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A PILOT OBSERVATIONAL SURVEY OF CVAD EXPERIENCES BY AUSTRALASIAN HPN PATIENTS

AIM

To survey a sample of home parenteral nutrition (HPN) users about their use of central venous access devices (CVADs) and products for administration of parenteral nutrition (PN), and their experiences of CVAD infections.

METHOD

All members of the Parenteral Nutrition Down Under (PNDU) online forums were invited to participate in the survey. The survey involved completing an online questionnaire and took place during January 2017. If PN was first commenced in hospital respondents were instructed to confine answers relating to the time after they were first discharged home on PN, i.e., became a Home PN user. However, experiences during subsequent hospital admissions were included when answering the questionnaire. For analysis purposes, those HPN users younger than 18 years were classified as children.

RESULTS

Respondents

There were 31 respondents, including 19 (61.3%) adult HPN users and 12 (38.7%) carers of child HPN users. All Australian states were represented, and included 13 (41.9%) respondents residing in New South Wales and one (3.2%) residing in New Zealand (Fig. 1).

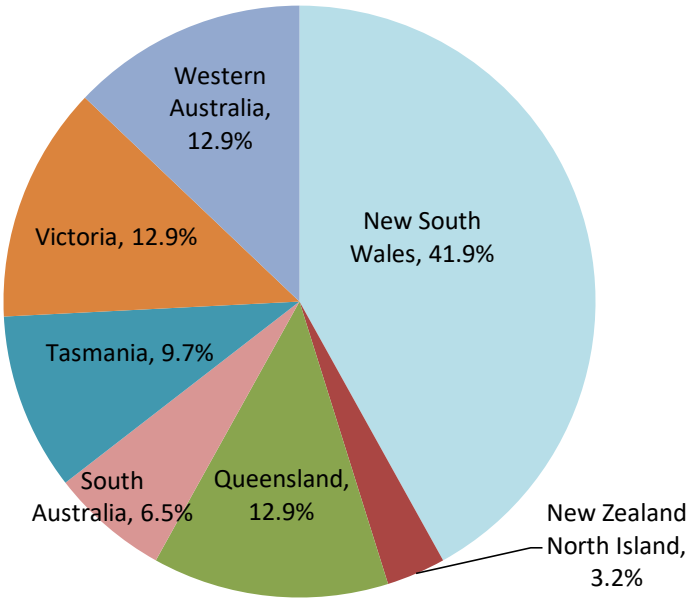

Fig.1. Place of residence of the 31 respondents

Length of time on HPN varied and ranged from less than 12 months (5 respondents, 16.1%) to 20 years or more (2 respondents, 6.5%) (Fig. 2).

