Implementing the Aseptic Non Touch Technique (ANTT[®]) clinical practice framework for aseptic technique: a pragmatic evaluation using a mixed methods approach in two London hospitals

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Abstract

Background: Aseptic technique is an important infection prevention competency for protecting patients from health-care-associated infection (HAI). Healthcare providers using the Aseptic Non Touch Technique (ANTT[®]) aseptic technique have demonstrated reduced variability and improved compliance with aseptic technique.

Objectives: The primary aim of this study is to determine whether standardizing aseptic technique for invasive IV procedures, using the ANTT[®] - Clinical Practice Framework (CPF), increases staff compliance with the infection prevention actions designed to achieve a safe and effective aseptic technique, and whether this is sustainable over time.

Methods: A pragmatic evaluation using a mixed-methods approach consisting of an observational audit of practice, a self-report survey and structured interviews with key stakeholders. Compliance with aseptic technique before and after the implementation of ANTT[®] was measured by observation of 49 registered healthcare professionals.

Results: Mean compliance with competencies was 94%; each component of practice was improved over baseline: hand hygiene = 63% ($P \leq 0.001$); glove use = 14% ($P \leq 0.037$); Key-Part protection = 54% ($P \leq 0.001$); a non-touch technique = 45% ($P \leq 0.001$); Key-Part cleaning = 82% ($P \leq 0.001$); and aseptic field management = 80% ($P \leq 0.001$).

Conclusions: Results show implementation of ANTT[®] improved compliance with the prerequisite steps for safe and effective aseptic technique as defined by the ANTT[®]-CPF. Improvements in compliance were sustained over four years.

Keywords

Aseptic Non Touch Technique (ANTT), aseptic technique, clinical competencies, education, infection control

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Background

Healthcare-associated infection (HAI) is defined by The Association for Safe Aseptic Practice (ASAP) as an infection acquired by a patient as a consequence of exposure to pathogenic organisms via healthcare staff or healthcare facilities (ASAP, 2014). In the European Union and European Economic Area it has been estimated that approximately 3.2 million patients per year will have at least one HAI (European Centers for Disease Prevention and Control [ECDC], 2013). The Centers for Disease Control and Prevention (CDC)

reports research indicating that healthcare providers and practitioners taking specific targeted steps can reduce some

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HAI (e.g. central-line associated bloodstream infections) by more than 70% (CDC, 2009).

Aseptic technique is one of the most common and important clinical competencies in healthcare (Rowley et al., 2010). Aseptic technique involves a set of infection prevention actions aimed at protecting patients from infections associated with pathogenic microorganism transmission.

The importance of aseptic technique is highlighted by the Department of Health (DH) in the Health and Social Care act 2008 (DH, 2015); it requires healthcare providers to have a single standard aseptic technique demonstrable by training and audit. Importantly, when aseptic techniques are used as a method of preventing infection, it is essential that they are theoretically sound and carried out correctly (Aziz, 2009: 26). Aseptic technique is variously and confusingly described in the literature and problematic in practice. Hartley (2005) reports that aseptic technique is not carried out to a high standard across the UK and Flores (2008) suggested that there was a theory–practice gap along with much confusion and complacency in professional practice regarding aseptic technique. The vocabulary of aseptic technique is often inaccurate, used interchangeably, confusing and lacking in evidence, all of which appears to have contributed to practice variability, inadequate risk assessment and uncontrolled standards of practice (Aziz, 2009; Rowley et al., 2010).

Failures of aseptic technique have long been thought to be associated with practice compromises (Worthington et al., 2001). Pellowe describes ‘Poor adherence to evidence-based infection prevention measures and the subsequently increased risks to patients’ (Pellowe, 2007:568). Increasingly, modern technology enabling organisms to be tracked around the procedure environment is providing evidence for the role of failed aseptic technique in the transmission of infection (Loftus et al., 2008, 2011, 2012).

There is evidence that significant reductions in HAI are possible by establishing compliance with standardised clinical practice (Pronovost et al., 2006).

