Supplemental Files

Appendix

Home cannulation training protocol

Each patient was allocated one primary nurse to create the BH tract using sharp needles. Once the tract was created, blunt needles were used. Only sharp needles were used for cannulation in the RL group. Training length was individualised and continued until all parties felt confident the patient could dialyse independently at home.

The HHD prescription is individualised for each patient, although extended weekly hours haemodialysis of 24 hours or more is encouraged. Dialysis sessions were performed either overnight or during waking hours according to patient preference.

Routine practice in the HHD unit includes 3 monthly home visits with additional visits and regular telephone contact as needed. Home visits are also conducted if problems cannot be resolved over the phone.

Baseline data collected for the cohort study:

Variable	Detail
Patient demographics	Age, gender
Cause of End stage kidney disease	
Date and modality of first renal replacement therapy	
Dialysis vintage	Duration of renal replacement therapy prior to starting Home Haemodialysis
Co-morbidities	Diabetes mellitus, peripheral vascular disease, chronic lung disease, cardiovascular disease
Dialysis information	
Cannulation technique	

Changes in cannulation method	
Arteriovenous fistula-related complications	
Hours per session	
Sessions per week	
Length of initial home training	Measured in days
Number of home visits	
Returns to the unit for dialysis	

Management of potential infections in the home training unit.

1. If suspicion of infection: 2 sets of blood cultures and a swab from the AVF site as part of a standard septic screen to be collected.

2. Review by physician

3. Infection determined clinically by the treating physician.

Table S1. Hazard ratios based on Time to First infection using proportional hazard models

Access Associated Events	Cannulation method		Risk Ratio			
	RL	**BH**	**Univariate analysis**		**Adjusted analysis[1]**	
	Follow-up time 29,940 AVF-days	Follow-up time 83,010 AVF-days	HR (95% CI)	p value	HR (95% CI)	p value
Systemic Infections: Number	2	15	2.35 (0.53-10.36)	0.26	2.41 (0.54-10.77)	0.25
Local Infections: Number	1	17	3.85 (0.50-29.88)	0.20	4.01 (0.51-31.38)	0.19
Total Access Infections: Number	3	32	2.63 (0.79-8.82)	0.12	2.87 (0.85-9.69)	0.09
Fistula loss/surgical Interventions: Number	8	24	1.01 (0.36-2.83)	0.99	0.91 (0.31-2.61)	0.86

Abbreviations: BH, buttonhole; RL, rope ladder; AVF, arteriovenous fistula; HR, Hazard Ratio; CI, confidence interval
1 – analysis adjusted for patient age and diabetes status

Table S2. Fistula Preservation: Number and Type of Access Event Requiring Surgical Intervention or leading to AVF Abandonment

Event	RL Cannulation	BH Cannulation
Thrombosis	7	13
Aneurysm	0	3
Stenosis	1	6
Steal Syndrome	0	2
Rate of total events	8(0.27/1000 AVF days)	24 (0.29/1000 AVF days)

Abbreviations: BH, buttonhole; RL, rope ladder; AVF, arteriovenous fistula.
AVF loss that was a consequence of access infection (2 events, all BH) were not included in this analysis.

Table S3: Quality assessment of studies included in the systematic review

Author(year)	Study design	Study limitation	Consistency	Directness
Struthers (2010)[17]	RCT	Very serious limitation		Direct
Chow (2011)[16]	RCT	Serious limitations	Minimal heterogeneity:	Direct
Macrae (2012)[19]	RCT	No/Minimal bias	I^2=14.5%, p=0.32	Direct
Vaux (2013)[20]	RCT	No/Minimal bias		Direct
Verhallen (2007)[8]	Unit analysis: Pre-post practice change	Serious limitations		Direct
Ludlow (2010)[6]	Unit analysis: Pre-post practice change	Very serious limitations		Indirect
Birchenough (2010)[21]	Individual unit: Pre-post practice change	Very serious limitations	No detectable	Indirect
Nesrellah (2010)[22]	Individual unit: Pre-post practice change	Serious limitations	heterogeneity: I^2=0.00%,	Indirect
Labriola (2011)[18]	Individual unit: Pre-post practice change	Serious limitations	p=0.81	Direct
Ward (2011)[24]	Individual unit: Pre-post practice change	Very serious limitations		Direct
O'Brien (2012)[25]	Individual unit: Pre-post practice change	Serious limitations		Indirect
Van eps (2010)[14]	Comparison between units	Very serious limitations	No detectable	Indirect
van Loon (2010)[7]	Comparison between units	Serious limitations	heterogeneity: I^2=0.00%,	Indirect
Divi (2010)[23]	Comparison between units	Very serious limitations	p=0.46	Direct

Abbreviations:
RCT: Randomised controlled trial,

Database: Ovid MEDLINE(R) <1946 to May Week 2 2013>
Search Strategy:
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1.   exp renal dialysis/ (88579)
2.   exp Catheterization/ (179917)
3.   1 or 3/ (2689821)
4.   buttonhole cannulation.mp. (18)
5.   blunt needle.mp. (66)
6.   4 or 5 (84)
7.   3 and 6 (36)

Database Embase <1946 to May 2013>
Search Strategy:
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1.   Dialysis (145,826)
2.   Catheterization (126,894)
3.   1 or 2 (270,732)
4.   Blunt and ('needle'/exp OR needle) (666)
5.   Buttonhole AND ('cannulation'/exp OR cannulation) (98)
6.   4 or 5 (746)
7.   3 and 6 (109)

Database: EBM Reviews - Cochrane Central Register of Controlled Trials <April 2013>
Search Strategy:
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1.   exp renal dialysis/ (3552)
2.   exp Catheterization/ (7820)
3.   buttonhole cannulation.mp. (2)
4.   blunt needle.mp. (13)
5.   3 or 4 (15)
6.   1 and 2 (154)
7.   5 or 6 (168)

Figure S1: Search strategy used for systematic review of buttonhole cannulation versus rope ladder cannulation in Medline, Embase and the Cochrane central register of controlled trials.