Infection control for practice standards

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ABSTRACT: This report was compiled as part of the author's work in the completion of the BVNA's LANTRA approved course *Infection Control for Practice Standards*, and was an interesting and proactive exercise in interrogating, evaluating and applying the biosecurity knowledge gleaned throughout the course, with a view to identifying the current strengths and areas for implementing improvement for infection control within one general practice.

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Introduction

The purpose of this report is to interrogate current practices, protocols and knowledge bases within a general practice, with a view to gaining an understanding of the current areas of strength and weakness in the delivery and maintenance of biosecurity protocols. It will address both practical and medicine-based behaviours, and look at colleagues' understanding of infection control as a principle, and of the importance of exercising good practice by introducing and maintaining robust protocols as a team, to minimise infection risk among staff, clients and patients. Additionally, it will discuss bonding colleagues to the concept of intelligent use of antibiotics in practice, and encouraging increasing use of additional diagnostic techniques to more appropriately prescribe, minimise or possibly eliminate the use of antibiotics in some presentations. By collating this data, and introducing colleagues to a greater understanding of the importance of infection control, it is hoped that the delivery of an effective infection control regimen can be developed and implemented, and maintained by all staff with an increased appreciation of both the immediate and wider impact that substandard biosecurity threats hold not just within the practice but for the human population as a whole, in the uphill struggle against bacterial resistance to antibiotics.

The importance of minimising bacterial colonisation and also preventing microbial resistance was discussed among colleagues, and an informal conversation regarding potentially overlooked fomites was undertaken. Having discussed how far-reaching the concept of infection control and our collective responsibility for it was concerned, colleagues were then invited to participate in completing a questionnaire to enable information to be collated about their individual knowledge and practices regarding existing biosecurity initiatives and protocols, in order to acquire the fullest picture of the current position regarding biosecurity. Everyone was given the option not to partake, if they preferred. It was made clear that their responses were neither right nor wrong, would not be judged, and would remain strictly anonymous, used only for the purpose of understanding what the practice as a whole was doing well, and to identify where improvements could be made. Post-questionnaire, random covert observation sampling was undertaken to compare the responses to the questionnaire with actual behaviours, in case of misperceptions or inaccurate answering, which would skew the results. The population size was 13, with a final sample size of 10, comprising two veterinary surgeons, three veterinary nurses, and five receptionists.

Findings

Fomites

Thinking about the various areas of a veterinary surgery in isolation, such as reception, theatre, offices, kennels and "prep", it may seem a simple enough process to identify fomites within these areas. In theory, a biosecurity protocol could be developed which works for consult rooms, and another for reception, etc., with all colleagues who undertake work within that area abiding by that protocol and therefore maintaining a well-sanitised space. In practice, however, there are many overlooked items which are harbouring pathogens, used on a

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Table 1. Knowledge – All staff

Question	Response		
	Y	N	N/A or Don't know
Does the practice have a written biosecurity policy	4	0	6
Do you know where to find a copy of the above	2	6	2
Do you know who leads biosecurity within practice	1	7	2
Have you had any training/CPD on biosecurity	3	6	1
Have you received internal biosecurity updates in the last year	1	7	2
Do you change your clothes/shoes before and after work	0	10	0
Is there a protocol for cleaning hand-touch surfaces	3	4	3
Is there a protocol for cleaning consultation rooms	9	0	1
Is there a protocol for cleaning theatre	8	0	2
Are antibiotics given to elective routine surgeries	3	6	1
Do you have an isolation protocol	10	0	0

regular basis but not encompassed by the sanitisation protocol for that room. While "critical surfaces" (Dancer, 2014) such as radiography troughs, tables, sandbags and plates are wiped down after use, what about the "non-critical" (Dancer, 2014) Left/Right marker tags? Or the exposure panel on the radiography machine? The telephones (critical surfaces) in reception may be frequently cleaned, also the keyboards, but what about the filing cabinet drawer handles, or the kettle switch or chair arms? In this practice, sanitising wipes have been recently introduced to encourage and facilitate more engagement in ad-hoc sanitising of such fomites, without having to seek out sprays and cloths, or wet down equipment such as telephones and keyboards, which are in constant use.