Aseptic Non Touch Technique (ANTT®)

The ANTT® Clinical Practice Framework (CPF) was originated by Rowley in the mid-1990s (Rowley, 2001) and is defined by The National Institute for Health and Care Excellence (NICE) as, ‘a specific type of aseptic technique with a unique theory and practice framework’ (NICE, 2012). Recognising the historical ambiguity surrounding variations of so-called clean, aseptic and sterile techniques (Aziz, 2009; Unsworth and Collins, 2011), the purpose of the ANTT® CPF is to provide a contemporary and original practice language for aseptic technique – with a view to standardising education and practice. Prior to the origination of the ANTT® CPF no standardised approach existed for aseptic technique, and many countries, including the

UK, had no accepted standardised technical-based approach of how to risk-assess and determine the right kind of aseptic technique for specific procedures (Aziz, 2009; Rowley et al., 2010).

Healthcare organisations that have standardised aseptic technique with ANTT® report improved compliance with the core components of aseptic technique and associated reductions in the incidence of HAI (Mutalib et al., 2015; Pike et al., 2009; Rowley and Clare, 2009; White, 2010).

Notably, ANTT® is designed as a practice framework for all invasive procedures – from major surgery to the maintenance of invasive devices. It is designed to define and teach a standard competency-based aseptic technique to healthcare workers (HCW).

At the core of ANTT® is the unique concept of Key-Part and Key-Site Protection, a simple but effective model for teaching effective aseptic technique (Kozier et al., 2015; Rowley, 2001; Rowley and Clare, 2009; Rowley et al., 2010). The CPF describes both the theory and practice of aseptic technique, comprehensively explaining, through a set of simple rules, how the different elements of aseptic technique relate to and integrate with each other enabling HCWs to practise a safe and efficient aseptic technique. Because the framework standardises risk assessment with technical rather than subjective or ritualistic criteria the approach to aseptic technique with ANTT® is standardised and enables a uniform approach to practice.

The ANTT® CPF highlights six core elements of aseptic technique (see Table1). These elements are prerequisites for safe and effective aseptic technique (Aziz, 2009; Rowley et al., 2010; RCN, 2010; Unsworth and Collins, 2011; Loveday et al., 2014).

Since the 2008 Health and Social Care Act (updated Code of Practice 2015) there has been a legislative directive for Trusts in England and Wales to standardise the aseptic technique their staff use and to provide evidence of competency training (DH, 2015). ANTT® has been widely recommended as a method of meeting these requirements by standardising aseptic technique, e.g. Public Health Wales (Welsh Government, 2015).

Rationale for study

Surveillance data reported to Public Health England (PHE), formally the Health Protection Agency (HPA) indicated a high incidence of Methicillin-resistant *Staphylococcus aureus* (MRSA) bacteraemia in the two hospital sites used in this study; between April 2008 and June 2008 15 MRSA bacteraemia were reported and 11 (73%) were identified as related to intravenous (IV) therapy interventions. Local root cause analysis (RCA) consistently identified several failings relating to aseptic technique (local unpublished data). ANTT® was identified by the hospitals as a best practice example of aseptic technique that, if introduced, could

Table 1. The six core elements of aseptic technique from the ANTT® CPF measured in this study.

1	Hand hygiene: strict adherence to effective hand cleaning, using a systematic method, performed prior to, during, if required following contamination, and following invasive clinical procedures (WHO, 2009)
2	Correct glove use: appropriate use of gloves and other personal protective equipment to reduce the transmission of harmful microorganisms (Loveday et al., 2014; RCN, 2010)
3	Key-Part and Key-Site protection: a method of identifying and strictly not touching and protecting from touch contamination the most critical parts of the procedure equipment (Rowley, 2001; Rowley et al., 2010)
4	Non-touch technique: the skill of not touching any critical part(s) or site(s) of an invasive clinical procedure (NICE, 2008)
5	Key-Part disinfection: the disinfection of the most critical parts of procedure equipment that could provide a port of entry for harmful microorganisms (Loveday et al., 2014)
6	Aseptic field management: selecting appropriate types of aseptic fields to protect the Key-Parts of procedure equipment prior to and during invasive clinical procedures (Rowley et al., 2010)

potentially improve compliance with aseptic technique competency, and contribute to the reduction in HAI associated with the insertion and maintenance of invasive IV devices. Researchers also wanted to use this implementation to evaluate any long-term changes to clinical practice and assess how practice might embed into a clinical workforce over time. Pre- and post-evaluations were separated by 48 months, with the post evaluation beginning 36 months after the end of the implementation phase. The timeframe was not pre-defined and reflected ongoing negotiations with the hospitals involved.

