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Article:
Ludman, A., Corr, M., Ferro, C. et al. (2026) Joint British Transplantation Society and British Cardiovascular Society guideline on invasive coronary angiography and elective coronary artery revascularisation in adult potential kidney transplant recipients. Transplantation Reviews, 40 (4). 101049. ISSN: 0955-470X

https://doi.org/10.1016/j.trre.2026.101049

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Transplantation Reviews 40 (2026) 101049



Contents lists available at ScienceDirect

Transplantation Reviews

journal homepage: www.elsevier.com/locate/trre



Review article

Joint British Transplantation Society and British Cardiovascular Society guideline on invasive coronary angiography and elective coronary artery revascularisation in adult potential kidney transplant recipients

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ARTICLE INFO

Keywords:
Cardiovascular disease
Kidney transplantation
Coronary angiography
Coronary revascularisation
Guidelines

ABSTRACT

Cardiovascular disease is a significant cause of morbidity and mortality in kidney transplant candidates and recipients. Cardiac investigation prior to kidney transplant listing has aimed to minimise the risk of early post-operative cardiac events or premature death. Invasive coronary angiography and coronary revascularisation may be considered as part of pre-transplant work up, but there is limited evidence to support this strategy in asymptomatic patients. The joint British Transplantation Society and British Cardiovascular Society guideline on 'Cardiovascular assessment of potential adult kidney transplant recipients' has been written to harmonise UK practice and highlight current evidence in this area. This manuscript summarises the relevant recommendations from chapters related to coronary angiography and coronary revascularisation in adult patients being assessed for kidney transplantation.

1. Introduction

The aim of cardiac investigation prior to a kidney transplant is to minimise the risk of post-transplant adverse cardiac events or premature death of the recipient. A large component of this risk relates to coronary atherosclerotic disease and myocardial infarction.

Coronary artery disease (CAD) may be suspected or confirmed through a number of methods. Currently, invasive coronary angiography (ICA) remains the gold standard and the test on which potential revascularisation is planned.

Whether to undertake coronary artery revascularisation in anybody with CAD continues to be the subject of intense research. However, coronary artery revascularisation specifically in a population of people proceeding towards a kidney transplant has been less well studied.

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https://doi.org/10.1016/j.trre.2026.101049

Available online 19 August 2026
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Beyond consideration of revascularisation, the identification of CAD may also have significant implications for the transplant listing decision.

The joint British Transplantation Society (BTS) and British Cardiovascular Society (BCS) guideline on cardiovascular assessment of potential adult kidney transplant recipients has recently been written and this manuscript summarises the relevant recommendations from the chapter related to coronary angiography and elective coronary artery revascularisation.

2. Methods

The joint BTS and BCS 'Guideline on cardiovascular assessment of potential adult kidney transplant recipients' was written in line with the BTS guideline development policy, and the recommendations of NICE Evidence [1]. Guideline contributors conducted literature searches using PubMed® to identify relevant evidence. Virtual progress meetings between the guideline development group and contributors were held, including discussion of the final grading of the recommendations, with input from a patient representative throughout. The guideline was opened for public consultation through email correspondence and the website of the BTS. In these Guidelines the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system has been used to rate the strength of evidence and the strength of recommendations [2].

3. Symptomatic patients

Patients with symptoms of coronary artery disease (predominantly effort-related chest discomfort and/or breathlessness) can be evaluated in a very similar way to standard practice, taking into account that patients requiring a kidney transplant may have a number of contributing causes. Whilst assessment is being undertaken, the patient is not likely to be considered a transplant candidate, and this may add an additional degree of urgency to cardiac investigations.

The choice of a non-invasive test will vary according to patient characteristics and local expertise. All patients should have optimised medical therapy for cardiovascular risk factors [3] and antianginal medication to relieve symptoms.

Revascularisation may be considered either after failure of satisfactory response to medical therapy or for perceived prognostic reasons. Most commonly, this is due to functionally significant left main stem (LMS) or 3-vessel coronary disease [4]. Routine revascularisation prior to low or intermediate-risk non-cardiac surgery is not recommended [5]. A routine invasive strategy with coronary revascularisation prior to high-risk vascular surgery did not result in significant benefit [6], although patients with LMS disease were excluded. American guidance does not recommend coronary revascularisation solely with the aim of reducing perioperative cardiovascular events outwith of patients with LMS or complex coronary artery disease [7].