The results of the staff questionnaire showed that respondents didn't seem to have an awareness of any existing protocols for non-clinical fomites, compared with clinical, with only 30% (3 out of 10) of the workforce responding that one was available for hand-touch surfaces, and 40% (4 out of 10) indicating that there was not one at all (**Table 1**).

When asked about clinical areas, 8 and 9 of 10 (80% and 90%) of the group said there was a protocol for cleaning these areas, with 100% satisfied that there was an isolation protocol although, of these respondents, only one person was able to state the document's location. One respondent had, somewhat alarmingly, completed all of the "competencies" questions with the response "not applicable". With the majority of the respondents (60%) indicating that they did not know whether there was a biosecurity protocol, where to find it (70%) and not having had any sort of communication or education within the last year regarding

Table 2. Measuring competencies – All staff

Area	Key steps	Comp	Comp but ...	Not comp	NA or DK
Cleaning	Dilution ratios	6		1	3
	Table disinfection between all patients	7	1		2
	Correct contact time observed	4	2	2	2
	Food bowl sanitisation	5	2	1	2
	Accommodation sanitisation	9			1
	Correct waste disposal	8		1	1
Hand hygiene	Jewellery removed	4		3	3
	WHO method	9			1
	Sanitised between all patients	4	3	1	2
	Sanitised before typing notes	3	2	2	3
	Gloves for open wounds	6	1		3
	Gloves for clipping	3	2	2	3
Theatre	Sterile gloves worn by all scrubbed in	6			4
	Hats worn	1	5		4
	Gowns worn	2	4		4
	Masks worn	2	4		4
Patient welfare	Owners own health	2		5	3
	Where they work		1	6	3
	Host susceptibility considered	2		5	3
	Tier system allocation	2		4	4
	Equipment sanitisation	5			5
Antibiotics	Policy for use (when and why)	4			6

biosecurity (70–90%), education does appear to be an area which is calling out to be placed much higher up the practice agenda if good biosecurity is to be understood and supported.

Disinfectant evaluation

Non-clinical colleagues may not necessarily have the same levels of knowledge regarding the importance of sanitising, or of zoonotic microorganisms and their transmission. They may also not understand such concepts as "contact time" when using sanitising products and thus may only undertake superficial hand hygiene, which does not incorporate the necessary elements recorded within the WHO hand sanitising protocol (2009). The competencies section returned some interesting results, which seemed to be divided by the greater/less-clinical nature of the task. For example, physically interactive clinical undertakings such as donning theatre wear, hand hygiene and sanitisation of patient accommodation, compared with softer, more hands-off competencies such as the "patient welfare" questioning (**Table 2**). Interestingly, the three "not competent" responses to the jewellery removal question were from two of the three veterinary nurse respondents and one of the two vets who had responded.

There was a sense, by the author, that staff may have completed the forms considering their own actions for some elements, and the desired or expected practice of colleagues for other activities with which they may not be directly involved. For example, when asked about handwashing, 9 of 10 (90%) (**Table 2**) respondents answered that they were sure of the competent use of the WHO handwashing method. The one respondent who did not tick the competency box was also the individual who did not consider that biosecurity measures were applicable to their role. Conversely, it was covertly observed that the WHO method was actually rather poorly practised (although for obvious reasons it was not possible to observe a full range of handwashing contexts) other than during surgical scrubbing, where it was adhered to on each observed occasion, alongside the required contact time for the sanitising medium used. One of the veterinary surgeons (who trained overseas) had no idea what the WHO handwash was, or how to action it – a demonstration and paperwork were issued immediately.