Objectives

The experience of other centres in introducing ANTT® suggested compliance with the components of the ANTT® approach for aseptic technique could be as high as 80% over baseline (White, 2010).

The primary aim of this study was to determine whether standardising aseptic technique for invasive IV therapy procedures or IV cannulation, using the ANTT® CPF, increases staff compliance with a set of standardised infection prevention and control measures intended to improve aseptic technique in the organisation.

Secondary aims were also identified:

- to determine the sustainability of the ANTT® CPF in terms of staff understanding, competency and practice language 36 months after implementation;
- to seek the opinion of nurses and medical staff to determine if standardising aseptic technique affords any advantage over a non-standardised approach;
- to assess key stakeholders' perceptions of the contribution ANTT® made to clinical practice;
- to evaluate the impact of the standardisation of aseptic technique with ANTT® on the incidence of MRSA bacteraemia.

Methods

Design

This study was a pragmatic evaluation of implementation the ANTT® CPF in three phases using a mixed-methods approach. This consisted of observational audits of compliance with aseptic technique performed by 49 healthcare professionals before implementation, and 36 and 49 months after implementation, together with a practice-based opinion survey and structured interviews with key stakeholders (see Table 2).

Implementation of the ANTT® aseptic technique

Each of the two centres introduced the ANTT® CPF in the same way using the same resources. The implementation of the ANTT® CPF took place over a 12-month period in two hospital sites and consisted of the following elements:

- an ANTT® resource package (ASAP, 2014) was disseminated in each hospital (which included the ANTT® Theory Practice Framework, instructional videos, educational self-running media and informational posters) by the infection prevention and control (IPC) team or ANTT® training lead for the hospital. Most of these resources were uploaded to the organisation's intranet for ease of access;
- a cascade (train-the-trainer) training model was used; each clinical team/area nominated one or more 'ANTT®-Link Nurses' who were trained by an external ANTT® trainer (from ASAP) in ANTT®;
- the ANTT-Link Nurse then helped facilitate the utilisation of the ANTT® resources to their clinical team/area and helped support the transition of practice to ANTT®;

Table 2. The four study phases.

		Timeframe
1	Pre-implementation evaluation of ANTT® using an observational audit tool (Group A)	2 months prior to implementation
2	Post-implementation evaluation of ANTT® using an observational audit tool (Group B)	2 weeks and 36 months after the implementation
2	Participant opinion of the adoption of the ANTT® standard approach to aseptic technique using a self-report questionnaire (Group B – post implementation only)	2 weeks and 36 months after the implementation
3	Structured interviews with key-stakeholders associated with the implementation and maintenance of ANTT® (separate from Groups A or B)	At the end of the 2-week post-implementation evaluation

- ANTT® Clinical Guidelines for IV therapy and cannulation were displayed in all relevant clinical prep areas;
- once staff had viewed the ANTT® resources and had become comfortable following the ANTT® Guidelines they were competency-assessed by their ANTT®-Link Nurse and accredited as ANTT® competent;
- when all staff in an area were ANTT® competent, the area was certified ANTT® compliant;
- Annual competency reassessment by nominated ANTT®-Link trainers.

This approach to competency training aimed to promote a consistent application of the ANTT® CPF and control teaching variability. Each participant was observed performing aseptic technique for either an IV therapy intervention or IV cannulation using an ANTT® clinical audit tool.

