

Home hemodialysis access care - is it different?

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Objectives

- Prevalence of Home Hemodialysis (HHD)
- Home modality options
- VA related morbidity: infection, interventions
- Strategies to reduce VA complications
- Unique considerations for the home patient

Overview of Home HD in US

420, 000 HD patients

8, 593 HHD patients (2 % of HD pts)

HHD patients tend to be younger, fewer comorbidities, less diabetes

Benefits of Home HD

Quality of Life

Cardiac benefits

- BP control, reduction anti-hypertensive meds

- Improved volume control

- LVH reduction

- LVEF improvement

Phosphate control, reduction phosphate binders

Home HD Modality Options

Home Modality	USA	Canada
Conventional (CHD) 4h 3x/ wk	25%	50%
Short Daily (DHD) 3-3.5h 5-6x/wk	65%	10%
Nocturnal (NHD) 7-8h 4-6x/ wk	10%	40%

Vascular Access Use in Home HD

Vascular Access Use in Home HD

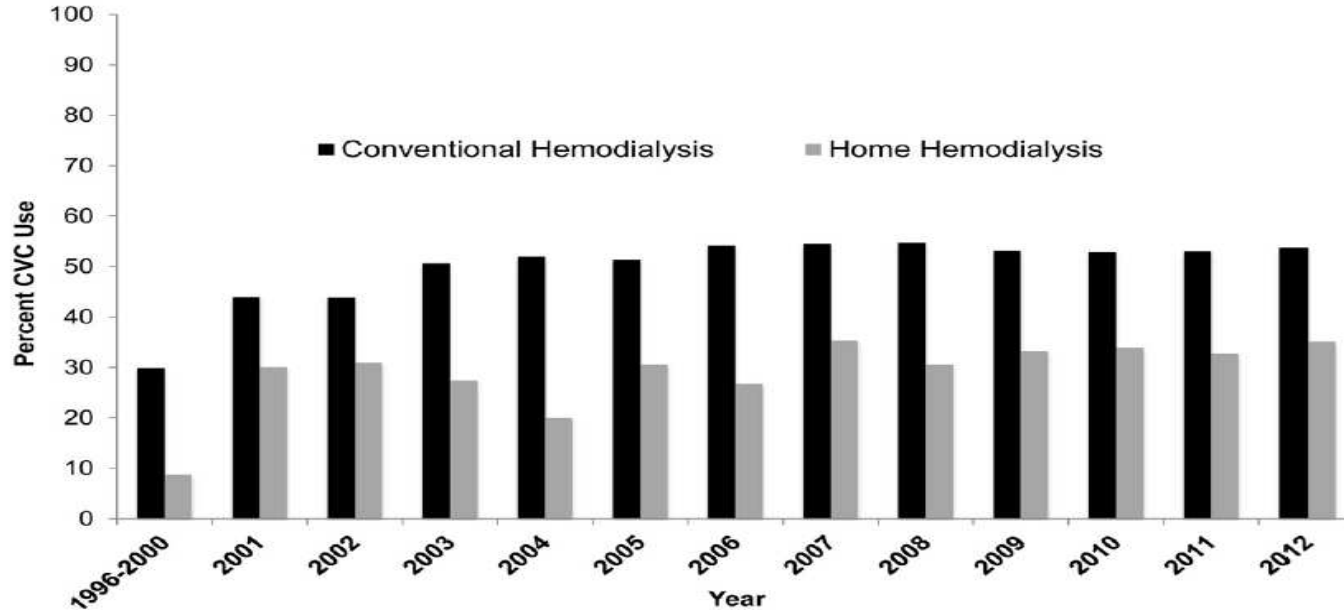


Figure 1. Central venous catheter (CVC) use in Canada, 1996 to 2012, among prevalent patients: conventional versus home hemodialysis.



Home HD: VA and Mortality

- Registry of all HHD 1870 patients in Canada
- 57% AVA (648 AVF, 46 AVG); 43% CVC
- CVC pts tend to be female, DM and PVD;

