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CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Drug-Eluting Stents for Patients with Coronary Artery Disease: Comparative Clinical Effectiveness

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Research Question

What is the comparative safety of one type of coronary drug-eluting stent versus another coronary drug-eluting stent for patients with coronary artery disease?

Key Findings

One systematic review, 10 systematic reviews with meta-analyses and 32 meta-analyses were identified regarding the comparative safety of one type of coronary drug-eluting stent versus another coronary drug-eluting stent for patients with coronary artery disease.

Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE ALL (1946—) 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 coronary drug-eluting stents and safety/adverse events. Search filters were applied to limit retrieval to systematic reviews, meta-analyses, network meta-analyses, health technology assessments, randomized controlled trials, or controlled clinical trials. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 01, 2014 and August 09, 2019. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Adult patients with coronary artery disease
Intervention	Coronary drug-eluting stents (DES): • Abbott Xcience (ie., everolimus-eluting coronary stent) • Medtronic Resolute Integrity (ie., Resolute zotarolimus-eluting) stent • Boston Scientific Promus (ie., everolimus-eluting platinum chromium coronary stent) • Any other type of coronary drug-eluting stent
Comparator	Another type of coronary drug-eluting stent
Outcomes	Safety/harms outcomes (e.g. adverse events, stent thrombosis, restenosis, major or minor bleeding, mortality, emergency surgery, another surgery complication)
Study Designs	Health technology assessments, systematic reviews, meta-analyses

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports are presented first. These are followed by systematic reviews and meta-analyses. Additionally, due to the abundance of literature retrieved, randomized controlled trials and non-randomized studies were not included in this report.

One systematic review,[1] 10 systematic reviews with meta-analyses[2-11] and 32 meta-analyses[12-43] were identified regarding the comparative safety of one type of coronary drug-eluting stent versus another coronary drug-eluting stent for patients with coronary artery disease. No relevant health technology assessments were identified.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

One systematic review,[1] 10 systematic reviews with meta-analyses[2-11] and 32 meta-analyses[12-43] were identified regarding the comparative safety of one type of coronary drug-eluting stent versus another coronary drug-eluting stent for patients with coronary artery disease.

No conclusions can be drawn from the identified systematic review[1] as the abstract does not provide enough information for an overall summary.

The identified systematic reviews with meta-analyses[2-11] varied in the types of drug-eluting stents compared and the overall conclusions. However, three systematic reviews with meta-analyses[3,7,10] suggested that second generation drug-eluting stents were safer compared to first generation drug-eluting stents.

Similarly, the identified meta-analyses[12-43] varied in the types of drug-eluting stents compared and the overall conclusions. Six meta-analyses[24,25,28,31,33,39] suggested that second generation and newer drug-eluting stents were safer compared to first generation drug-eluting stents. Furthermore, two meta-analyses[38,42] suggested that first generation sirolimus-eluting stents were safer than first generation paclitaxel-eluting stents.

Detailed study characteristics are provided in Table 2.

Table 2: Study and Patient Characteristics of Included Studies

First Author, Year	Study Characteristics	Population	Intervention vs Comparator	Relevant Outcomes Assessed	Conclusions
Systematic Reviews					
Yang, 2018[1]	• SR • N= NR	• Patients undergoing PCI	• ZES vs NR	• NR	• NR
Systematic Reviews with Meta-Analyses					
Picard, 2019[2]	• SR and MA • Four RCTs • N= 4,631	• CAD patients	• BP-EES vs DP-DES (EES and ZES)	• Stent thrombosis	• No statistically significant differences between groups