Observational audit of practice pre and post intervention

An observation audit was conducted by the same auditor using the same data collection instrument before and after the intervention. Both before and after audit samples contained 49 participants, representing 2% of the population of licensed healthcare professionals employed in two hospital sites (98/2229). The observational audit tool mirrored exactly each step of the ANTT® clinical guideline(s) and contains the six actions of the ANTT®-Approach. The tool(s) were previously validated by the ASAP and measure only the items/steps they were designed for. The tool was used for both pre/post groups because the practice actions it monitors are commonly described in the literature (Aziz, 2009; Loveday et al., 2014; NICE, 2012; Rowley et al., 2010; Unsworth and Collins; 2011).

Pre-intervention (Group A) consisted of 49 participants observed using whatever aseptic technique they used in their normal practice. The audit was conducted in 2008 as a Trust mandatory service improvement project observing

existing practice. Group B of 49 participants was a prospective post-intervention sample. Group B were observed using the ANTT® aseptic technique and participation was not mandatory, with staff giving permission for individual observations. Participants in both groups were selected from staff on a given shift and screened by the auditor for eligibility to participate (see Table 3). No formal sample size calculations were performed; the post sample was matched for size with no other controls. Group B were recruited in 2012, 36 months after completion of the ANTT® implementation. Individual clinical areas were not identified in the study as part of the anonymity afforded participants. Qualified candidates were asked to participate in the study and given detailed materials about the study and how data would be used. Each candidate in Group B signed an informed consent form. Information materials, including details of anonymity, confidentiality and right of withdrawal from the study were given to potential candidates prior to seeking informed consent. All data were collected and stored in compliance with the 1998 Data Protection Act (UK Gov 1998) and local Trust information governance requirements.

Survey

Group B received a survey designed to elicit their opinion of clinical practice with ANTT®. The tool was a self-report questionnaire comprising 22 multiple choice questions. Thirteen of the questions utilise a five-point Likert scale with a neutral mid-point. The questionnaire was piloted with a small group of clinical staff ($n = 10$) at a Trust not connected with the study. The reliability of the tool was assessed using a test-retest methodology and a correlation coefficient (r) was generated suggesting a good level of correlation ($r = 0.957$).

Interviews with key stakeholders

For the interviews with key stakeholders, a structured interview schedule was used to keep as much consistency as

Table 3. Eligibility criteria.

Group A	Group B
<i>Inclusion criteria</i>	
Must be a Registered Nurse licensed in one or more categories of the Nursing and Midwifery Council register or a General Medical Council (GMC) registered and licensed Medical Doctor	Must be a Registered Nurse licensed in one or more categories of the Nursing and Midwifery Council register or a GMC registered and licensed Medical Doctor*
Must be competent in performing intravenous therapy and/or intravenous cannulation. Competency was defined by the NHS Trust involved and established, if necessary by a review of relevant training records	Must be competent in performing intravenous therapy and/or intravenous cannulation.* Competency was defined by the NHS Trust involved and established, if necessary by a review of relevant training records
	Able to give written informed consent to participate

*The Operating Department Practitioners (n = 2) did not technically meet inclusion criteria; however, they were licensed (Health and Care Professionals Council) and qualified (IV therapy & cannulation) healthcare professionals so were ultimately included in the study.

possible. The questions were all open-ended and created by an experienced ANTT® trainer to allow participants to accurately account their experiences of ANTT® implementation.

Interviews with senior key stakeholders (n = 3): the Deputy Director of Nursing, the Deputy Director of Infection Prevention and Control and the Lead for ANTT® Implementation and Training in the Trust were analysed using a framework analysis methodology (Ritchie and Spencer, 1994).

Ethics

The study was approved by the NHS Ethics Research Service and the research and development department at the NHS Trust involved.

Statistical analysis

The categorical data were analysed using a chi-square (χ^2) statistic using the Minitab-15® statistical package and statistical functions in Microsoft® Excel® software.

Results

Observational audit of practice

Data on the experience level and date of last training in an aseptic technique was available for Group B, but not Group A. Of those asked to participate, 100% (n = 49) joined the study and nobody withdrew once enrolled. Most of the participants were registered nurses 46/49 (94%); one medical doctor (2%) and two 'other' licensed healthcare practitioners (4%) also took part (operating department assistants). Thirty-six (74%) staff had been practising ANTT® for more than two years. Eight (16%) participants had been practising for between one and two years, and five (10%) had one year or less experience of using ANTT®. All staff had

received an ANTT® competency update within the last two years; 22 (45%) participants had received this update between six months and a year.