Therefore, current guidance allows an individualised approach based on coronary anatomy, the extent of myocardium at risk, the risks of revascularisation procedures, and the risks of forthcoming surgery [8].

4. Asymptomatic patients

We suggest:

- All patients with abnormal cardiac tests (e.g. significantly abnormal echocardiogram or functional ischaemia test) should be discussed in a joint cardiac-transplant multi-disciplinary meeting or with a linked cardiologist with special interest in kidney transplantation to determine an appropriate investigation and management plan in the event of a diagnosis of significant coronary artery disease (2D).

We recommend:

- Offer elective invasive coronary angiography only as part of a multiprofessional transplant work-up protocol or after agreement from the applicable transplant multi-disciplinary meeting that the test has a high likelihood of changing clinical decisions supported by an appropriate evidence base (1B).

Symptoms can be hard to assess in people where exercise capacity may be limited from multiple causes, which is often the case in those being considered for kidney transplantation.

In the population beyond transplantation, there is now little mandate to offer coronary artery revascularisation in the absence of refractory symptoms, and guidelines caution against this [4,5,8] except in rare circumstances such as the incidental finding of coronary artery disease which is considered high-risk and functionally significant despite the lack of symptoms. In the UK, a revascularisation decision in these circumstances would be expected to be discussed by the 'Heart MDT' [9], a meeting comprised of cardiologists and cardiac surgeons with different sub-speciality expertise, and a careful discussion with the patient undertaken to ensure full understanding of the relevant risks and unknowns.

Patients undergoing transplant assessment are commonly screened for CAD, but currently there is no or limited evidence that screening impacts longer-term cardiovascular or transplant outcomes [11,12], and so detailed and individualised discussion in a Cardiac-Transplant MDT is recommended.

5. Invasive coronary angiography

In the United Kingdom, ICA is now most commonly performed via the radial artery as a day-case procedure under local anaesthetic. Undertaken in a specific type of procedure room ('cardiac cath lab'), a preshaped catheter is navigated to each coronary artery, and iodine-based radiopaque contrast is used under X-ray fluoroscopy guidance to obtain images of the coronary artery lumen from multiple orientations.

6. Timing

We recommend:

- If offered as part of pre-transplant assessment, invasive coronary angiography should be performed only after other less invasive tests have been unsuccessful in allowing a transplant listing decision. (1B)
- Do not routinely offer elective invasive coronary angiography or coronary artery revascularisation in asymptomatic patients. (1A)
- Once invasive coronary angiography is to be offered, it should be performed as soon as clinically feasible, taking into account the urgency of potential transplant listing and, in the case of pre-emptive kidney transplant, decisions about dialysis initiation. (1D)

Elective ICA carries inherent risks, and the information obtained may provide clinical benefit only in a selected group of patients. As such, it should only be performed as part of an evidence-based transplant work-up protocol or after agreement from the applicable transplant multi-disciplinary meeting that the test has a high likelihood of changing clinical decisions supported by an appropriate evidence base.

If offered as part of pre-transplant assessment, ICA should be performed after other less invasive tests have been unsuccessful in allowing clinical decisions to be reached and after the patient has completed other less invasive tests and remains a potential transplant candidate. Cardiac-transplant MDT input prior to coronary angiography to ensure the findings inform further management is important.

Once ICA is indicated, it should be performed as soon as clinically feasible, with regard to the urgency of potential transplant listing and, in the case of pre-emptive kidney transplant, decisions about dialysis initiation.

7. Informed consent

Patients undergoing ICA as part of transplant assessment should provide informed consent similar to other patients. However, it is important to ensure that patients are aware that identification of severe CAD may not necessarily lead to revascularisation (which is commonly assumed) but also that the findings may affect their subsequent listing for transplant.

For patients with chronic kidney disease (CKD), consent should include the risks of contrast-associated acute kidney injury and acceleration of dialysis-dependent kidney failure, where relevant, in addition to an increased risk of stroke. Patients in the ISCHEMIA-CKD trial undergoing coronary angiography or percutaneous coronary intervention (PCI) who were not already receiving dialysis had an incidence of contrast-associated acute kidney injury of 7.9% and a 3.76-fold higher stroke risk [12].