Disregarding the "not applicable" respondent described above, there was a response of 100% to the knowledge that there is a protocol regarding isolation management, and likewise a clear demonstration of competency regarding kennel sanitisation. As touched on above, this may be because, although a large proportion of staff is not directly involved in either undertaking, all staff possibly wished to believe, or perceived that this would be something which would be carried out properly on every occasion, hence the high rate of competency. Correct disinfectant dilution ratios were observed each time, as the disinfectant is pre-diluted and then distributed from a central container into a number of more convenient hand-held sprayers; however, this does assume correct dilution ratio being observed at source. Personal protective equipment (PPE) comprising gloves and (during spraying of several kennels at one time) face masks were only observed to have been employed by one nurse. There was a variable degree of cleaning standards covertly observed; the protocol has been changed from a "bucket and rag" cleaning regimen, to removal of any gross contamination with hot water and disinfectant, followed with a "spray and walk away" method, permitting appropriate contact time for the sanitiser before drying off, if necessary, but ideally air-drying and then relining the kennel. Interestingly, the cleaning of every kennel surface was not undertaken as a matter of course, with bars, latches and hinges being overlooked for the vast majority of interventions and, on occasions, evidence of gross contamination was still present in kennels, despite the kennel being indicated as ready for relining.

The disinfectant used is always the same brand; no additional brand is used to minimise microbial resistance, although the design of the disinfectant (a blend of two quaternary ammonium compounds and a biguanide) maintains a reduced risk of this occurring, and also removes biofilms, and so is suitable for both routine and deep-cleaning. The disinfectant is used throughout the practice (floors, walls, kennels, consult tables – and, alarmingly, for hand-sanitisation by a hitherto uninformed staff member) and the use of PPE during its use is now actively encouraged; gloves as standard, with masks and eye protection, depending on the task being undertaken. Contact time is lengthy at five minutes, and makes compliance very difficult for veterinary surgeons and nurses during back-to-back, fairly short consult windows – five minutes in some cases, which obviously does not make incorporating a five-minute contact time for the disinfectant particularly viable. To ensure that the tables are *properly* sanitised at least three times a day, a protocol has recently been introduced whereby clinical staff finish their block of consultations, wipe their table free from gross contamination and then "spray and walk away" to let the table achieve a sanitised state with sufficient contact time and air-drying.

The practice offers sanitising hand gel and liquid in the prep room as alternatives to antibacterial soap and water. This should facilitate use between patients, but appears to be an initiative embraced by few staff. Perhaps if gel dispensers were situated in more readily accessible places, such as next to consult and prep tables, or within the kennels, take up would increase in much the same way that, in human medicine, gels placed next to patients increased frequency of their use by medical staff (Loveday et al., 2014). When it does occur, the full contact time of 90 s is rarely observed, other than during surgical preparation of hands; this may be because of the perceived need to hurry on to the next patient, as certainly veterinary surgeons are clearly familiar with the required contact time. Hands were not observed being sanitised immediately prior to stopping for lunch. Heinrich's (2016) doctoral dissertation regarding hand hygiene among veterinary students noted that females were considerably more likely to sanitise their hands before eating compared with males who, in other studies, have been identified as being more likely, by their gender, to be less compliant with hand hygiene. There is currently only one male staff member at this practice, making the gathering of statistics too burdened by potential bias to be helpful in this biosecurity evaluation; however, as a routine undertaking, this was noted to be scarce.

Building evaluation

A considerable problem with the practice under scrutiny here, as with many other practices, is that it was not a purpose-built veterinary practice, and so the required areas of business have been shoe-horned into the available spaces of the existing building (see online Appendix 3). For this practice this has resulted in an arterial corridor of practically non-existent biosecurity which runs through the majority of the practice, and right past the theatre door.

All staff move along the corridor to reach areas of the building requiring daily access; none change their clothes on arrival/departure from work and only one changes their shoes – but in their car, so they bring the outside environment into the building anyway. Any animal which is seen in consult or admitted straight for hospitalisation is transferred along this corridor and into or through prep (to access isolation) to kennels. Staff pets are brought to work and additionally travel the length of the building via this corridor, from the entry point to the reception area, where they reside across the day, before travelling back along the corridor to exit via the barn doors. Dogs, cats and any exotic animal, for example rats, ferrets, exotic birds (including psittaci) or reptiles, or injured wildlife are kennelled together, making zoonotic transferral a very real threat, which is not considered during admission.