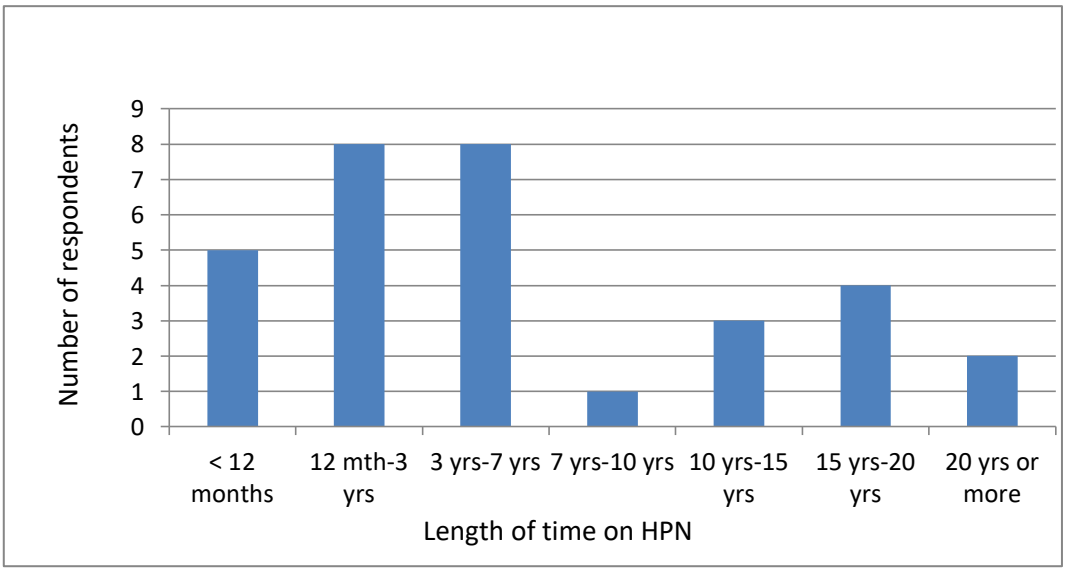

Fig. 2. Length of time on HPN versus number of respondents

Type of venous access device currently used

Twenty-one (67.7%) respondents, including 11 of the 12 children, currently used a Hickman or Broviac central venous catheter, 9 (29.0%) respondents used an implanted port, including 1 child, and 1 adult used an arteriovenous (AV) fistula for administration of parenteral nutrition. Seventeen (81%) of the Hickman/Broviac lines used were single lumen and 4 (19%) were double lumen. One respondent with an implanted port did not know how many lumens the device had while all other implanted ports used were single lumen.

The respondent who currently used an AV fistula had used it for at least 10 years. For others, the time that the current device had been in place varied but the most frequent length of time was between 12 months and 3 years (13 respondents, 42%) (Fig. 3).

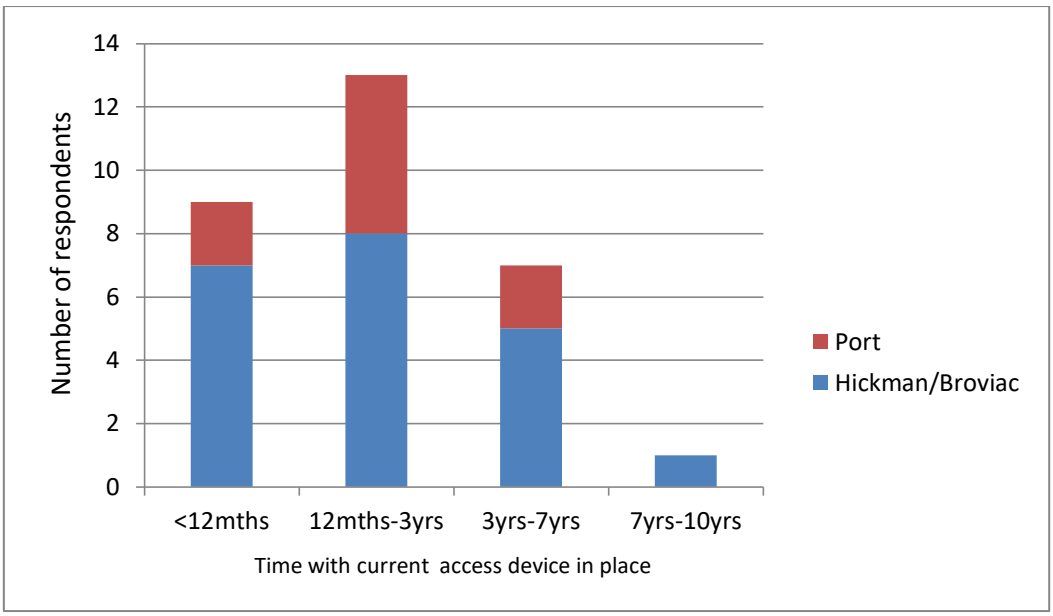

Fig.3. Time with current access device in place versus number of respondents

Accessing the Central Venous Access Device

All 21 respondents using a Hickman or Broviac line and 6 of the 9 (66.7%) using a port accessed their device every night for HPN. Three of the respondents accessed their ports 4-6 times a week and the respondent with a fistula accessed it 1-3 times a week. Those not accessing their device every night were all adults.

Seventeen (81.0%) of those using a Hickman or Broviac line had their CVAD dressing changed weekly, 2 (9.5%) twice a week and 1 (4.8%) when required but more than once per week. One respondent had the dressing changed weekly in winter but 2-3 times a week in summer.

