

# Interventions to Reduce Urinary Tract Infections for Older Adults in Care Settings: A Systematic Review

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## INTRODUCTION

- Infection surveillance has indicated a rise in rates of *Escherichia coli* (E. coli) bacteraemia, by 15.6% between 2010 and 2014.
- Mandatory surveillance of E. coli bacteraemia indicates previous urinary tract infections (UTIs) is a key risk factor.
- The Department of Health aims to halve Gram Negative Bloodstream Infections (GNBSIs) by 2020.

## AIMS

1. To describe existing interventions aimed at reducing rates of E.coli bacteraemia or reducing symptomatic UTI that are published evaluations.
2. To assess the effectiveness of these interventions at reducing rates of E.coli bacteraemia and reducing symptomatic UTI, or other surrogate markers of UTI i.e. antibiotic use for UTI, total pyrexia, hospital admissions from a care home etc.

## METHODS

**Population:** Older adults in care settings  
**Intervention:** All interventions  
**Comparator:** None specified  
**Outcome:** Symptomatic UTI, E.coli bacteraemia and relevant surrogate markers

Based on the Population, Intervention, Comparator, Outcome framework, a search strategy was devised and 18 databases were searched.

### Inclusion Criteria

- All studies evaluating interventions to reduce or prevent symptomatic UTI or E.coli bacteraemia, including catheter associated UTI (CAUTI) in any care setting directly with either staff or patients.
- International studies conducted from 1990 and onwards where full texts were available were included.

### Exclusion criteria

- Studies were excluded if...
- interventions were aimed at reducing asymptomatic bacteriuria.
  - patients' ages were not provided.
  - they were conducted on specialist hospital units such as intensive care units or burns wards.