Home HD: VA and Mortality

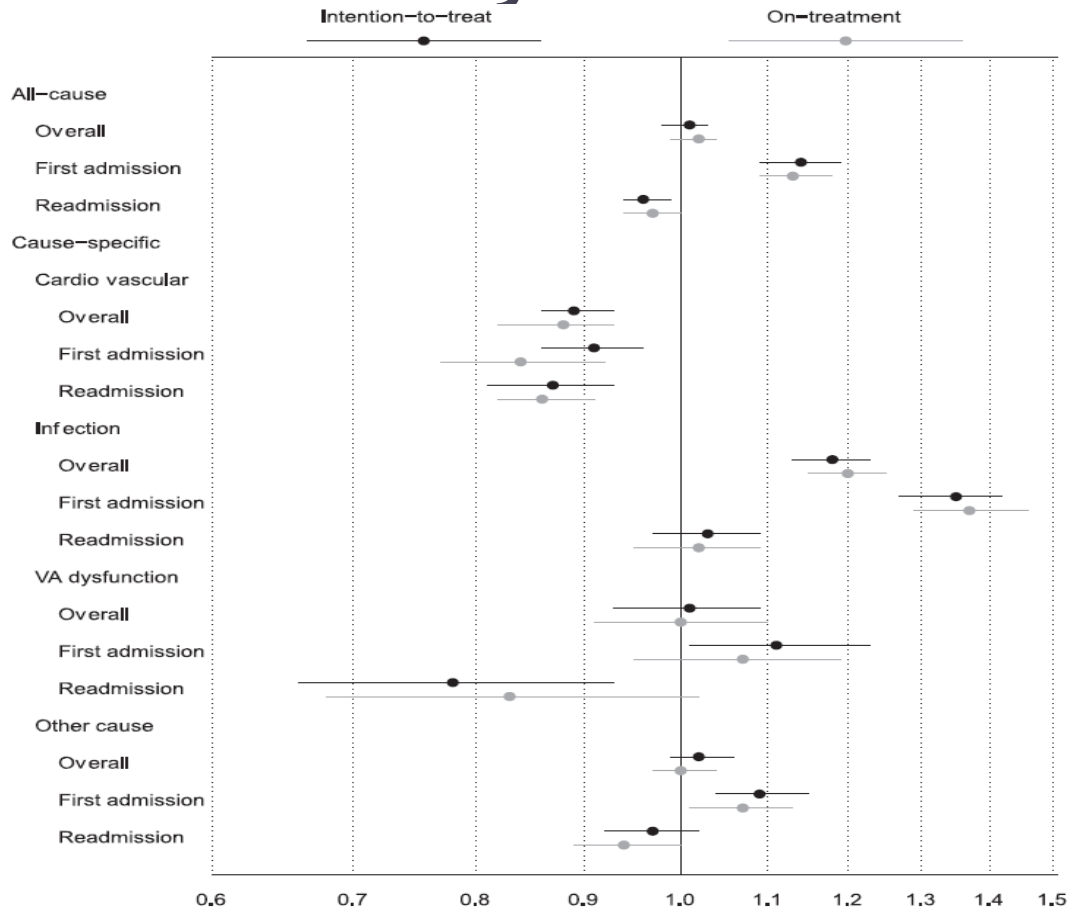
- All cause mortality: AV access HR 0.63 (0.64-0.94)
- Composite of mortality and technique failure:
AV access HR 0.78 (0.43-0.91)
- Patients with catheters appear to have similar increased risk of mortality as in CHD (32% higher risk mortality, Pisoni AJKD 2009)



Home HD: Hospitalization and VA

- USRDS cohort daily 3 480 HHD pts (5-6 sessions) vs 17 400 IC CHD pts.
- Outcomes:
 - all cause hospitalization
 - cause specific hospitalization:
CVD, infection, and VA dysfunction

