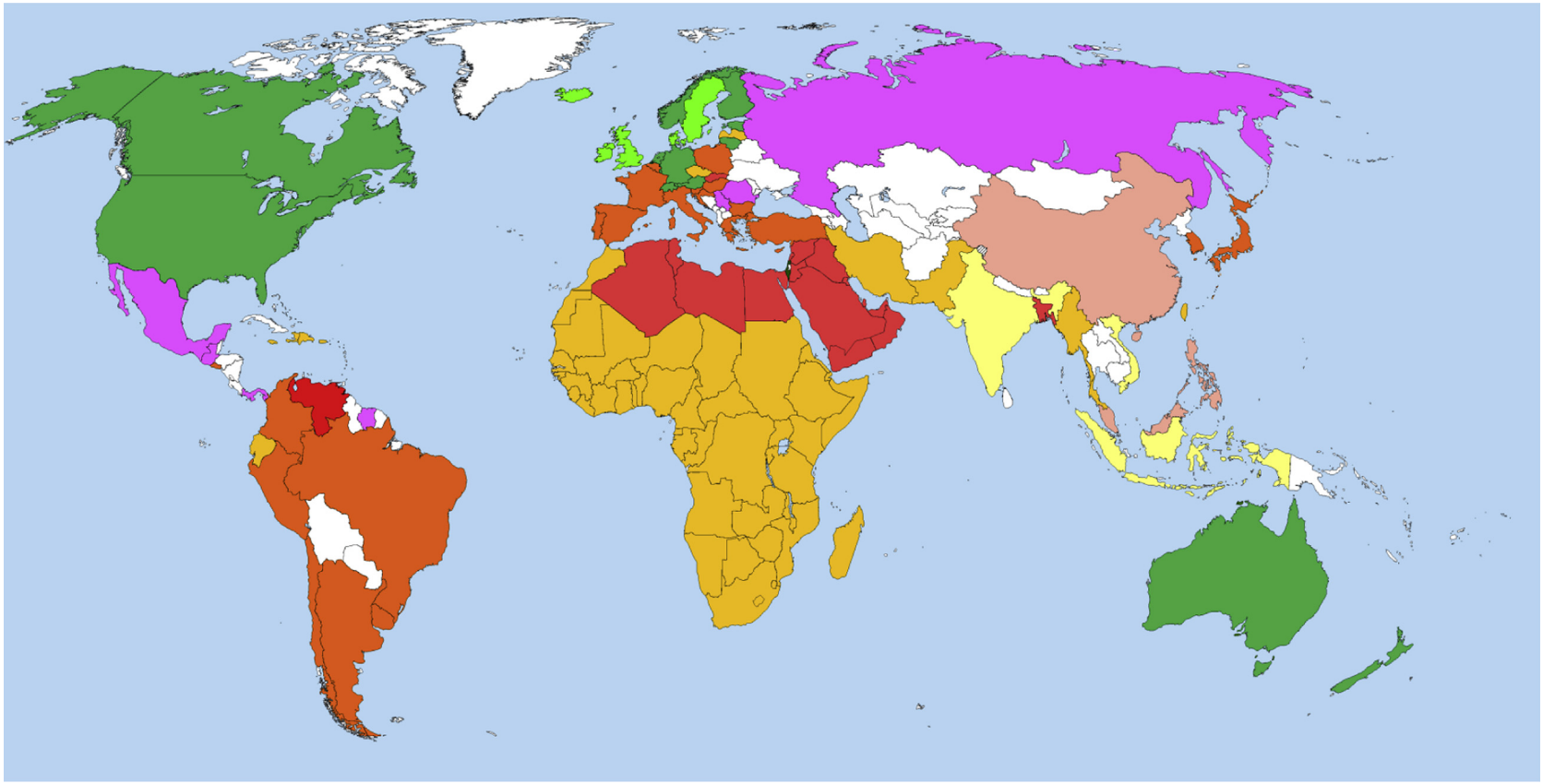

Figure 3. Power distance (PDI) and uncertainty avoidance (UAI) score variability by country, as reported by Hofstede *et al.*[13]

low PDI with low UAI are restricted to Anglo-Saxon and Scandinavian countries (Figure 3). It is therefore pertinent to ask whether successful and 'evidence-based' IPC interventions from these countries are fully applicable to those in the rest of the world, which possess a different cultural milieu. It has already been pointed out by Gould *et al.* that, 'a customized intervention from another country that fails to consider local factors likely to influence the implementation of the campaign is unlikely to be effective.'[38] Unfortunately, there is a paucity of data and good quality research on IPC-related behaviour change from countries with high UAI and/or high PDI. Elements of the successful UK campaign which emphasized that 'infections are intolerable' and that 'infection prevention is not just the responsibility of the infection control team' may not be as applicable in high UAI/high PDI countries. Indeed many models originating from Anglo-Saxon countries will probably need modification. Hofstede quotes a focus group from an organization development programme looking at interpersonal process analysis techniques.[13] Latin participants (high UAI/high PDI) suggested that these initiatives were culturally incompatible with them. They believed that their culture lacked the equity ethos for such programmes, which created uncertainty and insecurity. Interpersonal feedback was interpreted competitively, unless it came from someone regarded as their superior. Above all, they emphasized that Latin organizations are not changed by development but by crisis. For this reason, crisis situations (such as outbreaks) offer windows of opportunity to achieve effective change in such cultural backgrounds that are unlikely to be matched by the most expertly drafted business plan or cost-benefit analysis. Although horizontal approaches are often advocated as being most effective to achieve IPC change (in line with the village market model), top-down approaches have achieved considerable success in high UAI/high PDI countries. Unnecessarily prolonged surgical prophylaxis was effectively curtailed throughout Belgium following a Royal Decree that limited reimbursement of antimicrobial drug prophylaxis to specific agents and only for a 24 h period after surgery.[39]

