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Schoch, Monica, Bennett, Paul, Fiolet, Renee, Kent, Bridie and Au, Catherine 2012, Renal access coordinators' impact on haemodialysis patient outcomes and associated service delivery: a systematic review, *JB I library of systematic reviews*, vol. 10, no. 56, pp. 1-12.

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Renal access coordinators' impact on haemodialysis patient outcomes and associated service delivery: A systematic review.

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Review question/objective

The objective of this review is to synthesize the available evidence examining the impact of the renal access coordinator on haemodialysis patient outcomes and associated service delivery. The review question is: What is the renal access coordinators' impact on haemodialysis patient outcomes and associated service delivery?

Background

Patients with end stage kidney disease require regular haemodialysis sessions to filter the waste products from the blood to maintain life. In haemodialysis blood is accessed via a surgically created arteriovenous fistula (AVF), an arteriovenous graft (AVG), or a central venous catheter (CVC). Through these accesses the patient is connected via tubing to a haemodialysis machine and their blood is filtered through a dialyser and then returned to the patient. Timely surgical creation of vascular accesses has a considerable effect on the patient quality of life and mortality.¹ The preferred vascular access is the arteriovenous fistula, due to its higher patency rates and association with decreased morbidity, infection rates, and healthcare costs.²

In the early 1990s haemodialysis units in the United States and Europe introduced the role of the renal access coordinator, followed by Australia and New Zealand into the early 2000s. The first reported coordinator programs emerged in the early to mid-1990's and since this time they have been known as: renal access nurses, vascular access coordinators, vascular health nurses and renal access coordinators.³

The renal access coordinator addresses the coordination and care of haemodialysis patients' accesses in the pre-dialysis phase, and during their dialysis treatment are pivotal to a satisfactory patient journey. Patients can be missed on access waiting lists or not on a waiting list at all, nursing staff can be uncertain of whom to contact when access problems arise, no specific pathway to channel referrals for access creation or revision may occur and there may be no governance into staff training of correct techniques for access care based on current evidence.

The renal access coordinator provides a communication pathway between nephrology and vascular teams³, pre dialysis access coordination⁴, access surveillance⁵, patient education⁶, and nurse education.⁷ As the vascular access is the patient's lifeline it is imperative that their care pathway is a smooth process from pre-dialysis through vascular access creation/insertion to starting dialysis. As medical and surgical interns and registrars regularly rotate positions, it is the role of the access coordinator to maintain consistency in patient care. This is done by keeping accurate records of patient databases and providing information to the medical/surgical teams when assessment or intervention is required. Some access coordinator roles also prioritise patients for surgical intervention or even have the role of managing the renal surgical list (bookings/cancellations).

The role of the nurse in pre-dialysis access coordination is to educate the patient regarding all types of vascular access available, both the positive and negative aspects of each choice, so the patient can make an informed decision in consultation with the surgeon and nephrologist. The pre-dialysis education also involves discussion of the surgical pathway, post-operative care, care of the vascular access when the patient returns home, and surgical, vascular access coordinator follow-up timeframes post creation/insertion.³

Access surveillance is routinely conducted when the patient has commenced dialysis. There are various methods of surveillance to determine the level of functioning of the vascular access. Depending on the level, pre-emptive radiological or surgical interventions can be performed to correct the access issue prior to the access becoming unusable through thrombosis⁸ or stenosis.⁹ Some of the ways that renal access nurses can assess and measure the access performance is by using ultrasound dilutional techniques, in particular the Transonic Qc™ machine.¹⁰ This method is used to detect the speed at which injected saline moves from one ultrasound transducer on the arterial needle tubing to the ultrasound transducer on the venous needle. A calculation is then made by the Transonic Qc machine measuring the blood flow in millilitres passing through the arteriovenous fistula or graft. These measurements are done on a bimonthly basis and recorded. Any decrease in flow of 25% over two measurements or if the flow decreases below 500ml/min for an AVF or 600ml/min for an AVG, the coordinator will refer the patient to the vascular team for ultrasonic or angiographic review followed by either radiological or surgical intervention to fix the problem, which would generally be stenosis, plus or minus thrombosis.¹¹