The consent process should specifically cover the risk of vascular injury. This is particularly relevant for patients with CKD, where a radial approach may reduce future availability of conduits for arteriovenous (AV) fistula. A femoral approach is often feasible but is accompanied by increased risk of peri-procedural bleeding. Ultrasound guidance and micro-puncture techniques are now commonly used.

8. Vascular access

An individual discussion should occur regarding the pros and cons of radial versus femoral access for ICA. The cardiologist performing the procedure should be informed by the transplant MDT, including input from vascular surgery if needed. Preservation of the radial artery for future AV fistula formation must be weighed against the increased risk of bleeding with a femoral approach. Arterial access is contraindicated in a limb with an active or planned AV fistula. Where radial access is used, a 'patent haemostasis technique' using controlled pressure (such as with a TR band) with plethysmography to promote radial patency should be employed, along with administration of 50–70 i.u/kg heparin during diagnostic ICA to minimise the consequence of reduced radial artery blood flow [13].

9. Contrast considerations

Low-osmolar contrast (e.g., Visipaque) and intravenous fluids (pre- and post-hydration) are recommended at the time of ICA or PCI, depending on kidney function, urine output status, and left ventricular function. Routine use of *N*-acetyl cysteine is not recommended. The lowest volume of contrast needed to obtain diagnostic images should be used [14].

10. Performing clinician

In many cases, particularly in patients with CKD, there will be a need to minimise contrast use and take special regard to vascular access. Therefore, procedures should be performed by a senior resident doctor or a consultant.

11. Elective coronary artery revascularisation

Coronary artery revascularisation may be performed by PCI or coronary artery bypass graft surgery (CABG) to relieve symptoms of ischaemic heart disease or to improve the longer-term prognosis by reducing cardiovascular events. The European Society of Cardiology (ESC) 2024 guidelines [4] and their 2023 counterpart from the United States [8] set out the current evidence and consensus.

Briefly, PCI has demonstrable prognostic benefit in the acute setting [15] but not when performed for chronic symptoms [16]. Prognostic benefit following CABG is seen in patients with stable angina who have diffuse three-vessel coronary disease or left main stem coronary disease, with benefit most marked among those with diabetes mellitus or impaired left ventricular function.

There is no data which demonstrates that PCI or CABG among asymptomatic individuals with significant flow-limiting coronary disease will reduce the risk of perioperative ischaemic events.

There is, therefore, an inherent paradox in the pursuit of cardiac risk reduction prior to kidney transplantation: we are currently testing asymptomatic patients to detect pathology for which no evidence-based intervention exists. Nevertheless, there is a need to develop sensible management pathways for patients where 'asymptomatic' but flow-limiting CAD is detected prior to transplant listing. Individualised joint cardiac-transplant MDT decision-making is key to maximising the number of successful organ transplants.

12. Decision making

We recommend:

- Elective coronary artery revascularisation in potential kidney transplant recipients should generally be offered for the same reasons as in the non-transplant population. (1B)
- Revascularisation decisions should be made by a multi-professional, multi-disciplinary team with the presence of a clinician responsible for the patient and with the wishes of the informed patient represented. (1D)

UK cardiology decision-making around coronary artery revascularisation is increasingly supported by a 'heart team' multidisciplinary approach with a format set out in joint British Society recommendations [9]. For patients being considered for a kidney transplant, the more specific cardiac-transplant MDT should ensure effective communication and joined-up decision-making, relevant not only to the individual patient's symptoms and prognosis but also to the timing of the transplant.

If coronary evaluation in asymptomatic patients is to be more than simply a triage tool to restrict transplantation based upon inferred risk [17], then individualised discussion within the MDT is mandatory to settle the following questions:

(1) Does the severity of CAD truly preclude transplant listing?
(2) Should PCI or CABG be offered to reduce perceived risk (perioperative or otherwise)?
(3) Will successful coronary revascularisation change transplant eligibility, and why?
(4) If revascularisation is being recommended, are there specific procedural considerations?