Of those using a Hickman or Broviac line, 6 (28.6%) changed their own dressing around the site of the device but this included 2 respondents who had carers who also performed this task. For the other respondents, carers, community nurses and/or hospital staff changed the dressings (Table 1).

Table 1. People changing the Hickman/Broviac line dressings

Person changing the dressing	Number of respondents	% of respondents using Hickman/Broviac lines (n=21)
Community nurse, carer	1	4.8
HPN user	4	19.0
HPN user, carer	2	9.5
Carer	7	33.3
Carer, hospital staff	3	14.3
Hospital staff	2	9.5
Hospital staff, community nurse	2	9.5

Of the 9 respondents who used an implanted port, 6 (66.7%) inserted a new needle themselves. Others inserting new needles included a carer (1 respondent), hospital staff (1 respondent) and an ambulatory care nurse (1 respondent). It was not clear whether the ambulatory care nurse was based at the hospital or in the community. Six (66.7%) port users had their needles changed weekly, 2 (22.2%) 2-3 times a week and 1 user changed the needle daily.

The respondent using an AV fistula accessed the device themselves.

Locking agent and cap used on end of Central Venous Access Device

Overall, the most frequently used locking agents used were heparinised saline (14 respondents, 45.2%) and Taurolock (11 respondents, 35.5%). Six of those using Taurolock were children.

Six (19.4%) respondents used 2 different agents to lock their CVAD, presumably at different times. These included 3 who used heparinised saline and 70% ethanol, 1 heparinised saline and Taurolock and 1 saline and heparinised saline (Table 2).

Table 2. Locking agent used for CVAD versus number of respondents (n= 31)

Locking agent	Number of respondents	% of respondents (n=31)
Taurolock	10	32.3
Heparinised saline	9	29.0
Heparinised saline, Taurolock	1	3.2
Heparinised saline, Ethanol 70%	3	9.7
Saline only, Ethanol 70%	1	3.2
Saline only, Heparinised saline	1	3.2
Saline only	4	19.0
Ethanol 30%	1	3.2
Gentamycin	1	3.2

Twenty-five (80.6%) respondents did not put anything on the end of the CVAD when not infusing. Twenty of these had their valve/luer connector changed approximately weekly and five changed the valve/luer connector when preparing for the next infusion. Five (16.1%) respondents attached products to their CVADs when not infusing. These included; an injection stopper/luer cap (3 respondents), disinfecting cap (1 respondent), and an extra "bung" which was removed prior to the next infusion then replaced. One (3.2%) respondent with a port removed the needle and valve/luer connector at the end of every infusion.

CVADs used previous and present

Since being on HPN some respondents had used a number of CVADs including different types at different times.

Nineteen (61.3%) respondents had used more than one type of CVAD. The Hickman/Broviac lines were the most frequently reported CVAD used (25 respondents, 80.6%), followed by PICC (15 respondents, 48.4%), implanted port (14 respondents, 48.4%), AV fistula (1 respondent, 3.2%) and generic temporary central venous catheter (1 respondent, 3.2%).

The 31 respondents reported a collective total of approximately 188 CVADs being used since commencing HPN (range 1 to 33 CVADs for each respondent). Nineteen (61.3%) respondents reported the use of 4 or fewer CVADs. However, not all respondents could recall the exact number used and hence the numbers reported should be considered as an approximation only. The 2 adult respondents who had been on HPN for more than 20 years and 1 child who had only been on HPN for less than 12 months had each used more than 10 CVADs (Fig. 4).