The patient education role of the access coordinator would include pre-dialysis education and ongoing education for patients regarding the care of the AVF/AVG/CVC.¹² It is important that the patient is educated on the correct cleaning techniques, the issues that come with having a vascular access, and how to prevent any problems occurring, such as thrombosis formation or development of infection.¹³ Nurse education includes the continuing education of staff re: anatomy and physiology, how an AVF/AVG is created, how a CVC is inserted (eg. what vessels used), care of the AVF/AVG/CVC, how a fistulagram is conducted, correct cannulation techniques for AVF/AVG, ultrasound use, interpretation of

ultrasound pictures, interpretation of radiological reports and use of the Transonic Qc machine for AVF/AVG surveillance.

There are reported examples of patient outcome and service delivery improvements that may be attributed to the introduction of this role¹⁴, but very few dialysis units worldwide have published evidence of these outcome improvements. Reporting of the effectiveness of the renal access coordinator has generally been positive however there has not been a rigorous review of the impact of the implementation of these specialist roles into dialysis units. A search of Medline, CINAHL, Cochrane Database of Systematic Reviews, Joanna Briggs Institute Library of Systematic Reviews, DARE, and PROSPERO showed that there are currently no existing reviews on this topic.

Inclusion criteria

Types of participants

This review will consider studies that include renal access coordinators (regardless of the variations of the titles used) and adult haemodialysis patients (aged 18 years and above).

Types of intervention(s)/phenomena of interest

This review will consider studies that evaluate the renal access coordinator. The review will consider the clinical and administration duties such as pre dialysis access coordination, access surveillance, patient education, and nurse education. .

Types of outcomes

This review will consider studies that include the following outcome measures:

Patient outcomes

1. Days to first vascular access complication (such as stenosis or thrombosis) and/or primary intervention (such as angioplasty or surgical intervention)
2. Incidence of central line insertions (negative)
3. Incident rates of arteriovenous fistula (AVF), arteriovenous graft (AVG), central venous catheter (CVC) at start of dialysis (incidence);
4. Prevalence of AVF/AVG/CVC;
5. Time to occlusion of AVF
6. Time from referral to surgery

Service outcomes:

1. Knowledge/up skilling of renal nurses measured by pre and post education questionnaire
2. Cannulation skills measured by number of 'missed' cannulation pre and post education
3. Ultrasound skills measured by use of ultrasound machine and accuracy of use,

Types of studies

This review will consider both experimental and epidemiological study designs including randomised controlled trials, non-randomised controlled trials, quasi-experimental, before and after studies, prospective and retrospective cohort studies, case control studies and analytical cross sectional studies. This review will also consider descriptive epidemiological study designs including case series, individual case reports and descriptive cross sectional studies.

Search strategy

The search strategy aims to find both published and unpublished studies. A three-step search strategy will be utilised in this review. An initial limited search of MEDLINE and CINAHL will be undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe article. A second search using all identified keywords and index terms will then be undertaken across all included databases. Thirdly, the reference list of all identified reports and articles will be searched for additional studies. Studies published in English will be considered for inclusion in this review. Studies published between 1990 and 2012 will be considered for inclusion in this review. The search timeframe is from 1990 because the role of the vascular access coordinator was introduced in haemodialysis units in the early 1990s in the United States and Europe.

