

CADTH RAPID RESPONSE REPORT: REFERENCE LIST

Positron Emission

Tomography–Computed

Tomography versus Computed

Tomography for Patients with

Infective Endocarditis: Clinical

Utility, Cost-Effectiveness, and

Diagnostic Accuracy

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Research Questions

1. What is the clinical utility of positron emission tomography–computed tomography compared to computed tomography in patients with suspected infective endocarditis or infection of cardiac devices?
2. What is the cost-effectiveness of positron emission tomography–computed tomography compared to computed tomography in patients with suspected infective endocarditis or infection of cardiac devices?
3. What is the diagnostic accuracy of positron emission tomography–computed tomography in patients with suspected infective endocarditis or infection of cardiac devices?

Key Findings

Seven systematic reviews with meta-analyses and 26 non-randomized studies were identified regarding the diagnostic accuracy of positron emission tomography–computed tomography (PET-CT) in patients with suspected infective endocarditis or infection of cardiac devices. No relevant literature was identified regarding the clinical utility or cost-effectiveness of PET-CT compared to computed tomography (CT) in patients with suspected infective endocarditis or infection of cardiac devices.

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including Medline and EMBASE via OVID, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine’s MeSH (Medical Subject Headings), and keywords. The main search concepts were positron emission tomography computed tomography (PET/CT) infective endocarditis, and cardiac device infections. No filters were applied to limit the retrieval by study type. The search was also limited to English language documents published between January 1, 2010 and September 21, 2020. Internet links are provided, where available.

Selection Criteria

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in Table 1. Full texts of study publications were not reviewed.

Table 1: Selection Criteria

Population	Adult or pediatric patients with cardiac conditions (e.g., congenital heart disease) assessed for infective endocarditis or infection found in aortic root abscesses, pacemaker, implantable cardioverter defibrillator or ventricular assisted device
Intervention	PET-CT or PET (Q3: Reference test: tissue diagnosis through surgical excision)
Comparator	Q1-2: CT Q3: CT; Transesophageal echocardiography; or No comparator (Reference test: tissue diagnosis through surgical excision)

Outcomes	<p>Q1: Clinical utility: effect on clinical decisions, clinician and patient confidence in prognosis; all-cause mortality, sudden cardiac death, heart failure, hospitalization, improved cardiac metrics (e.g., myocardial function or ejection fraction [myocarditis]), timely treatment</p> <p>Q2: Cost-effectiveness</p> <p>Q3: Diagnostic accuracy: sensitivity, specificity, accuracy, positive predictive value, negative predictive value, disease detection rate</p>
Study Designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, economic evaluations

CT = computed tomography; PET = positron emission tomography; PET-CT = positron emission tomography – computed tomography

Results

Seven systematic reviews¹⁻⁷ with meta-analyses and 26 non-randomized studies⁸⁻³³ were identified regarding the diagnostic accuracy of PET-CT in patients with suspected infective endocarditis or infection of cardiac devices. No relevant health technology assessments, randomized controlled trials, or economic evaluations were identified.

Additional references of potential interest that did not meet the inclusion criteria are provided in the appendix.

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-Analyses

Diagnostic Accuracy

1. Tam MC, Patel VN, Weinberg RL, et al. Diagnostic accuracy of FDG PET/CT in suspected LVAD infections: a case series, systematic review, and meta-analysis. *JACC Cardiovasc Imaging*. 2020 May;13(5):1191-1202.
[PubMed: PM31326483](#)
2. Wang TKM, Sanchez-Nadales A, Igbinomwanhia E, Cremer P, Griffin B, Xu B. Diagnosis of infective endocarditis by subtype using 18F-Fluorodeoxyglucose Positron emission tomography/computed tomography: a contemporary meta-analysis. *Circ Cardiovasc Imaging*. 2020 Jun;13(6):e010600.
[PubMed: PM32507019](#)
3. Mahmood M, Kendi AT, Ajmal S, et al. Meta-analysis of 18F-FDG PET/CT in the diagnosis of infective endocarditis. *J Nucl Cardiol*. 2019 Jun;26(3):922-935.
[PubMed: PM29086386](#)
4. Mahmood M, Kendi AT, Farid S, et al. Role of 18F-FDG PET/CT in the diagnosis of cardiovascular implantable electronic device infections: a meta-analysis. *J Nucl Cardiol*. 2019 06;26(3):958-970.
[PubMed: PM28913626](#)
5. Juneau D, Golfam M, Hazra S, et al. Molecular Imaging for the diagnosis of infective endocarditis: a systematic literature review and meta-analysis. *Int J Cardiol*. 2018 Feb 15;253:183-188.
[PubMed: PM29137818](#)