Primary results are presented in Table 4. These indicate that compliance improved significantly in each of the six essential components of the ANTT® CPF. Overall the mean compliance pre-intervention group (Group A) was 33% (range = 0–80%, SD = 27.1, 95% confidence interval [CI] = 13.07–53.22). Mean compliance, in the post-implementation group (Group B), was 94% (range = 82–100%, SD = 7.60, 95% CI = 88.08–99.35). Actions with the greatest improvement in compliance were identified as hand hygiene immediately prior to preparation, Key-Part protection and Key-Part cleaning.

Although overall glove compliance prior to performing either a peripheral cannulation or drawing up IV medications or flushes was 94% (46/49) in Group B, this varied between the two types of intervention; IV therapy had a 98% (42) compliance rate and peripheral cannulation a 71% (7) compliance rate.

Overall Key-Part protection was 41/49 (84%) broken down further. During the preparation of equipment phase of a given procedure cannulation Key-Part protection compliance drops to 57% (4), while in IV therapy interventions compliance increases to 88% (37). Failures in Key-Part protection were primarily observed in the preparation stage of aseptic procedures, where Key-Parts were left unprotected and exposed to inadvertent touch and environmental contact and the air environment. Of the 12% of observed Key-Part failures in IV therapy, all were due to unprotected preparation: in peripheral cannulation, of the 43% (3) instances of compromise two came from unprotected Key-Parts (infusion extension sets) and one from an exposed peripheral IV cannula prior to attempted cannulation.

All the observed practice effectively utilised a non-touch technique and effective management of an aseptic field.

Table 4. Compliance with the core elements of aseptic technique from the ANTT® Clinical Practice Framework measured in this study.

Area of practice	Group A 2008 pre-intervention compliance level		Group B 2012 post-intervention compliance level		X ²
	%	n (49)	%	n (49)	
Pre-procedure hand hygiene	35	17	98	48	$P \leq 0.001$
Pre-procedure hand hygiene: immediately prior to prep	12	6	98	48	$P \leq 0.001$
Correct glove use	80	39	94	46	$P \leq 0.037$
Key-Part protection	30	15	84	41	$P \leq 0.001$
Non-touch technique	55	27	100	49	$P \leq 0.001$
Key-Part cleaning	0	0	82	40	$P \leq 0.001$

Survey questionnaire on adoption of ANTT®

Forty-nine surveys were distributed to the same participants in Group B who were observed during the audit phase. All participants completed the survey (100%) with only a small number providing incomplete information (Key-Parts 1/49, Key-Sites 1/49 and Micro Critical Aseptic Fields 2/49).

Most staff had been practising ANTT® for more than two years (36/49, 74%) and most staff had received a competency update between six months and one year (22/49, 45%); nobody stated a complete lack of an ANTT® competency update.

Participants were asked if they considered their aseptic technique had changed since the introduction of ANTT®; more than three-quarters of staff thought that their practice had ‘definitely’ improved (37/49, 76%).

Participants were asked if they thought that standardising clinical practice benefited patient care; all participants registered agreement to this proposition, with more than three-quarters strongly agreeing that standardising practice improved patient care (37/29, 76%). Most staff considered that ANTT® had helped to standardise practice in aseptic technique (48/49, 98%), with more than half strongly agreeing with the proposition (28/49, 57%).

Of those respondents who strongly agreed that standardisation improved clinical practice (37/49, 76%), most of these also strongly agreed that ANTT had help to standardise practice in the Trust (27/49, 73%). Respondents found the principles of ANTT® either easy (25/49, 51%) or very easy (22/49, 45%) to apply to clinical practice, and most staff across every descriptor used to define the standard aseptic technique felt better able to describe practice since they have been using ANTT® (Table 5).