Appendix 3 focuses on additional layout issues, one of which is the isolation room adjoining the laboratory, with access to the laboratory only being available by walking through isolation. The autoclave currently resides in the isolation room. Appendix 4, Part A identifies areas of greater concern involving the practice layout, and Part B suggests methods of revising or changing these, addressing footfall plans, room use and structural and hardware modifications. Please refer to the online supplementary material for all appendices.

Antimicrobial resistance

Meticillin-resistant *Staphylococcus aureus* is currently found on approximately 30% of the human population (Mayne, 2012), and is an example of a microorganism which can transfer in both directions between owners and their pets. Minimising the opportunity for such pathogenic microorganisms to develop colony-forming units on fomites within practice by better use of PPE, sanitisation and education, coupled with knowledgeable and intelligent antibiotic use (or restriction) is more important than ever before, as the healthcare industries tackle a future in which antibiotic resistance is set to become possibly the biggest threat to humanity. Biosecurity undertakings had been discussed with colleagues, explaining the concept of infection control protocols, addressing the increasing numbers of antibiotic-resistant bacteria, as well as the paucity of new antibiotics (Summers, 2002).

Deeper consideration regarding the prescribing and use of broad-spectrum antibiotics on presentation of infection in place of, for example, swabbing or other diagnostic approaches to fine-tune to a more tailored treatment (see online only Appendix 5), means that as more fragile microbes may be eliminated, those genetically stronger microbes which survive will proliferate as highly resistant bacteria. Antibiotics are still administered at this practice for routine procedures on Cats Protection kittens, which live in kindles, as well as any surgery exceeding 1.5 hours. Summers (2002) observes that "once acquired, the resistance genes will be lost very slowly (and maybe not at all) from their large and ubiquitous populations". The engineering of new antibiotics has slowed measurably over the last 25years, with only two new antibiotics emerging since 2008 (Hughes, 2011). Any new antibiotic, although buying time, will eventually also lose its efficacy, as the genetics of the resistant bacteria adapt by the process of natural selection. A cooperative, interdisciplinary collaboration towards antibiotic guardianship (such as One Health™) by interconnected human, animal and environmental healthcare providers is a vital initiative to minimise resistant-bacteria proliferation.

Zoonoses

In order to reduce the transferal of resistant bacteria and zoonotic microorganisms among people and patients, further protocols need to be introduced to address areas of weakness within the practice which may lead to zoonotic transmission, for example, not kissing patients or touching them against staff faces, and using PPE such as gloves and aprons more routinely as a barrier between staff and patients, not only to prevent two-way microorganism transmission, but also to minimise risk of contamination of the hands by organic matter or microorganisms (Loveday et al., 2014). Early recognition of infected patients, proper handling, improved biosecurity precautions, and, most importantly, high standards of personal (particularly hand) hygiene will reduce the risk of the development of a zoonotic disease within practice. For patients carrying subclinical infection, such as *Bartonella* in cats, proper restraint and handling will minimise bites/scratches and therefore the need for antibiotics among staff (Weese, Peregrine, & Armstrong, 2002). Patients with obvious clinical signs are usually immediately kennelled in isolation, but for those potentially subclinical patients described, biosecurity is lacking with, for instance, fogging never carried out after their discharge. In-practice communication regarding zoonotic disease is limited, with only an email regarding the admission and handling of birds which may potentially have H5N1 being identified in the last six months.

Conclusion

Veterinary practices, by their very nature, lend themselves to potentially high levels of bio-burden, from airborne pathogens to those transient or commensal microorganisms colonising

Table 3. Factors for implementation

Factors to consider	Rationale
Identify the weak areas	Justification for the need to change. Describing the consequences of not changing.
Communication	Ensuring that everyone understands the need to change. Communicating a clear and consistent message.
Enlisting support	Identify who will be impacted by the change. Identify that they are aware that the change is needed.
Form a team	To help implement the changes.
Communicate the changes as they occur	What will and will not change.What can be expected during the process.
Training	Identify colleagues who are struggling with the change. Provide in-house or online training.
Monitor the changes	What is easy and more difficult to implement and why (e.g. current lack of necessary resources).
Reinforce successes	Reminders of progress and accomplishments to keep colleagues enthused.