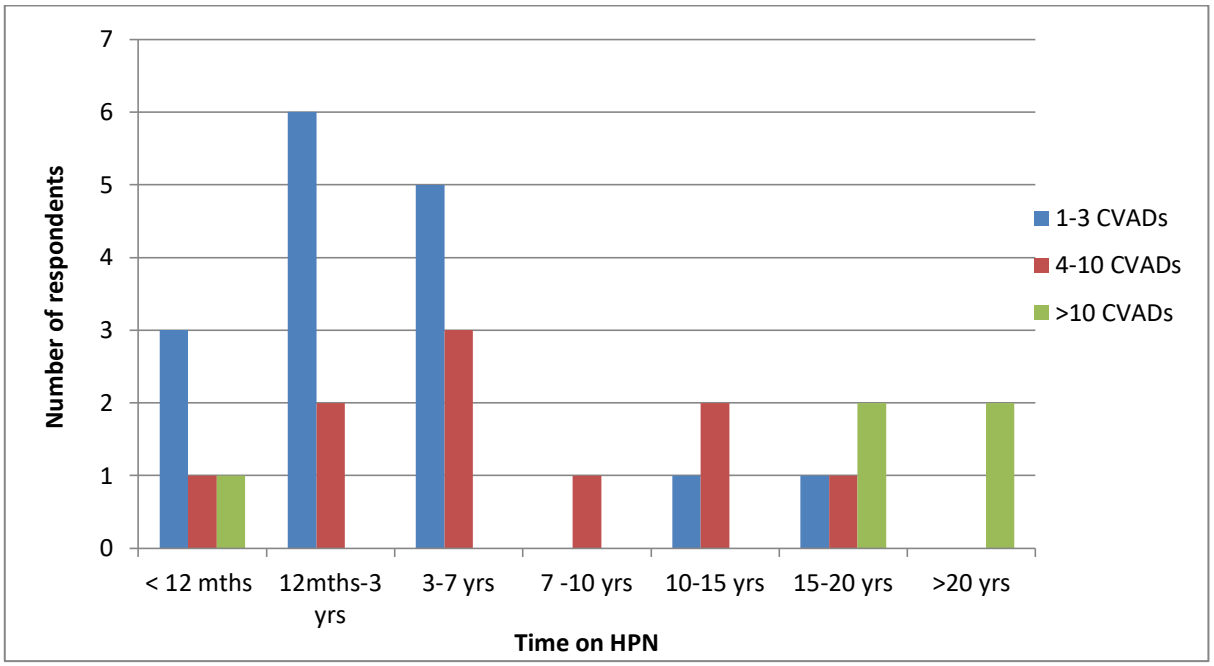

Fig. 4. Time on HPN and number of CVADs used

Suspected / proven CVAD infections

Overall, twenty-one (67.7%) of respondents had at some stage since commencing HPN developed a suspected or proven CVAD infection. This included 11 of the 19 adults (57.9%) and 10 of the 12 children (83.3%). Overall, 6 (28.5%) had a suspected/proven infection less than a year ago, 7 (33.33%) between 1 and 3 years ago and 8 (38.1%) more than 3 years ago.

Since commencing HPN, 6 users had experienced only 1 suspected/proven infection (4 children, 2 adults). One respondent reported at least 10 infections and another at least 3 infections. For the remaining 13 respondents the number of CVAD suspected/proven infections ranged from 2 to 30 (Table 3).

Table 3. Number of CVAD suspected/proven infections versus number of respondents.

No. CVAD suspected/proven infections	Number of respondents
Child	
0	2
1	4
2	2
3	1
4	1
8	1
>10	1
Adult	
0	8
1	2
2	1
3	2
7	2
12	1
15	1
30	1
> 3	1

Sixteen respondents who had a suspected/proven infection had only ever used one type of CVAD (14 Hickman/Broviac lines, 2 implanted ports). A further 5 respondents had used two types of CVAD including; 2 with a Hickman/Broviac and Implanted port, 2 with a Hickman/Broviac and PICC, and 1 with an Implanted port and PICC.

Overall, 6 of the 21 with suspected/proven infections had used a double lumen CVAD at that time and the remainder used a single lumen device.

At the time of the suspected/proven infections 6 (28.6%) respondents were using saline as the locking agent, 14 (66.7%) were using heparinised saline, 3 (14.3%) 70% ethanol, 1 (4.8%) Gentamycin and 1 (4.8%) Vancomycin. This included 3 respondents who experienced more than 1

infection and were not necessarily using the same locking agent when each infection was suspected.