Local bacteraemia reporting

From April to June 2008, the Health Protection Agency (HPA) reported that the Trust had recorded 15 MRSA

bacteraemias, and in the preceding 12 months (April 2007 to April 2008) a total of 54 MRSA cases were reported in the Trust. Between January 2008 and January 2009, 38 MRSA bacteraemias were reported to the HPA. Internal Trust RCA had concluded that, between 2008 and 2009, 80% of MRSA bacteraemias were IV therapy intervention-related. In the initial 20 months following the end of the ANTT® implementation, no MRSA catheter-related bloodstream infections were recorded. During that time (January 2009–September 2010) 26 MRSA bacteraemias were recorded at the Trust. Comparing the 12 months prior to ANTT® introduction with the 12 months following implementation shows a reduction from 41 reported cases of MRSA bacteraemia to 15.

Stakeholder interviews

Three senior members of staff interviewed using a structured interview schedule. Five themes were identified: practice variability; implementation resources; embedding practice; aseptic technique as process; and staff resistance.

Practice variability. Local RCA identified variability in aseptic technique as directly linked with poor standards of clinical practice prior to the introduction of ANTT® (unpublished local data). Interviewees reported a similar picture: (1) ‘... there was no standardising of practice across the trust. Aseptic technique was very poor’; (2) ‘... everybody being shown how to do something by a variety of people with a variety of different skills and what happened by default is that there was no consistent process to be followed when undertaking a task’; and (3) ‘... in terms of how practice was, I think it was relatively a lost art, and a forgotten bit of clinical practice’.

Implementation resources. Interviewees identified the sustained effort by the implementation team, getting many key staff trained in a short timeframe, and so-called

Table 5. Practice language questionnaire post ANTT® implementation: staff were asked if they felt better able to define and describe the components of aseptic technique.

	Asepsis		Aseptic technique		Sterile		Aseptic field		Key-Part		Key-Site		Critical micro aseptic field	
	%	n (49)	%	n (49)	%	n (49)	%	n (49)	%	n (49)	%	n (49)	%	n (49)
Much better able to define and describe	80	39	86	42	82	40	76	37	74	36	74	36	49	24
Slightly better able to define and describe	16	8	6	3	10	5	18	9	16	8	16	8	33	16
No change in being able to define and describe	4	2	8	4	8	4	6	3	4	2	6	3	8	4
Slightly less able to define and describe	0	0	0	0	0	0	0	0	4	2	2	1	4	2
Much less able to define and describe	0	0	0	0	0	0	0	0	0	0	0	0	2	1
No response	0	0	0	0	0	0	0	0	2	1	2	1	4	2

‘Board-to-Ward’ (DH 2008) engagement as major contributing factors in the successful implementation of ANTT®. The implementation resources were well evaluated for their utility although local information communications technology (ICT) limitations were identified as slowing the process of uploading resources to the Trust ‘intranet’ slowing down resource dissemination to staff.

Embedding practice. Stakeholders said that practice was improved at both hospitals reflecting a perceived benefit for patient care that appeared to help secure continued engagement of staff with ANTT® compliance: ‘... what I found one of the quite amazing things about this is the amount of engagement’.

Interviewees noted that there were initiatives ongoing at the time of the ANTT® implementation that could also have impacted on the HAI rate, such as MRSA screening and new hand-hygiene audits; however, those interviewed were confident that ANTT® had been a key driver of improvements in clinical practice: (1) ‘...I think it was successful, it clearly worked because we’ve had a reduction, you know a steady reduction in our MRSA bacteraemias’; (2) ‘... I personally think on top of the agenda, ANTT® was one of the most important things happened for prevention of healthcare associated infection’; and (3) ‘...I think I’d rate it quite highly because I think it has been absolutely pivotal in reduction of MRSA bacteraemia rates’.

Other factors mentioned included its impact in terms of resources given over to the implementation project, such as one-to-one training and assessment and dedicated ‘ANTT®-Link Nurses’ for all relevant areas, and the belief that it was the only initiative that specifically addressed the root causes of bacteraemia that were identified by RCA prior to the intervention.