Limitations

The major limitation of these cultural models lies in the level of evidence on which they are built. Most conclusions and hypotheses have been reached from focus groups, content analysis, and studies of association using available national statistics. None would satisfy a Cochrane review. However, this is precisely the norm in organizational and anthropological literature which differs from medical science in both epistemological and methodological assumptions.[40] It is almost impossible to find randomized control trials or quasi-experimental studies in behavioural texts. Furthermore, models have been generated almost exclusively using European data. This is again not surprising. No other global region possesses such a diversity of national cultural constructs at present within the countries of Europe (Figure 3). Above all, the coordinating activities of the ECDC have provided a unique set of comparable databases of national infection-related outcomes and processes across a large set of countries, collected through a standardized methodology. However, just as in other behavioural characteristics highlighted by Hofstede, it is likely that cultural influences also impact on IPC behaviour outside of Europe.

Conclusion

Culture is certainly not the only factor relevant to IPC behaviour. Nevertheless, within Europe, cultural models have explained between 25% and 50% of variance in infection-related processes and outcomes. They provide a new insight into the multifactorial drivers that impact on HCAI and offer possibilities of developing new or modified approaches to IPC strategies. There are no good or bad cultures. However, it is likely that specific combinations of cultural dimensions are more conducive for effective IPC behaviour than others. Nevertheless, acknowledging the role of culture should not become an excuse for fatalism. On the contrary, it offers opportunities for IPC teams to achieve behaviour change more effectively by knowing the cultures they are up against.[41] This is particularly the case within healthcare institutions where IPC improvement by addressing organizational culture appears possible, albeit very challenging.[42] Above all, it is clear that 'copy and paste' approaches in IPC improvement are doomed to fail and that cultural awareness is yet another skill that IPC teams throughout the world need to master in order to become more effective in their behaviour change strategies and interventions.

Acknowledgements

The helpful suggestions of B. Waisfisz, from the Hofstede Centre, are gratefully acknowledged.

Conflict of interest statement
None declared.

Funding sources
None.

References

1. Seto WH. Staff compliance with infection control practices: application of behavioural sciences. *J Hosp Infect* 1995;**30**:S107—S115.
2. Cars O, Mölstad S, Melander A. Variation in antibiotic use in the European Union. *Lancet* 2001;**9**:1851—1853.
3. European Centre for Disease Prevention and Control. *Surveillance of antimicrobial consumption in Europe, 2010*. Stockholm: ECDC; 2013.
4. Grigoryan L, Haaijer-Ruskamp F, Burgerhof JG, *et al*. Self-medication with antimicrobial drugs in Europe. *Emerg Infect Dis* 2006;**12**:452—459.
5. Borg MA. National cultural dimensions as drivers of inappropriate ambulatory care consumption of antibiotics in Europe and their relevance to awareness campaigns. *J Antimicrob Chemother* 2012;**67**:763—767.
6. European Centre for Disease Prevention and Control. *Point prevalence survey of healthcare associated infections and antimicrobial use in European acute care hospitals*. Stockholm: ECDC; 2013.
7. Johnson AP. Methicillin-resistant *Staphylococcus aureus*: the European landscape. *J Antimicrob Chemother* 2011;**66**:iv43—iv48.
8. European Centre for Disease Prevention and Control. *Antimicrobial resistance surveillance in Europe 2012. Annual report of the European Antimicrobial Resistance Surveillance Network (EARSNet)*. Stockholm: ECDC; 2013.