First Author, Year	Study Characteristics	Population	Intervention vs Comparator	Relevant Outcomes Assessed	Conclusions
Gao, 2019[3]	• SR and MA • 14 trials • N= 9,542	• CKD patients undergoing PCI	• First generation DES (SES and PES) vs second generation DES (EES, ZES, and BES)	• Stent restenosis • Stent thrombosis	• First generation DES associated with increased risk of stent restenosis and stent thrombosis compared to second generation DES
Bundhun, 2017[4]	• SR and MA • 12 RCTs • N= 13,480	• CAD patients	• BP-DES vs first generation DP-DES	• Long term total stent thrombosis • Definite and probable stent thrombosis	• No statistically significant differences between groups
Lu, 2017[5]	• SR and MA • Five studies • N= 4,687	• Patients undergoing PCI	• BP-BES vs DP-DES	• Stent thrombosis	• BP-DES decreased stent thrombosis compared to DP-DES
Bundhun, 2017[6]	• SR and MA • 10 RCTs • N= 13,218	• NR	• BP-DES vs DP-EES	• Definite and probable stent thrombosis	• No statistically significant differences between groups
Bavishi, 2017[7]	• SR and MA • 18 RCTs • N= 8,095	• Diabetic patients with CAD undergoing PCI	• First generation DES (PES and SES) vs EES and ZES	• Stent thrombosis	• EES decreased stent thrombosis compared to first generation DES • Sub-analysis in diabetic patients requiring insulin also showed EES decreased stent thrombosis compared to first generation DES
Wang, 2016[8]	• SR and MA • 12 RCTs • N= NR	• Diabetic patients undergoing PCI	• PES vs SES	• Stent thrombosis	• No statistically significant differences between groups
Bundhun, 2016[9]	• SR and MA • 29 studies • N= 25,729	• Type 2 diabetic patients with CAD	• SES vs other DES	• Total, definite or probable stent thrombosis	• No statistically significant differences between groups
Toyota, 2015[10]	• SR and MA • 14 RCTs • N= 13,434	• NR	• EES vs SES	• Definite stent thrombosis • Definite/probable stent thrombosis	• EES decreased definite and definite/probable stent thrombosis compared to SES

First Author, Year	Study Characteristics	Population	Intervention vs Comparator	Relevant Outcomes Assessed	Conclusions
Kwong, 2014[11]	• SR and MA • 20 RCTs • N= 20,021	• Patients undergoing PCI	• BP-DES vs DP-DES	• Definite/probable stent thrombosis	• No statistically significant differences between groups
Meta-Analyses					
Mridha, 2019[12]	• MA • Six RCTs included in three to five-year follow-up • Eight RCTs included in two-year follow-up • N= NR	• NR • Subgroup analysis of strut thickness (<100 micro m, >100 micro m)	• Bioadsorbable polymer DES vs DP-DES	• Stent thrombosis • Very late stent thrombosis	• No statistically significant differences between groups
Wu, 2019[13]	• MA • 13 RCTs • N= 8,021	• CAD patients	• PF-DES vs DP-DES	• Definite or probable stent thrombosis	• No statistically significant differences between groups
Nogic, 2018[14]	• MA • Five RCTs • N= 1,975	• CAD patients	• BP-DES vs PF-DES	• Stent thrombosis	• No statistically significant differences between groups
Bangalore, 2018[15]	• MA • 10 RCTs • N= 11,658	• CAD patients	• Newer generation ultrathin DES (Orsiro, MiStent and BioMime) vs second generation DES	• Stent thrombosis	• No statistically significant differences between groups
Wu, 2018[16]	• MA • 19 RCTs • N= 24,406	• CAD patients	• BP-DES vs DP-DES	• Definite or probable stent thrombosis	• No statistically significant differences between groups
Nogic, 2018[17]	• MA • 12 RCTs • N= 6,943	• CAD patients	• PF-DES vs PP-DES	• Stent thrombosis	• No statistically significant differences between groups
Zhu, 2018[18]	• MA • Six RCTs • N= 6,949	• CAD patients	• BP-SES (Orsiro) vs DP-DES	• Stent thrombosis	• No statistically significant differences between groups
Gao, 2017[19]	• MA • 11 RCTs • N= 8,616	• Patients with acute coronary syndrome	• Polymer free stent vs PP-DES	• Stent thrombosis	• No statistically significant differences between groups

First Author, Year	Study Characteristics	Population	Intervention vs Comparator	Relevant Outcomes Assessed	Conclusions
		undergoing PCI			
Kong, 2017[20]	• MA • 29 RCTs • N= 18,379	• Patients undergoing PCI	• SES vs PES	• Stent thrombosis	• No statistically significant differences between groups
El-Hayek, 2017[21]	• MA • 16 RCTs • N= 19,886	• NR	• BP-DES vs second generation DP-DES	• Stent thrombosis • Very late stent thrombosis	• No statistically significant differences between groups
Sakurai, 2016[22]	• MA • Eight RCTs • N= NR	• Patients undergoing PCI	• BP-BES vs DP-EES	• Definite or probable stent thrombosis	• No statistically significant differences between groups
Yang, 2016[23]	• MA • 15 RCTs • N= 14,187	• NR	• BP-SES vs DP-DES	• Late stent thrombosis • Very late stent thrombosis	• BP-SES decreased late and very late stent thrombosis compared to DP-DES
Kang, 2016[24]	• NMA • 147 RCTs • N= 126,526	• Patients undergoing PCI	• All contemporary DES	• Definite or probable stent thrombosis	• All contemporary DES decreased definite or probable stent thrombosis compared to PES • CoCr-EES and hybrid- SES decreased stent thrombosis compared to SES and BP-BES
Meng, 2016[25]	• MA • N= 4,991	• Patients undergoing PCI	• EES vs PES	• Stent thrombosis	• EES decreased stent thrombosis compared to PES at the three-year follow-up • No statistically significant differences at the four- and five-year follow-ups between groups
Gu, 2015[26]	• MA • Eight RCTs • N= 11,778 • 26 observational studies • N= 34,850	• NR	• EES vs ZES	• Stent thrombosis	• No statistically significant differences in RCTs • EES decreased stent thrombosis compared to ZES in observational studies
Qi-Hua, 2015[27]	• MA • Five RCTs • N= 9,853	• CAD patients	• EES vs ZES	• Definite/probable stent thrombosis	• No statistically significant differences between groups