At the time of the suspected/proven infection 15 respondents did not put anything additional on the end of their CVAD when not infusing, including 13 who had their valve/connector changed approximately weekly, and 2 who had their valve/connector changed when preparing for the next infusion. In addition, 5 respondents put on an injection stopper/luer cap, 1 an extra "bung" and another removed the needle (and valve/luer connector) from the port at the end of the infusion.

Of the 21 with suspected/proven CVAD infections, 4 of 10 children and 3 of 11 adults had their CVAD removed each time, with the number of removals for each person ranging from 1 to 11. Of the 14 respondents who did not have their CVAD removed each time the number of CVADs infected ranged from 1 to 30.

Of those who had used a Hickman/Broviac line or PICC for HPN at some stage, 12 of 28 (42.9%) had at least one device repaired and of those 12, 4 subsequently developed a suspected/proven infection of that device.

DISCUSSION

This pilot study did not aim to determine CVAD infection rates given the nature of the study, i.e., sample size, sample selection and reliance on recall. However, it provided a description of the experiences and current practices of Australasian HPN users in relation to CVADs and CVAD infections.

Around a third of respondents had been on HPN for 7 or more years. The survey did not ask for information regarding the underlying medical reason causing Intestinal Failure and hence dependence on PN. However, the results highlight how such 'artificial' feeding can sustain life in some cases for many years and offers hope for those with Intestinal Failure. As most accessed their CVAD every night for PN, it also demonstrates the obvious reliance on PN for survival for many of the respondents.

Not surprisingly two thirds of respondents currently used a Hickman or Broviac line and at some stage around 80% used this type of CVAD. Reasons for this are likely to include cost and ease of accessing the line for infusion. Further it is unlikely that use of implanted ports or AV fistulas is possible for young children.

While some HPN users changed their own CVAD dressing or inserted a new needle in their port themselves, carers, but also community nurses or hospitals, often did this. This reflects the importance and in some cases the necessity of the HPN user having support. It also demonstrates the often unrecognised contribution of carers, usually a family member, in maintaining the health of the HPN user, or where a community nurse or hospital assists, the increased reliance on accessible and adequate healthcare services.

Some respondents had used many CVADs during their time on HPN and around two thirds of respondents had at some stage experienced a suspected or proven CVAD infection. It is likely that

the state of the individual user's immune system and existence of co morbidities may contribute to their risk of a CVAD infection. There are also many other possible factors in the use of the CVAD which may contribute to CVAD infection, including the inclusion of lipids in the PN formula, and if the CVAD is used for any other therapies and/or blood collection. In any event, as HPN can be a long term life support therapy, the result confirms the importance of continued research into ways to reduce that risk e.g., type of CVAD and locking solution. It is of note that those who experienced a CVAD infection had used a variety of locking agents but TauroLock™ was not reported as being used at that time. As TauroLock™ was reported as being currently used by 35.5% of those surveyed, this is consistent with findings in recent studies into the effectiveness of this agent[1].

Interestingly around 40% of those who had a Hickman/Broviac line had at some stage had their device repaired. Further, not all those who had a CVAD infection had that device removed. Avoiding removal of CVADs obviously benefits those who need to use PN indefinitely with limited access sites.

CVADs are used for the administration of drugs, chemotherapy, IV hydration and parenteral nutrition. The different patient groups using CVADs for these various therapies (and the various facets of their specific CVAD use) may therefore differ in many respects, including their susceptibility to CVAD infections. As such, the results of any investigations of CVADs used for one of these therapies may not necessarily be applicable to another. For example, some studies (of another patient group or non-patient group specific) show that implantable ports have a lower risk of infection than Hickman/Broviac/Groshong[2,3], while the small number of published studies specific to HPN use[4,5] concludes the opposite. Further research is needed into the specific use of CVADs for HPN and contributors to infection risk, with results incorporated into future HPN guidelines and clinical practice, particularly as HPN can be a lifelong therapy.

ACKOWLEDGEMENTS

Thank you to Sharyn Ingarfield for analysing the data and thank you to members of the PNDU online forums for their participation in the survey.

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