9. Duerden BI. Responsibility for managing healthcare-associated infections: where does the buck stop? *J Hosp Infect* 2009;**73**:414—417.
10. Hansen S, Schwab F, Asensio A, *et al*. Methicillin-resistant *Staphylococcus aureus* (MRSA) in Europe: which infection control measures are taken? *Infection* 2010;**38**:159—164.
11. MacKenzie FM, Bruce J, Struelens MJ, *et al*. Antimicrobial drug use and infection control practices associated with the prevalence of methicillin-resistant *Staphylococcus aureus* in European hospitals. *Clin Microbiol Infect* 2007;**13**:269—276.
12. Goossens H. Expert-proposed European strategies to monitor and control infection, antibiotic use, and resistance in health-care facilities. *Lancet Infect Dis* 2011;**11**:338—340.
13. Hofstede G, Hofstede GJ, Minkov M. *Cultures and organisations: software of the mind*. New York: McGraw-Hill; 2010.
14. Deschepper R, Grigoryan L, Lundborg CS, *et al*. Are cultural dimensions relevant for explaining cross-national differences in antibiotic use in Europe? *BMC Health Serv Res* 2008;**8**:123.
15. Borg MA, Camilleri L, Waisfisz B. Understanding the epidemiology of MRSA in Europe: do we need to think outside the box? *J Hosp Infect* 2012;**81**:251—256.
16. Borg MA. Prolonged perioperative surgical prophylaxis within European hospitals: an exercise in uncertainty avoidance? *J Antimicrob Chemother* 2013 Nov 13 [Epub ahead of print].
17. Elliot P. *Infection control: a psychosocial approach to changing practice*. Oxford: Radcliffe; 2009.
18. Nicol PW, Watkins RE, Donovan RJ, Wynaden D, Cadwallader H. The power of vivid experience in hand hygiene compliance. *J Hosp Infect* 2009;**72**:36—42.
19. Hofstede G. *Culture's consequences: comparing values, behaviors, institutions, and organizations across nations*. Thousand Oaks, CA: Sage Publications; 2001.
20. Meyer E, Gastmeier P, Schwab F. National MRSA rates run along with fair play of national football teams: a cross-national data analysis of the European Football Championship, 2008. *Infection* 2013;**41**:215—218.
21. Borg MA. Are healthcare economics a factor behind European MRSA rates? *Eur J Clin Microbiol Infect Dis* 2010;**29**:477—479.
22. Borg MA. Could the incidence of healthcare infections in Europe simply be a reflection of overall quality standards? *J Hosp Infect* 2012;**82**:141—142.
23. Liebowitz LD. MRSA burden and interventions. *Int J Antimicrob Agents* 2009;**34**:S11—S13.
24. Duerden BI. MRSA: why have we got it and can we do anything about it? *Eye (Lond)* 2012;**26**:218—221.
25. Wilson J, Guy R, Elgohari S, *et al*. Trends in sources of meticillin resistant *Staphylococcus aureus* (MRSA) bacteraemia: data from the national mandatory surveillance of MRSA bacteraemia in England, 2006—2009. *J Hosp Infect* 2011;**79**:211—217.
26. Jarlier V, Trystram D, Brun-Buisson C, *et al*. Curbing methicillin resistant *Staphylococcus aureus* in 38 French hospitals through a 15-year institutional control program. *Archs Intern Med* 2010;**170**:552—559.
27. Magiorakos AP, Leens E, Drouvot V, *et al*. Pathways to clean hands: highlights of successful hand hygiene implementation strategies in Europe. *Euro Surveill* 2010;**15**:19560.
28. Pittet D. The Lowbury Lecture: behaviour in infection control. *J Hosp Infect* 2004;**58**:1—13.
29. Formoso G, Liberati A, Magrini N. Practice guidelines: useful and "participative" method? Survey of Italian physicians by professional setting. *Archs Intern Med* 2001;**161**:2037—2042.
30. Seto WH, Ching TY, Chu YB, Seto WL. Social power and motivation for the compliance of nurses and housekeeping staff with infection control policies. *Am J Infect Control* 1991;**19**:42—44.
31. Mintzberg H. *The structuring of organizations*. Englewood Cliffs: Prentice-Hall; 1979.
32. Haley RW, Culver DH, White JW, *et al*. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals. *Am J Epidemiol* 1985;**121**:182—205.
33. Jarvis WR. The Lowbury Lecture. The United States approach to strategies in the battle against healthcare-associated infections, 2006: transitioning from benchmarking to zero tolerance and clinician accountability. *J Hosp Infect* 2007;**S2**:3—9.
34. Berenholtz SM, Pronovost PJ, Lipsett PA, *et al*. Eliminating catheter-related bloodstream infections in the intensive care unit. *Crit Care Med* 2004;**32**:2014—2020.
35. McGuckin M, Govednik J. Patient empowerment and hand hygiene, 1997—2012. *J Hosp Infect* 2013;**84**:191—199.
36. World Health Organization. *WHO guidelines on hand hygiene in health care*. Geneva: WHO; 2009.
37. Edwards R, Charani E, Sevdalis N, *et al*. Optimisation of infection prevention and control in acute health care by use of behaviour change: a systematic review. *Lancet Infect Dis* 2012;**12**:318—329.
38. Gould DJ, Hewitt-Taylor J, Drey NS, Gammon J, Chudleigh J, Weinberg JR. The CleanYourHandsCampaign: critiquing policy and evidence base. *J Hosp Infect* 2007;**65**:95—101.
39. Harbarth H, Samore MH. Antimicrobial resistance determinants and future control. *Emerg Infect Dis* 2005;**11**:794—801.
40. Jung T, Scott T, Davies H, *et al*. Instruments for exploring organizational culture: a review of the literature. *Public Admin Rev* 2009;**69**:1087—1096.
41. Payer L. *Medicine and culture*. New York: Holt; 1996.
42. De Bono S, Heling G, Borg MA. Organizational culture and its implications for infection prevention and control in healthcare institutions. *J Hosp Infect* 2014;**86**:1—4.