The databases to be searched include:

- Medline
- CINAHL
- PsycInfo
- Cochrane Library
- Joanna Briggs Institute Library of Systematic Reviews
- Informat Health collection
- Proquest Health and Medical
- Embase
- Scopus

The search for unpublished studies will include:

- Proquest Dissertation and Thesis
- Mednar

Initial keywords to be used will be:

- renal access nurses, vascular access coordinators, vascular health nurses, renal access coordinators
- kidney
- vascular

- access
- renal
- coordinator
- vascular fistula
- vascular access devices
- nursing, nurses, nurse
- fistula, fistulae, fistula's
- central venous catheters or CVC
- central venous line
- catheters, vascular
- graft occlusion, vascular
- arteriovenous fistula or AVF
- arteriovenous graft or AVG
- dialysis = dialysis equipment and supplies + dialysis patients
- haemodialysis = hemodialysis
- chronic kidney disease = chronic kidney failure or CKD - precipitating factors
- chronic renal failure = chronic renal disease or CRF
- end stage kidney disease or ESKD

Assessment of methodological quality

Papers selected for retrieval will be assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardised critical appraisal instruments from the Joanna Briggs Institute Meta Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (Appendix I). Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer.

Data collection

Data will be extracted from papers included in the review using the standardised data extraction tool from JBI-MAStARI (Appendix II). The data extracted will include specific details about the interventions, populations, study methods and outcomes of significance to the review question and specific objectives.

Data synthesis

Quantitative data will, where possible be pooled in statistical meta-analysis using JBI-MAStARI. All results will be subject to double data entry. Effect sizes expressed as odds ratio (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed statistically using the standard Chi-square and also explored using subgroup analyses based on the different study designs included in this review. Where statistical pooling is not possible the findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.

Conflicts of interest

No conflict of interest to be declared

Acknowledgements

Deakin University School of Nursing and Midwifery who provided a grant to enable this review to take place.

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Appendix I: Appraisal instruments

MAStARI Appraisal instrument

JBI Critical Appraisal Checklist for Randomised Control / Pseudo-randomised Trial

Reviewer Date

Author Year Record Number

	Yes	No	Unclear	Not Applicable
1. Was the assignment to treatment groups truly random?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were participants blinded to treatment allocation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Was allocation to treatment groups concealed from the allocator?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were the outcomes of people who withdrew described and included in the analysis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were those assessing outcomes blind to the treatment allocation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were the control and treatment groups comparable at entry?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were groups treated identically other than for the named interventions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in the same way for all groups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info.

Comments (Including reason for exclusion)

JBI Critical Appraisal Checklist for Descriptive / Case Series

Reviewer Date

Author Year Record Number

	Yes	No	Unclear	Not Applicable
1. Was study based on a random or pseudo-random sample?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the criteria for inclusion in the sample clearly defined?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were confounding factors identified and strategies to deal with them stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were outcomes assessed using objective criteria?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. If comparisons are being made, was there sufficient descriptions of the groups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was follow up carried out over a sufficient time period?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes of people who withdrew described and included in the analysis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

JBI Critical Appraisal Checklist for Comparable Cohort/ Case Control

Reviewer Date

Author Year Record Number

	Yes	No	Unclear	Not Applicable
1. Is sample representative of patients in the population as a whole?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Are the patients at a similar point in the course of their condition/illness?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Has bias been minimised in relation to selection of cases and of controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Are confounding factors identified and strategies to deal with them stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Are outcomes assessed using objective criteria?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was follow up carried out over a sufficient time period?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes of people who withdrew described and included in the analysis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info.

Comments (Including reason for exclusion)

Appendix II: Data extraction instruments

MAStARI data extraction instrument

JBI Data Extraction Form for Experimental / Observational Studies

Reviewer Date

Author Year

Journal Record Number

Study Method

RCT Quasi-RCT Longitudinal
 Retrospective Observational Other

Participants

Setting _____

Population _____

Sample size

Group A _____ Group B _____

Interventions

Intervention A _____

Intervention B _____

Authors Conclusions: _____

Reviewers Conclusions: _____

Study results

Dichotomous data

Outcome	Intervention () number / total number	Intervention () number / total number

Continuous data

Outcome	Intervention () number / total number	Intervention () number / total number