Home Dialysis and Hospitalization



All cause hospitalization same

Reduction in CVD admission

Increased risk of infections

Trend to increased VA dysfunction

Significant increased risk of first admission for VA dysfunction

Home HD: Increased VA Infections

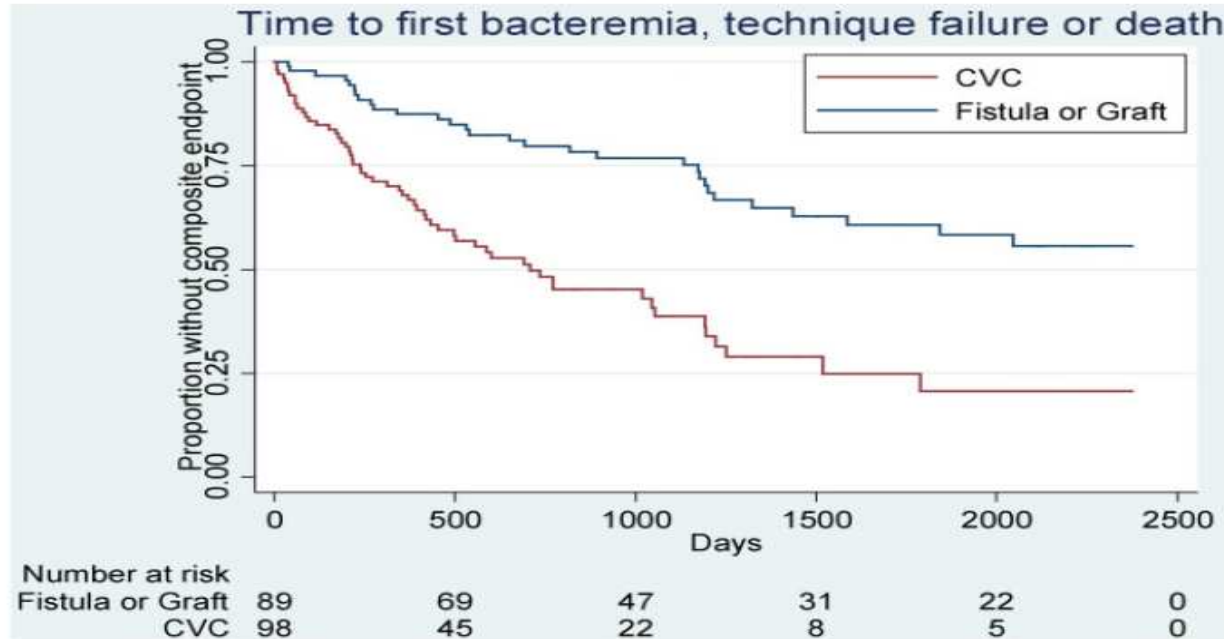


Lok KI 2011

Home N-HD and VA Infection

- Cohort of 187 Nocturnal home pts 4-7 nights per week; 7 - 8 hours
- Primary outcome: composite of time to first bacteremia, technique failure or death
- Secondary outcomes: infection rate, type of organisms

Home NHD and VA Infection



CVC HR 2.42 (1.5-3.9)

Home N-HD and VA Infection

- 60% CVC pts and 30% AVF/G had a bacteremia
- Bacteremia rate higher than C-HD
 - CVC: 1.12 per 1000 days
 - AVF/G: 0.25 per 1000 days
- Risk factors for bacteremia: Charlson comorbidity index, type of VA and DM
- **Increased risk of infections in the first few months of starting at home**

Home HD and VA Complications

Frequent Home N-HD and VA Complications

- Australian observational cohort of extended hours N-HD (≥ 24 h/week) 1999 - 2009
- Outcomes: all cause mortality, technique failure and access related events
- Access related event: any type of VA related intervention

Frequent Home N-HD and VA Complications

Table 2. Outcomes Analyzed

Outcome	No. (%)
All-cause mortality	
Cardiac death	7 (29.2)
Sepsis	5 (20.8)
Hemorrhage	1 (4.2)
Renal carcinoma	1 (4.2)
Unknown	10 (41.7)
Technique failure	
Failing health	17 (26.9)
Dialysis facility issues	8 (12.7)
Not coping with the modality	4 (6.4)
Not sleeping properly	4 (6.4)
Psychosocial issues	1 (1.6)
Access-related events	2 (3.2)
Patient choice	1 (1.6)
Other	4 (6.4)
Unknown	22 (34.9)
Access-related adverse events ^a	
Infection	47 (59.5)
Bacteremia	14 (29.8)
Local AVF infection	22 (46.8)
Unspecified infection	11 (23.4)
Thrombosis/occlusion	12 (15.2)
AVF aneurysm	5 (6.3)
Stenosis	8 (10.1)
AVF revision requirement	3 (3.8)
Other	4 (5.1)

Note: Based on unadjusted Kaplan-Meier survival rates.

Abbreviation: AVF, arteriovenous fistula.

