Recommended Dwell Times for UVC's
Critically Appraised Topic (CAT)

PICOT Question:

How long can umbilical venous catheters remain in place in sick neonates without significantly increasing the infant's risk of acquiring a bloodstream infection?

Clinical bottom line based on literature appraisal below:
The UVC can probably be left in place for up to 14 days if necessary without significantly increasing the risk of a bloodstream infection. Additional studies are warranted to determine whether it is safe to leave them in for a longer period of time.

Search strategy implemented:

Pubmed was searched with the following statement: "infant, newborn {MeSH}" AND "catheterization, central venous/adverse effects {MeSH}" AND "(time {MeSH}" OR "time factors {MeSH}" OR "duration" {text}). CINAHL was searched with the following search statement: MH "infant, newborn" AND (MH "catheterization, central venous +" OR MH "central venous catheters + " OR "Venous catheter care (Saba CCC)") AND (MH "time+ " OR MH "time factors" OR duration).

Search outcome:

I selected 13 of 131 articles listed in the data bases to review, based on title and/or abstract. Of these, 4 did not specifically break out data for UVC's, 1 dealt only with colonization rates (not bloodstream infections or BSI's), and 1 discussed only UVC's with a mean dwell time of 2 days (1-5 day range), leaving 7 articles (5 research studies, 1 editorial, and 1 set of NIH guidelines) for my synthesis. I also reviewed the references at the end of the first 6 articles, and found 5 more new articles that appeared pertinent. However, 1 was in French, 2 were unavailable (published only in 2 European journals), and 2 seemed outdated (published nearly 40 years ago, in 1970 and 1972), so they were not included in my synthesis.

Synthesis of relevant studies:

Author, date, country, and industry of funding	Patient Group	Level of Evidence (Oxford) / Strength of Evidence (GRADE)	Research design	Significant results	Limitations
Loisel et al, 1996, USA	Infants<5days @Child.Ntl.Med Ctr, DC, 9/90-	L of E=1b; S of E =A; GRADE=	RCT in single ICN,all BW+GA, 3 grps: PIV,	Rates of sepsis similar in all 3 grps: 25% in control grp (PIV's only); 27% in 1-lumen UVC's; 24% in 2-lumen	Small sample size by study's end. 123 pts enrolled, but only 56 completed study (because lines were

	9/92),no UVC present @ admission, req IVx 7 days	Strong recommen-dation+ research recommend-ed.	1-lumen UVC, 2-lumen UVC	UVC's. Mean dwell time of UVC's: 12.2-12.6 days (range 7-17 days).	no longer needed; only15, 20,& 21 pts were still in each cohort group respectively @ end of study @ 2 wks). PICC's not studied.
Apostolopou-lou et al, 2004, Greece	Sick neonates, admitted to Level III ICN in Athens, Greece from 8/02 to 4/03 who had central lines placed.	L of E = 3b S of E = B GRADE = Weak recommen-dation	Prospective surveillance of current ICN pts with central lines for nosocomial infections.	No appreciable difference in blood stream infections (BSI's) between UVC's and other types of central lines (60% of pts with UVC"s had BSI's; 70% of pts with other central lines had BSI's). No correlation of increased BSI's with increased dwell times. (Most BSI's occurred between 3-5 days).	123 patients surveyed, but only 22 had UVC's and 15 had other types of central lines, so sample size was small. Unlike other studies, infection rates were much higher, and occurred at earlier intervals.
Butler-Ohara et al, 2006, USA	210 neonates, <or =1250 gms, U of Rochester, 7/98-2/04, UVC placed @ ad-mission, ex-pected need for central line > 7 days	L of E = 1b S of E = A GRADE = Strong re-commenda-tion; research recommend-ed	Prospective RCT in single ICN. 2 study groups: UVC for 7-14 days with PICC after; UVC for up to 28 days	No statistically significant difference in BSI's between groups: 13% infection rate in short-term UVC group and 20% infection rate in long-term UVC group. Mean UVC dwell time @ time of infection was 11.5 days in short term UVC group and 14 days in long term UVC group.	Of 106 pts in first cohort and 104pts in second cohort @ the start of study, only 67 had UVC"s in each cohort by 14 days, and only 23 short-term and 19 long-term pts had UVC's @ 28 days, affecting sample size for analysis of >14 days data. By study end, there were both types of lines in both cohorts (half of pts outgrew" UVC"s after 2 wks). Many UVC's (35) in long-term group were replaced @>7 days of age and this could affect BSI rate.
Soe, 2007, England	400 neonates in 14 ICN's in SE England, from 7/02-4/03 with central venous lines (CVL's).	L of E = 3b S of E = C GRADE = Weak recommend-ation.	Prospective audit of patients with central venous lines for infections.	572 lines placed in 400 patients. (218 UVC's; 374 PICC's). 2% UVC pts had BSI's; 14% PICC pts had BSI's. UVC's may present less infection risk than PICC.	No dwell times for lines were given, so infection rates per 1000 catheter days could not be calculated to compare groups. UVC's may have had very short dwell times.
Mahieu et al,	Neonates	L of E =3b	Prospective	35 BSI's occurred.	While total BSI rates were given for

2001, Belgium	@ University Hosp- Antwerp, Belgium, 11/93-10/95, who required central venous lines. All birth wts and gest.ages included.	S of E = B Weak recommend-ation.	review of 862 CVL's placed over 2 yrs.(68% were UVC's and 32% were PICC's or subclavians).	2.6% in UVC's, 7.2% in PICC's, and 8.1% in subclavian lines.. No statistical difference between. groups when adjusted for total catheter days: (4.7/1000 cath days for UVC's vs 4.3/1000 cath days for other CVL's.) Length of dwell time did not increase rate of BSI's/1000 cath days: 5 @ 0-7days, 5.6 @ 8-14 days, and 3.0 @ >14 days. Age of >1wk @ insertion and BW<1000 gms were correlated with incrased BSI rate.	both UVC's and other CVL's, BSI's for each group were not calculated separately at each of the 3 intervals of dwell times (avg dwell time for UVC's was 6.4 days vs 15.7 days for PICC's.; maximum dwell time for UVC's was 23 days vs. 110 days for PICC's.)

Commentary:

An editorial by Mincey (2006, USA) reviewed Butler-O'Hara's study, and concurred that UVC's could probably dwell for longer times than the current norm without increased risk for infection, and recommended further multi-institutional studies to evaluate long-term UVC use. The 2002 NIH "Guidelines for Prevention of Intravascular Catheter-Related Infections" recommended replacing UVC's only for malfunctions (not BSI's or thromboses), and stated that although they should be removed when not needed, they could be used for up to 14 days without increased risk of infection if managed with appropriate sterile technique. A brief e-mail survey of VON ICN"s regarding their typical dwell times of UVC's yielded 10 responses over a 2 week period. Six institutions reported UVC"s were usually removed before or at 7 days; four typically removed them between 8-14 days. While no institutions responding usually left UVC's in for >14 days, all responded that they would leave their UVC's in a few days longer, depending on patient need (high acuity with need for multiple ports, if patient was an ELBW infant or very unstable, or a PICC was not able to be successfully placed). Based on the synthesis of studies, editorial, NIH recommendations, and VON survey results, it would seem reasonable to allow UVC's to remain in place for up to 14 days if necessary.

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