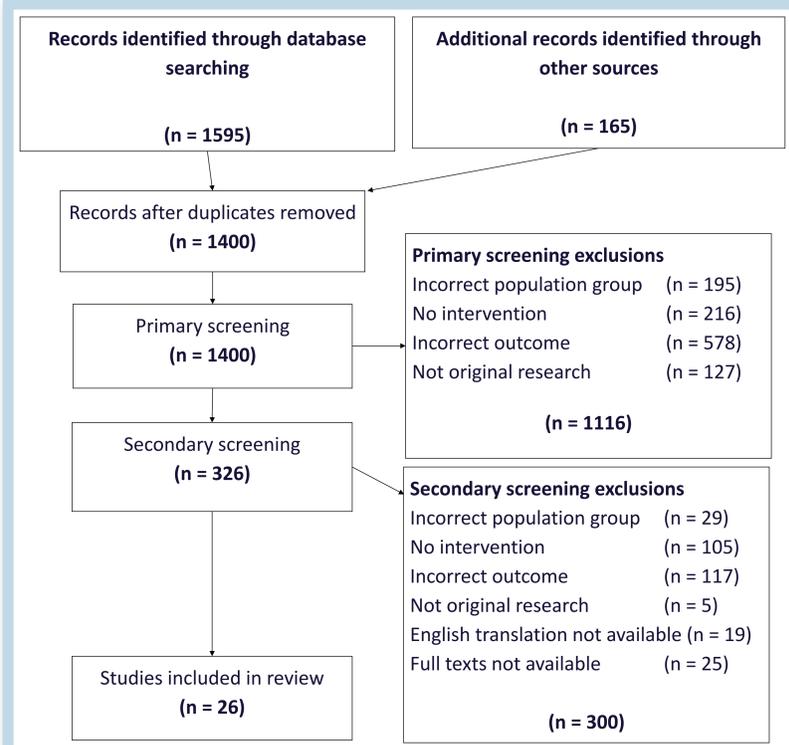


Figure 1: Literature search flow diagram of included and excluded studies

## RESULTS

Figure 2: Results table displaying all studies in the review

Intervention type	Study	Quality	Effectiveness			Design	Setting	Outcome	
			Significant	Non-significant	Unclear				
<b>Hydration toolkit</b>	Taylor (2015)	Low		X		Before and after study	Long term care facility	UTI	
<b>Bacterial interference*</b> caused patient harm	Horwitz (2015)	Low		X		Non-randomised trial	Long term care facility	UTI	
<b>Multi-faceted interventions:</b> **Education (e) Cranberry capsules (c) Silver catheters (sc) *Guidelines/protocol (gp) *Latex and non-latex catheters (lc) **Feedback (f) **Reminders (r) *Checklists (ch) Posters (p) **Auditing (a) Personal protective equipment (ppe) Urethral meatus cleansing (umc) Catheter assessments (ca) *Catheter product evaluations and standardisations (es) *Patient involvement (pi) *Implementation plans (ip) *Annual competency assessment (aca)	McMullen (2007) (c, e, gp, sc)	Low			X	Before and after study	Long term care facility	UTI	
	vanGaal (2011) (e, f, ip, pi.)	Low	X			Cluster randomised controlled trial	Hospitals and nursing homes	UTI	
	Dickson (2016) (a, e, f)	Low	X			Before and after study	Hospital	CAUTI	
	Oman (2012) (e, es, lc)	Low		Reduction but missing statistical evidence		Before and after study	Hospital	CAUTI	
	Rosenthal (2004) (a, e, f)	Low	X			Before and after study	Hospital	CAUTI	
	Theobald (2017) (e, gp, r)	Low		Reduction but missing statistical evidence		Before and after study	Hospital	CAUTI	
	Jaggi (2012) (a, ch, e)	Low		Reduction but missing statistical evidence		Before and after study	Hospital	CAUTI	
	Smith (2009) (a, aca, e, f, r)	Low	X			Before and after study	Hospital	CAUTI	
	Amine (2014) (a, ca, e, p, ppe, umc)	Low			X	Before and after study	Hospital	CAUTI	
	<b>Training and education (topic and method):</b>	Singh (2012) (gi, ff)	Low		X		Before and after study	Hospital	CAUTI
	*General infection (gi)	Girard (2015) (cm, ff)	Low		X		Before and after study	Hospital	UTI
	*Catheter insertion and care (cic)	Justus (2016) (cic, o, s)	Low	X			Before and after study	Hospital	CAUTI
	*Face to face (ff)	Gordon (2016) (cic, o, ff)	Low	X			Before and after study	Hospital	CAUTI
*Online (o)	Twigg (2011) (nhppd)	Low	X			Before and after study	Hospital	UTI	
*Simulations (s)	Kwo-Chen (2015) (nfp)	Low		X		Randomised controlled trial	Community	CAUTI	
<b>Staffing methods/types:</b>	Westra (2013) (woc)	Low	X			Descriptive and comparative design	Community	UTI	
*Nursing hours per patient day (nhppd)	McMurdo (2005) (j)	High		X		Randomised controlled trial	Hospital	UTI	
Nurse family partnership (nfp)	Ledda (2016) (c)	Low	X			Observational controlled study	Not stated	UTI	
*Wound, ostomy and continence nurses (woc)	Adams (2012) (rc)	Low		Reduction but missing statistical evidence		Before and after study	Hospital	E. Coli: blood and urine	
<b>Cranberry products:</b>	Loeb (2008) (pwo, rc)	Low		X		Randomised controlled trial	Hospital	UTI	
*Capsules (c)	Bruminhent (2010) (rs)	Low	X			Before and after study	Hospital	CAUTI	
Juice (j)	Wilde (2015)	Low	X			Randomised controlled trial	Community	CAUTI	
<b>Catheter removal protocols</b>	Goetz (1999)	Low	X			Before and after study	Hospital	UTI	
*Removal criteria (rc)	Han (2013)	Low		X		Quasi-experimental study	Hospital	E. Coli: blood	
Pre-written orders (pwo)									
*Reminder stickers (rs)									
<b>*Catheter self-management training</b>									
<b>*CAUTI rate feedback to staff</b>									
<b>Isolation of ESBL+ patients</b>									

## CONCLUSIONS

1. There were very few interventions evaluated in care homes and the community.
2. Most of the studies have a risk of bias and are lacking in methodological quality.
3. The hydration toolkit in care homes was not significantly effective, but was of low quality. Further evaluations are needed of national hydration interventions.
4. Seven low quality multi-faceted intervention studies which included education with audit, feedback or reminders were effective at reducing UTI or CAUTI. They also individually included patient involvement, implementation plans, catheter evaluations and standardisations, latex and non-latex catheters, annual competency assessments, guidelines/protocols, or checklists.
5. Face to face teaching on general infection and catheter management gave non-significant results but complementary online training and simulations on catheter insertion and care were significant.
6. Increasing nursing staff ratios or using specific continence nurses reduced infection rates.
7. Hospital catheter removal protocols evaluated in an RCT had no effect, but some effect was shown in less robust before and after studies.
8. There are interventions currently in use that have not been formally evaluated and are therefore not included in this review.
9. It is possible that more studies with negative or insignificant effects were not published.

## IMPLICATIONS

1. There is no single or multi-faceted intervention that provides high quality evidence of being effective. Increasing nursing or continence staff or a multi-faceted intervention including education, audit and feedback or implementation plans or checklists should be considered.
2. Further robust evaluations are needed.

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