28% (79/286) had adverse VA event

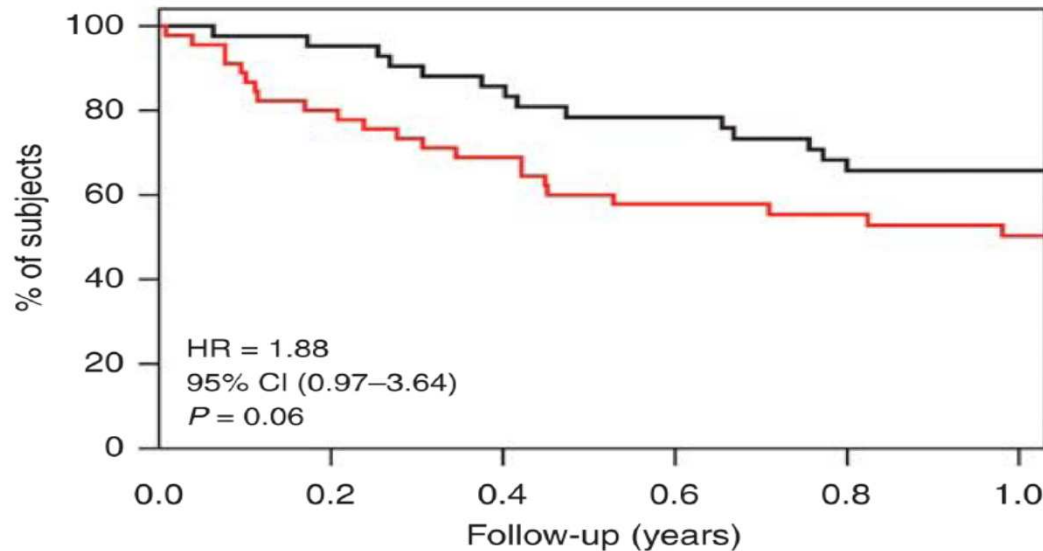
~60% VA infection

VA re-admission rates lower

Effect of Frequency on Vascular Access: FHN Nocturnal Trial

- 118 pts enrolled → 87 randomized to home NHD 6x per week vs CHD (home)
- 45 pts NHD vs 42 CHD
- Co-primary composite outcome death / LVM ; or death/physical health component of RAND
 - Severely underpowered
 - Non significant Mean difference in LVM -8.8 g and Physical health score 1.2

Six times/ week Home HD increased VA Complications



51% NHD had VA event
36% CHD had VA event

Figure 6. Time to first vascular access event

Shown are Kaplan–Meier curves representing the conventional therapy (black) and the frequent nocturnal (red) groups for the time from randomization to each patient’s first access event, defined as an access failure or other access procedure. CI, confidence interval; HR, hazard ratio.

Why frequent HHD might have more VA Complications?

- More AVF use in F-NHD (50 vs 40%)
- More buttonhole cannulation in F N-HD; $p < 0.001$
- Delayed presentation of VA dysfunction due to slower blood flow requirements