Aseptic technique as process. ANTT® was as much a clinical ‘process’ as a theory-practice framework: (1) ‘...I think it’s become the norm, it’s just become what people do, and I think it’s a process that they all follow’; (2) ‘...It’s changed the clinical practice and changed clinical behaviour, standardising practice in aseptic practice was the important thing, now everybody is practicing the same way’.

Staff resistance. Change is a concern for many clinical staff (Prochaska and Velicer, 1997) and change management is a challenging component of any major alteration to pre-existing clinical practice (Cabana et al., 1999). Despite early resistance, (1) ‘...mostly we had difficulty and resistance but eventually everybody understood the importance of ANTT®’, and the scale of the task (2) ‘...to standardise aseptic technique was obviously a big job just to bring this change, obviously, it needed a lot of effort to change the culture’, staff within the Trust embraced the standardisation of practice.

The interviewees were also realistic about the long-term nature of ANTT® implementation and how widely the ANTT® CPF can be applied to clinical practice: (3) ‘...it’s still a work in progress and we haven’t perhaps got as far with it, but I think having those principles has enabled us to see how you can extrapolate this across lots of clinical practice’.

Discussion

Data from this study demonstrate improved compliance among a group of clinical staff trained in invasive IV therapy interventions and IV cannulation with the core components of aseptic technique, as defined by the ANTT® CPF. Improvements were noted across all the monitored components.

Compliance with hand hygiene showed an improvement of 63% between pre- and post-implementation. The literature would suggest that non-compliance with expected standards of hand hygiene is a problem that could be routinely as low as 34–50% (Brühwasser et al., 2016; Fuller et al., 2011; Kingston et al., 2015). Similarly, prior to the introduction of ANTT® the use of a suitably managed aseptic field was uncommon (e.g. sterilised drape, disposable paper tray, reusable plastic or metal trays, etc.). The 20% compliance in 2008 represents so-called ‘sterile fields’ that were used for IV therapy and IV cannulation procedures during the pre-intervention audit of practice. But compliance with aseptic field management was greatly improved in the post-intervention audit.

It is generally reasonable to assume that auditing clinical practice immediately following a major change to clinical practice accompanied with comprehensive training and education would exhibit positive results (Pronovost et al., 2006). However, this study has demonstrated significant improvements in all items 36 months after the original implementation. This suggests that the ANTT® intervention model together with regular competency updates is sustainable over time and is a robust education and training model for aseptic technique.

There are some areas that have not demonstrated such marked improvement. Key-Part disinfection has historically been a weak area of compliance at the Trust and this was demonstrated in the pre-intervention audit data. Between 2009 and 2011, local audits of compliance demonstrated improvement; however, results from this study demonstrated a slight reduction in compliance from both the 2010 and 2011 audits.

Comparing compliance between pre- and post-intervention groups can provide helpful local intelligence that could help to target education and training in key areas of aseptic technique. If some competency areas show less improvement this may indicate the need to explore both compliance and competency. Ongoing audit can maintain this level of intelligence for the organisation.

Standardising practice language appears to have made the explanation of aseptic technique easier for staff members; most believed that their practice had improved and almost all thought that ANTT® had helped to standardise practice in aseptic technique. This suggests that ANTT® could be viewed as both a vehicle for standardisation and a quality improvement tool. The competency-based structure of the ANTT® CPF has demonstrated improved competency – staff thought that they now had a standard way of performing aseptic technique and that for some this approach had made their practice better.

NICE and other key stakeholders have recognised the risks to patient safety inherent in ambiguous clinical language and variable standards of practice for such an important clinical competency as aseptic technique, noting the terminology of aseptic technique is outdated and that

healthcare professionals are often confused about the principles of asepsis (NICE, 2012). This study showed the hospitals involved making a journey in which at baseline the clinical practice and descriptive clinical language was variable and conflicting moving towards a standard for practice and language. This resulted in HCWs reporting being better able to define and describe aseptic technique and perform standardised aseptic technique consistently.