Coronary revascularisation should not routinely proceed 'ad hoc' immediately following diagnostic ICA. However, when appropriately informed by prior non-invasive tests and MDT planning, an invasive angiogram with the option to proceed with PCI may be appropriate to avoid repeated procedures.

Revascularisation should not be routinely offered in asymptomatic patients, as there is no evidence that this reduces perioperative risk. However, once screening of an asymptomatic person has uncovered significant CAD, it places the patient, physician and transplant MDT in an invidious situation: how to make decisions and recommendations for which there is no evidence of benefit?

Therefore, decisions are made with good intentions [17] often based on a combination of factors, such as the pattern of coronary disease, the extent of myocardial ischaemia or jeopardy, patient comorbidities, the risk of a revascularisation procedure, whether transplant listing will be facilitated, and patient and clinician opinions. The MDT must be mindful of the potential harm of withholding transplantation without strong evidence [18].

Table 1
Selected studies assessing coronary revascularisation in CKD patients being considered for a kidney transplant.

Study	Findings
Kumar et al. 2011. [20]	Patients undergoing revascularisation followed by transplantation ($n = 51$) had a 98.0% and 88.4% cardiac event-free survival at 1 and 3 years, respectively. Cardiac event-free survival for patients revascularised and awaiting deceased donor transplantation was similar: 94.0% and 90.0% at 1 and 3 years, respectively. No control group, selection bias, bias by indication, medical therapy non-standardised
Hemmelgarn et al. 2004. [21]	CABG associated with improved outcomes compared to no intervention in patients on dialysis and non-dialysis CKD. PCI associated with improved outcomes for dialysis patients, but not for patients with non-dialysis CKD. Selection bias, non-standardised medical therapy, bias by indication
Sedlis et al. 2009. [22]	Post-hoc analysis of the COURAGE trial examined 320 patients with stable CAD and an eGFR below 60 ml/min and found no difference in rate of acute myocardial infarction and death between those who underwent revascularisation and those who received optimal medical therapy alone. However only 5% of patients had an eGFR below 30 ml/min and none were receiving kidney replacement therapy, so results are not directly applicable to the transplant population.
Farkouh et al. 2019. [23]	A meta-analysis of COURAGE alongside data from two further studies which included patients with CKD also showed no benefit of revascularisation compared to optimal medical therapy in patients with mildly depressed levels of kidney function.
Bangalore et al. 2024. [12]	The ISCHEMIA-CKD study specifically examined patients with an eGFR below 30 ml/min, recruiting 777 patients with moderate to severe ischaemia on an exercise or pharmacological stress test. Over half of patients had diabetes, over half were on dialysis, and 13% were listed for a kidney transplant. Patients were randomised to an invasive (angiography plus or minus revascularisation with optimal medical therapy) or conservative strategy (optimal medical therapy alone). No difference was found in primary outcome: a composite of all-cause death or non-fatal acute myocardial infarction (HR 1.01, 95% CI 0.79–1.29) or secondary outcome: all-cause death, non-fatal myocardial infarction, hospitalisation with a cardiac event or resuscitated cardiac arrest (HR 1.02, 95% CI 0.79–1.29). Comparable results were seen in subgroup analyses of patients with diabetes and those on dialysis. Patients in the invasive group had an increased risk of stroke (HR 3.76, 95% CI 1.52–9.32), and increased incidence of the composite outcome of death or initiation of dialysis.
Herzog et al. 2021. [24]	A post-hoc analysis of the 194 patients listed for kidney transplantation in ISCHAEMIA-CKD (who were younger and less comorbid than the overall cohort) found nearly a third of patients had a major adverse cardiovascular event over 2.4 years of follow up, but similarly there was no difference in outcomes between invasive and conservative approaches. It should be noted that half of kidney transplant candidates assigned to the invasive approach were not revascularised, most frequently due to no obstructive lesions being found on angiography, and 20% of patients in the conservative group underwent off-protocol angiography, which may limit the power of this subgroup analysis. One proposed explanation for the high frequency of off-protocol angiography was clinician anxiety around transplanting patients without coronary intervention.
Nimmo et al. 2021. [25]	The UK-based Access to Transplantation and Transplant Outcome Measures (ATTOM) study showed no association between completion of non-invasive screening for CAD and major adverse cardiovascular events up to five years post-transplant, including peri-operative complications, in a propensity score-matched analysis of 1760 patients. Those who were not propensity score matched were more likely to be male, of Asian ethnicity, of lower socioeconomic status, diabetic, and have a history of ischaemic heart disease, peripheral vascular disease and cerebrovascular disease.
Kamran et al. 2018. [26]	Meta-analysis of 6 studies. No randomised studies included. Compared to pretransplant revascularization, medical management is no different in terms of posttransplant cardiovascular outcomes.