6. Juneau D, Golfam M, Hazra S, et al. Positron emission tomography and single-photon emission computed tomography imaging in the diagnosis of cardiac implantable electronic device infection: a systematic review and meta-analysis. *Circ Cardiovasc Imaging*. 2017 Apr;10(4).
[PubMed: PM28377468](#)
7. Yan J, Zhang C, Niu Y, et al. The role of 18F-FDG PET/CT in infectious endocarditis: a systematic review and meta-analysis. *Int J Clin Pharmacol Ther*. 2016 May;54(5):337-342.
[PubMed: PM27008000](#)

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

Diagnostic Accuracy

8. Abikhzer G, Martineau P, Grégoire J, Finnerty V, Harel F, Pelletier-Galarneau M. [(18)F]FDG-PET CT for the evaluation of native valve endocarditis. *J Nucl Cardiol*. 2020 Mar 16.
[PubMed: PM32180137](#)
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[PubMed: PM30949690](#)
10. Gomes A, van Geel PP, Santing M, et al. Imaging infective endocarditis: adherence to a diagnostic flowchart and direct comparison of imaging techniques. *J Nucl Cardiol*. 2020 Apr;27(2):592-608.
[PubMed: PM30066279](#)
11. Jeronimo A, Olmos C, Vilacosta I, et al. Accuracy of 18F-FDG PET/CT in patients with the suspicion of cardiac implantable electronic device infections. *J Nucl Cardiol*. 2020 Aug 3.
[PubMed: PM32748277](#)
12. Philip M, Tessonier L, Mancini J, et al. Comparison between ESC and Duke Criteria for the diagnosis of prosthetic valve infective endocarditis. *JACC Cardiovasc Imaging*. 2020 Jun 17;S1936-878X(20)30335-1.
[PubMed: PM32563658](#)
13. Rodríguez-Alfonso B, Mitjavila Casanovas M, Castro Urda V, Cobo Marcos M, Sánchez Romero I, Ramos-Martínez A. PET/CT with (18)F-FDG in suspected intracardiac device-related infections: analysis of performance and diagnostic usefulness. *Rev Esp Cardiol (Eng Ed)*. 2020 May 26;S1885-5857(20)30175-4.
[PubMed: PM32471719](#)
14. Abou Jokh Casas E, Pubul Núñez V, Pombo Pasín MDC, et al. Advantages and limitations of 18-fluoro-2-deoxy-d-glucose positron emission tomography/computed tomography in the diagnosis of infective endocarditis. *Rev Port Cardiol*. 2019

Aug;38(8):573-580.

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15. Dell'Aquila AM, Avramovic N, Mastrobuoni S, et al. Fluorine-18 fluorodeoxyglucose positron emission tomography/computed tomography for improving diagnosis of infection in patients on CF-LVAD: longing for more 'insights'. *Eur Heart J Cardiovasc Imaging*. 2018 May 1;19(5):532-543.
[PubMed: PM28977417](#)
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[PubMed: PM30018167](#)
17. Bernhardt AM, Pamirsad MA, Brand C, et al. The value of fluorine-18 deoxyglucose positron emission tomography scans in patients with ventricular assist device specific infections†. *Eur J Cardiothorac Surg*. 2017 Jun 1;51(6):1072-1077.
[PubMed: PM28329162](#)
18. Kokalova A, Dell'aquila AM, Avramovic N, Martens S, Wenning C, Sindermann JR. Supporting imaging modalities for improving diagnosis of prosthesis endocarditis: preliminary results of a single-center experience with 18F-FDG-PET/CT. *Minerva Med*. 2017 Aug;108(4):299-304.
[PubMed: PM28326754](#)
19. Salomäki SP, Saraste A, Kempainen J, et al. (18)F-FDG positron emission tomography/computed tomography in infective endocarditis. *J Nucl Cardiol*. 2017 Feb;24(1):195-206.
[PubMed: PM26662063](#)
20. Šaponjski J, Šobić-Šaranović D, Odalović S, et al. The detection of endocarditis, post implantation grafts, arteritis and other related disorders by (18)F-FDG PET/CT. *Hell J Nucl Med*. 2017 Sep-Dec;20 Suppl:37-44.
[PubMed: PM29324913](#)
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[PubMed: PM27596984](#)
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[PubMed: PM26276890](#)
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[PubMed: PM25788402](#)
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[PubMed: PM23471580](#)
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[PubMed: PM23695724](#)
32. Saby L, Laas O, Habib G, et al. Positron emission tomography/computed tomography for diagnosis of prosthetic valve endocarditis: increased valvular 18F-fluorodeoxyglucose uptake as a novel major criterion. *J Am Coll Cardiol*. 2013 Jun 11;61(23):2374-2382.
[PubMed: PM23583251](#)
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[PubMed: PM20636421](#)

Economic Evaluations

No literature identified.