Reported MRSA bacteraemias reduced during and after the implementation of the ANTT® CPF. Any correlation between decreased bacteraemias and ANTT® does not imply causation, but it does suggest that the changes to working practices, staff knowledge and skills and the reported improvements to the quality of aseptic technique in practice may help to explain improvements to patient outcome. More rigorous research methods with better controls are needed to establish a clear correlation between intervention and outcome.

Moving forward

Nearly three-quarters of participants in this study had been using ANTT® for more than two years and more than half reported a competency update within the preceding 12 months. Results from the two sample populations over the 48-month period show that ANTT® has become embedded practice. This provides evidence that ANTT® can be sustainable with modest resource input through regular competency updates in the same way other important clinical competencies, such as basic life support, are managed as mandatory competencies.

Given the challenges of sustaining infection prevention initiatives, it was notable that in the two hospitals studied improvement was sustained effectively by ongoing ANTT® maintenance over 36 months, and for the first 20 months’ post implementation no MRSA IV-related bacteraemias were reported. Improved understanding of aseptic technique and a more standardised practice language were also evident over this time. From the users’ perspective, standardising the organisations’ aseptic practice with ANTT® improved their understanding of aseptic technique and in the opinion of the most of participants ‘definitely’ improved their clinical practice.

Results from this study reinforce NICE’s position concerning the confused picture nationally surrounding aseptic technique (NICE, 2012) and support a re-evaluation of the various definitions surrounding aseptic practice. Aseptic technique needs to be related to practice through a comprehensive practice framework that reflects its critical importance to safe patient care. It is suggested in the literature (Aziz, 2009; Flores, 2008; Hartley, 2005; Rowley et al., 2010) that prior to the ANTT® CPF there was little agreement concerning definitions and practice of aseptic technique. NICE suggests ANTT® may represent a possible framework for establishing aseptic guidance (NICE,

2012). This study provides evidence for the sustainability of a competency-based quality standard for aseptic technique. These hospitals and others are using the ANTT® CPF as guidance for aseptic practice (NHMRC, 2010; NICE, 2012; Rowley and Clare, 2009; Welsh Government, 2015).

Limitations

This study is a pragmatic evaluation rather than a controlled before and after methodology and there are several confounding factors to consider: The pre-intervention group (Group A) were not volunteers, nor were they screened or recruited. The post-intervention group (Group B) were screen and recruited. Therefore, it should be considered that staff in the post-intervention group might have volunteered if they were more confident in their own competency. There were no data collected on training level or experience in Group A, but these data were collected on last training in Group B. As there were no local competency-based training for aseptic technique prior to the introduction of ANTT® this is not thought to be a confounding factor. Neither group was controlled for gender.

Although the study only evaluated IV therapy and IV cannulation, the elements of the ANTT® CPF are applicable for an aseptic technique used in any clinical situation.

The potential heterogeneity issues with a non-probability sample were somewhat controlled by the ward 'skill mix', designed to ensure safe and effective clinical management; therefore, it is likely that although the sample was not random, it should reasonably contain a 'mix' of healthcare professionals at various levels of experience and training – providing a 'snap-shot' rather than a true random sample. While most staff reported a competency update between six and 12 months, almost one-quarter had not received an update in more than two years. The two samples were unpaired making it possible that some staff will not have been employed at either hospital during the before audit; conversely, it was uncertain how many staff were present for the first audit and the sample groups should be considered independent. Given the pragmatic nature of this study there are likely to be unknown confounding factors and so further research will be needed to compare these data with studies that have more extensive controls of potential confounding variables.

Conclusions

Findings from this study show implementation of the ANTT® CPF combined with regular competency updates improves both the understanding and application of aseptic technique for IV therapy and IV cannulation and that these improvements are sustainable over time. By standardising aseptic technique with ANTT®, HCW compliance is improved.

The ANTT® CPF is in widespread usage, providing an opportunity for other researchers to replicate this study while avoiding potentially confounding factors in the methodology and design. The authors recommend that continued research into the effects of implementing ANTT® would help refine the ANTT® implementation process and ongoing development of ANTT® over time.

Declaration of conflicting interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Both authors are non-salaried members of the board of The Association for Aseptic Practice (ASAP), a not-for-profit non-governmental organisation.

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