13. Modality of revascularisation

PCI and CABG have different periprocedural and postoperative considerations, which the 'heart team' will be well versed in [7,14]. Of relevance to patients proceeding to transplantation will be the necessary duration of dual-antiplatelet therapy (DAPT). Patients undergoing kidney transplantation on DAPT have a 50% greater postoperative haemorrhage rate [19]. In patients undergoing PCI, consideration should be given to 'short-DAPT' drug-eluting stents i.e. those with CE marks or study data supporting DAPT duration of 1–3 months following elective PCI, although stent choice should not significantly vary from the general PCI population.

Where PCI is offered for symptomatic coronary artery disease, the use of invasive physiological lesion assessment (e.g., FFR/iFR) and intracoronary imaging (IVUS/OCT) is encouraged based on individual lesion characteristics. Given the high incidence of calcification among patients with CKD, we suggest that PCI is best performed at centres experienced in calcium-modification techniques (e.g., rotational atherectomy and/or intravascular lithoplasty). Drug-eluting balloon angioplasty may be a suitable alternative for selected patients with diffuse CAD.

CABG is most commonly performed via sternotomy, and recovery generally takes a minimum of 6 weeks before further major surgery would be considered. In patients enrolled in ISCHEMIA-CKD [12], the incidence of dialysis initiation after CABG was 12.5% versus 11.1% in the conservative strategy group.

Current international guidance does not differentiate between revascularisation modalities based on the presence of CKD or the potential transplant recipient [4,7,8,14]. Therefore, the decision to choose PCI or CABG should be individualised by the 'heart team' [9].

Table 1 presents a selection of studies examining the impact of coronary revascularisation in CKD patients who are being considered for kidney transplantation.

14. Conclusion

The decision whether to use invasive coronary angiography and to proceed to elective coronary artery revascularisation is difficult in the pre-transplant population. It is incumbent upon the transplant team, with links to cardiac expertise, to ensure that testing is appropriate and supported by evidence of improved clinical outcomes. Where evidence is lacking, a multiprofessional decision-making process should be the standard, and the patient should be fully informed of the uncertainty and the implications of different approaches.

Funding

No funding was received for completion of this article.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The authors would like to thank Sue Lyon for her invaluable input to the development of these guidelines.