Source: Adapted from Nash (2014).

on the epidermis of patients and staff. Their methods of transferral among humans and animals can be by direct contact or via fomites, which act as hosts and bridge the time-point between touch by two individuals. There are obvious vehicles such as keyboards, pens and telephones, but it became clear during the informal discussion regarding fomites described above that there are many common fomites which are overlooked from being such by individuals; one example was long sleeves, which was novel information to one of the (perhaps surprisingly) clinical colleagues, who had not considered that these may be vehicles for bacterial transmission.

Some biosecurity changes have recently been implemented by the author, such as encouraging veterinary surgeons to don gowns, hats and masks alongside sterile gloves for all procedures. Although there is no compelling evidence to suggest that these extra items reduce surgical site infection (Eisen, 2011), the more formal attire is thought to initiate more theatre-appropriate conduct. Despite hand gels being banned for ad-hoc use by this practice's senior management (only allowed during surgical preparation) they are also now placed in each consult room, to facilitate a more convenient sanitisation intervention, although it is not known at the present time to what extent they are used, or whether the correct contact time of 90 s is observed. If cost is raised as an issue then referral to this document will be used as leverage to permit their use around the building.

Having identified where changes need to be made (Appendix 4, Part A), there are a number of factors to be taken into consideration during their implementation (**Table 3**; online Appendix 4, Part C).

The most sensible way to implement the many improvement initiatives for this practice would seem to be the employment of a timeline, in much the same way as when launching a new business. Easy changes to implement, such as moving the autoclave into the laboratory space and wearing appropriate PPE (online Appendix 4, Part B) can all be factored into the early days and weeks of the plan, with changes which require larger amounts of money being spent or greater upheaval being scheduled further down the line. Tasks such as the writing of new protocols or acting as leaders for certain tasks such as hand hygiene (Loveday et al., 2014) can be distributed to the team members mentioned in Table **3**, to ease the time commitments required, and encourage voluntary compliance among colleagues. Tasks which are related or flow easily together can be positioned in a linear delivery, so that there is not a disjointed period of time between one change being introduced and the next. This will also permit observation of clean, manageable and effective transitions and maintenance before further tasks are implemented. Any training needs identified among staff can be booked for delivery as near to the initial stages of the timeline as possible.

Colleagues can be given more succinct copies of the timeline, illustrating tasks which affect all personnel, so that they can see which changes to expect when, and prepare to embrace them. All tasks can be revisited at six-monthly intervals (reflecting the timeline layout) to ensure that they are being undertaken correctly. Over time the new protocols should become embedded into the daily routine of staff and flow as natural behaviours, to be passed down to the new staff as normal and best practice. Although good biosecurity is the responsibility of all colleagues, one person should be the leader and "go-to" member of staff and it would seem natural, with the accrued knowledge, understanding and personal interest, for the author to adopt this role. As biosecurity becomes increasingly important, the role may gradually be rolled out to include formal delivery of education, either in-house and/or as regional CPD lectures. The knowledge of the role-holder could also be utilised in the capacity of clinical auditor within practice groups, or at least as members of management committees, able to offer intelligent, evidence-based advice during policy and protocol development.

This practice has a long journey ahead of it in terms of achieving a high level of biosecurity, but already there have been several initiatives introduced to improve delivery at the front line. To achieve anything near to Gold Standard, improvements will need the backing and support of senior management and a business plan could be drawn up to identify the financial implications of this. As the building is not owned by the company, but rented, there may be a measured level of willingness from the landlord regarding changes to the structure of the building, but nonetheless, there are a considerable number of more "ground-level" measures which can be implemented in the meantime in order to raise infection control standards.

Supplementary material

Supplementary material is available for this article (five appendices) at https://doi.org/10.1080/17415349.2017.1357880.

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