Appendix — Further Information

Previous CADTH Reports

34. Pejic W, Ford C, Argáez C. Positron emission tomography–computed tomography for cardiovascular indications: diagnostic accuracy, clinical utility, cost-effectiveness, and guidelines [*CADTH rapid response report: summary of abstracts*]. Ottawa (ON): CADTH; 2020 Aug: <https://cadth.ca/sites/default/files/pdf/htis/2018/RB1244%20PET-CT%20for%20Cardiovascular%20Indications%20Final.pdf> Accessed 2020 Oct 01.
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36. Mujoomdar M, Clark M, Nkansah E. Positron emission tomography for cardiovascular disease: a review of the clinical effectiveness [*CADTH rapid response report: peer reviewed summary with critical appraisal*]. Ottawa (ON): CADTH; 2010 Aug: https://cadth.ca/sites/default/files/pdf/M0015_PET_for_Cardiology_e.pdf Accessed 2020 Oct 01.

Systematic Reviews and Meta-Analyses – Multiple Interventions

37. Gomes A, Glaudemans A, Touw DJ, et al. Diagnostic value of imaging in infective endocarditis: a systematic review. *Lancet Infect Dis*. 2017 01;17(1):e1-e14. [PubMed: PM27746163](#)

Non-Randomized Studies

Clinical Utility – Alternative Comparator

38. Duval X, Le Moing V, Tubiana S, et al. Impact of systematic whole-body 18F-fluorodeoxyglucose PET/CT on the management of patients suspected of infective endocarditis: the prospective multicenter TEPvENDO study. *Clin Infect Dis*. 2020 Jun 03;03:03. [PubMed: PM32488236](#)
39. El-Dalati S, Murthy VL, Owczarczyk AB, et al. Correlating cardiac F-18 FDG PET/CT results with intra-operative findings in infectious endocarditis. *J Nucl Cardiol*. 2019 Sep 4. [PubMed: PM31485962](#)
40. Hohmann C, Michels G, Schmidt M, et al. Diagnostic challenges in infective endocarditis: is PET/CT the solution? *Infection*. 2019 Aug;47(4):579-587. [PubMed: PM30847769](#)
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42. Lauridsen TK, Iversen KK, Ihlemann N, et al. Clinical utility of (18)F-FDG positron emission tomography/computed tomography scan vs. (99m)Tc-HMPAO white blood

cell single-photon emission computed tomography in extra-cardiac work-up of infective endocarditis. *Int J Cardiovasc Imaging*. 2017 May;33(5):751-760.

[PubMed: PM28050751](#)

43. Sarrazin JF, Philippon F, Tessier M, et al. Usefulness of fluorine-18 positron emission tomography/computed tomography for identification of cardiovascular implantable electronic device infections. *J Am Coll Cardiol*. 2012 May 01;59(18):1616-1625.

[PubMed: PM22538331](#)

Clinical Utility – No Comparator

44. San S, Ravis E, Tessonier L, et al. Prognostic Value of (18)F-Fluorodeoxyglucose positron emission tomography/computed tomography in infective endocarditis. *J Am Coll Cardiol*. 2019 Aug 27;74(8):1031-1040.

[PubMed: PM31439211](#)

45. Orvin K, Goldberg E, Bernstine H, et al. The role of FDG-PET/CT imaging in early detection of extra-cardiac complications of infective endocarditis. *Clin Microbiol Infect*. 2015 Jan;21(1):69-76.

[PubMed: PM25636930](#)

46. Asmar A, Ozcan C, Diederichsen AC, Thomassen A, Gill S. Clinical impact of 18F-FDG-PET/CT in the extra cardiac work-up of patients with infective endocarditis. *Eur Heart J Cardiovasc Imaging*. 2014 Sep;15(9):1013-1019.

[PubMed: PM24711514](#)

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[PubMed: PM21463705](#)

Review Articles

48. Lakkas L, Serim BD, Fotopoulos A, et al. Infection of cardiac prosthetic valves and implantable electronic devices: early diagnosis and treatment. *Acta Cardiol*. 2020 May 14:1-7.

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49. Li X, Kondray V, Tavri S, et al. Role of imaging in diagnosis and management of left ventricular assist device complications. *Int J Cardiovasc Imaging*. 2019 Jul;35(7):1365-1377.

[PubMed: PM30830527](#)

50. Aguadé Bruix S, Roque Pérez A, Cuéllar Calabria H, Pizzi MN. Cardiac (18)F-FDG PET/CT procedure for the diagnosis of prosthetic endocarditis and intracardiac devices. *Rev Esp Med Nucl Imagen Mol*. 2018 May-Jun;37(3):163-171.

[PubMed: PM29496402](#)

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Additional References

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