References

[1] BTS Guideline Development Policy. Available at, https://bts.org.uk/wp-content/uploads/2021/05/BTS_Guideline_Development_Policy_2021.pdf; 2026.
[2] Atkins D, et al. Grading quality of evidence and strength of recommendations. BMJ 2004;328:1490.
[3] Asgari E, Corr M, Ferro C, Fossati N, Graham-Brown M, Howse M, Jeetley P, Jones G, Kelly D, Kojro A, Lioudaki E, McGill L, Madden B, Nagaraja P, Nimmo A, Sharif A, Wijetunga I, Ludman A. Joint British Transplantation Society and British Cardiovascular Society guidelines on medical management of coronary artery disease in patients with chronic kidney disease being considered for a kidney transplant. Transplant Rev 2026;40(4):101048. https://doi.org/10.1016/j.trre.2026.101048.
[4] Vrints C, Andreotti F, Koskinas KC, et al. 2024 ESC guidelines for the management of chronic coronary syndromes. Eur Heart J 2024;45:3415–537.
[5] Halvorsen S, Mehilli J, Cassese S, et al. 2022 ESC guidelines on cardiovascular assessment and management of patients undergoing non-cardiac surgery. Eur Heart J 2022;43:3826–924.
[6] EO McFalls, Ward HB, Moritz TE, et al. Coronary-artery revascularization before elective major vascular surgery. N Engl J Med 2004;351:2795–804.
[7] Lawton JS, Tamis-Holland JE, Bangalore S, et al. ACC/AHA/SCAI guideline for coronary artery revascularization: a report of the American College of Cardiology/American Heart Association joint committee on clinical practice guidelines. Circulation 2021;2022:145.
[8] Virani SS, Newby LK, Arnold SV, et al. AHA/ACC/ACCP/ASPC/NLA/PCNA guideline for the Management of Patients with Chronic Coronary Disease: a report of the American Heart Association/American College of Cardiology Joint Committee on clinical practice guidelines. Circulation 2023;2023:148.
[9] Archbold A, Akowuah E, Banning AP, et al. Getting the best from the heart team: guidance for cardiac multidisciplinary meetings. Heart 2022;108:e2.
[10] Chadban SJ, Ahn C, Axelrod DA, et al. KDIGO clinical practice guideline on the evaluation and Management of Candidates for kidney transplantation. Transplantation 2020;104:S11–103.
[11] Lentine KL, Costa SP, Weir MR, et al. Cardiac disease evaluation and management among kidney and liver transplantation candidates: a scientific statement from the American Heart Association and the American College of Cardiology Foundation. Circulation 2012;126:617–63.
[12] Bangalore S, Maron DJ, O'Brien SM, et al. Management of Coronary Disease in patients with advanced kidney disease. N Engl J Med 2020;382:1608–18.
[13] Tsigkas G, Apostolos A, Papageorgiou A, et al. The effect of heparin dose on radial artery occlusion in patients undergoing coronary procedures via distal radial access: a sub-analysis of a randomized trial. Eur Heart J 2023;44:ehad655.2167.
[14] Neumann F-J, Sousa-Uva M, Ahlsson A, et al. 2018 ESC/EACTS Guidelines on myocardial revascularization. Eur Heart J 2019;40:87–165.
[15] Byrne RA, Rossello X, Coughlan JJ, et al. 2023 ESC guidelines for the management of acute coronary syndromes. Eur Heart J 2023;44:3720–826.
[16] Maron DJ, Hochman JS, Reynolds HR, et al. Initial invasive or conservative strategy for stable coronary disease. N Engl J Med 2020;382:1395–407.
[17] Rankin AJ, Mark PB. Cardiac screening prior to renal transplantation—good intentions, rather than good evidence, dictate practice. Kidney Int 2021;99:306–8.
[18] Sharif A. The argument for abolishing cardiac screening of asymptomatic kidney transplant candidates. Am J Kidney Dis 2020;75:946–54.
[19] Lee T, D'Souza K, Hameed A, et al. Comparison of the effect of single vs dual antiplatelet agents on post-operative haemorrhage after renal transplantation: a systematic review and meta-analysis. Transplant Rev 2021;35:100594.
[20] Kumar N, Baker CSR, Chan K, et al. Cardiac survival after pre-emptive coronary angiography in transplant patients and those awaiting transplantation. Clin J Am Soc Nephrol 2011;6:1912–9.
[21] Hemmelgarn BR, Southern D, Culleton BF, et al. Survival after coronary revascularization among patients with kidney disease. Circulation 2004;110:1890–5.
[22] Sedlis SP, Jurkovitz CT, Hartigan PM, et al. Optimal medical therapy with or without percutaneous coronary intervention for patients with stable coronary artery disease and chronic kidney disease. Am J Cardiol 2009;104:1647–53.
[23] Farkouh ME, Sidhu MS, Brooks MM, et al. Impact of chronic kidney disease on outcomes of myocardial revascularization in patients with diabetes. J Am Coll Cardiol 2019;73:400–11.
[24] Herzog CA, Simegn MA, Xu Y, et al. Kidney transplant list status and outcomes in the ISCHEMIA-CKD trial. J Am Coll Cardiol 2021;78:348–61.
[25] Nimmo A, Forsyth JL, Oniscu GC, et al. A propensity score-matched analysis indicates screening for asymptomatic coronary artery disease does not predict cardiac events in kidney transplant recipients. Kidney Int 2021;99:431–42.
[26] Kamran H, Kupferstein E, Sharma N, et al. Revascularization versus medical Management of Coronary Artery Disease in prerenal transplant patients: a meta-analysis. Cardiorenal Med 2018;8:192–8.