Buttonhole Cannulation



IR Tip: Please avoid cannulating near BH sites

Buttonhole Randomized Trials

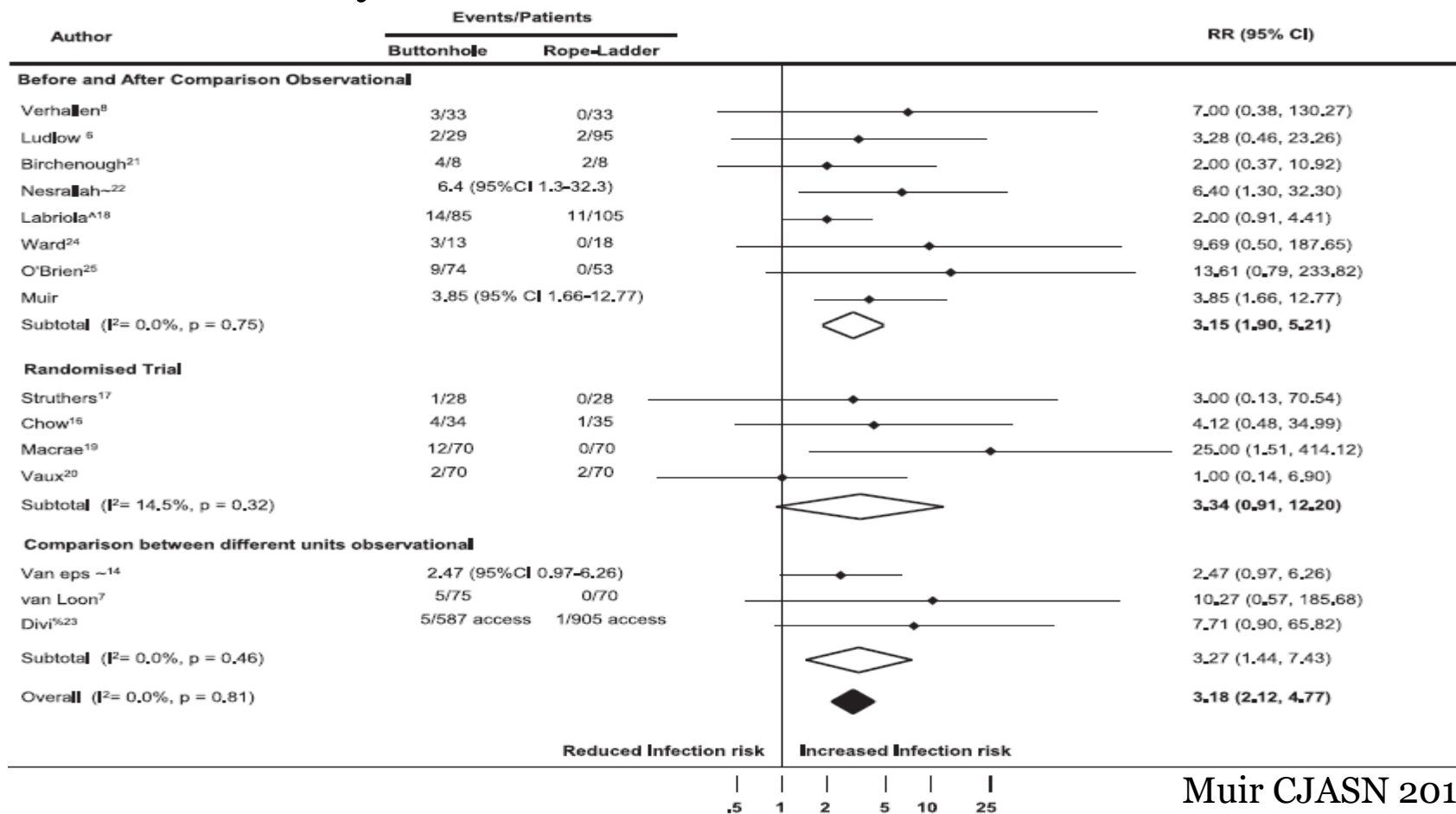
No reduction in pain with needling

Significant reduction in hematoma rates

Contradictory findings on AVF patency and survival

- Improved (BH via peg track, Vaux AJKD 2013)
- Unchanged (BH via sharp cannulation, MacRae AJKD 2014)

Meta-Analysis of Infection Risk with Buttonhole Cannulation



Buttonhole Infection Risk



IR Tip: Infected buttonhole is a medical emergency

Reasons for increased VA Complications

- Setting:
 - home vs facility
 - laxness in aseptic technique
 - Delayed access to medical care
 - Lack of monitoring
- Frequency of access use
- Technique:
 - use of buttonhole vs rope ladder cannulation
 - technique deteriorates over time

Strategies to Counteract VA Complications

- Regular audits of technique
- Re-training after complication:
 - Retrain pts after bacteremia episode and leads to significant fall in bacteremia
- Use of connector device in catheters to prevent air emboli

Strategies to Counteract VA Complications

- Topical ABX at buttonhole (Nesrallah AJKD 2013)
- Face mask with buttonhole (Faratro HDI 2015)
- Encourage use of AVF vs CVC
- Hand hygiene/ skin disinfectant
- Less frequent < 6x per week

Bottom Line: VA Care for Home HD

- Increased infection risk (1st admission)
CVC > AVG > AVF
Buttonhole cannulation
- Increased risk of access complications

Resources - Home HD

International Society of HD (ISHD) Manual for
Home HD Care Module 7 (VA)

<http://www.ishd.org/7-the-care-and-keeping-of-vascular-access-for-home-hemodialysis-patients/>

Resource – VA Core Curriculum

Canadian Journal of Kidney Health and Disease VA Core Curriculum 2016

1. Arteriovenous access selection and evaluation

<http://journals.sagepub.com/doi/full/10.1177/2054358116669125>

2. Arteriovenous access failure, stenosis and thrombosis

<http://journals.sagepub.com/doi/full/10.1177/2054358116669126>

3. Arteriovenous access infection, neuropathy and other complications

<http://journals.sagepub.com/doi/full/10.1177/2054358116669127>

4. Practical aspects of tunneled and nontunneled HD catheters

<http://journals.sagepub.com/doi/full/10.1177/2054358116669128>

5. Hemodialysis tunneled catheter related infections

<http://journals.sagepub.com/doi/full/10.1177/2054358116669129>

6. Hemodialysis tunneled catheter non-infectious complications

<http://journals.sagepub.com/doi/full/10.1177/2054358116669130>

Thank you - Questions?