First Author, Year	Study Characteristics	Population	Intervention vs Comparator	Relevant Outcomes Assessed	Conclusions
Liu, 2015[28]	• MA • 28 trials • N= 23,678	• Diabetic patients undergoing PCI	• SES vs PES vs EES or ZES	• Stent thrombosis	• No statistically significant difference between SES and PES • EES or ZES decreased stent thrombosis compared to PES
Lv, 2015[29]	• MA • 16 RCTs • N= 22,211	• NR	• BP-DES vs DP-DES	• Early stent thrombosis • Late stent thrombosis • Very late stent thrombosis	• No statistically significant differences in early or late stent thrombosis • BP-DES decreased very late stent thrombosis compared to DP-DES
Zhu, 2015[30]	• MA • 11 RCTs • N= 9,676	• NR	• DP-SES vs BP-DES	• Definite or probable stent thrombosis • Early and late stent thrombosis • Very late stent thrombosis	• BP-DES decreased risk definite or probable stent thrombosis compared to DP-SES • BP-DES and DP-DES had a comparable rate of early and late stent thrombosis • BP-DES decreased risk of very late stent thrombosis compared to DP-SES
Zhang YJ, 2014[31]	• MA • 16 RCTs • N= 23,481	• CAD patients	• EES vs rapamycin derivative-eluting stents	• Definite/probable stent thrombosis	• EES decreased definite stent thrombosis compared to ZES and SES, but not BES
Cassese, 2014[32]	• MA • N= 9,114	• Patients undergoing PCI	• BP-BES (Nobori) vs EES, SES, PES	• Definite/probable stent thrombosis	• No statistically significant differences between groups
Li, 2014[33]	• MA • Seven RCTs • N= 8,162	• CAD patients	• EES vs PES	• Late stent thrombosis • Very late stent thrombosis	• No statistically significant difference in late stent thrombosis between groups • EES decreased very late stent thrombosis compared to PES
Sun, 2014[34]	• MA • Four RCTs • N= 8,282	• Patients undergoing PCI	• BP-DES vs EES	• Definite/probable stent thrombosis	• No statistically significant differences between groups
Wang, 2014[35]	• MA • 19 RCTs • N= 18,395	• NR	• DP-DES vs PP-DES	• Definite/probable stent thrombosis	• DP-DES decreased very late stent thrombosis compared to PP-DES
Navarese, 2014[36]	• MA • Eight RCTs • N= 6,178	• NR	• PF-DES vs DP-DES	• Stent thrombosis	• *"…these two different devices proved equally*

First Author, Year	Study Characteristics	Population	Intervention vs Comparator	Relevant Outcomes Assessed	Conclusions
					effective in regards to ST…"[36]
Palmerini, 2014[37]	• NMA • 89 RCTs • N= 85,490	• NR	• Bioadsorbable polymer BES vs DP-DES	• Stent thrombosis	• BP-BES had higher rates of stent thrombosis compared to CoCr-EES • No statistically significant difference between BP-DES and other DP-DES
Gao, 2014[38]	• MA • 23 RCTs • N= 19,319	• Patients undergoing PCI	• Limus-based stents vs PES	• Stent thrombosis	• Limus-based stents decreased stent thrombosis compared to PES at two years
Navarese, 2014[39]	• MA • 33 RCTs • N= 31,379	• Patients with stable CAD or acute coronary syndrome	• SES and PES vs EES and ZES (Endeavor and Resolute)	• Definite/probable stent thrombosis	• EES decreased definite/probable stent thrombosis compared to PES
Niu, 2014[40]	• MA • 19 RCTs • N= 20,229	• NR	• BP-DES vs PP-DES	• Very late definite/probable stent thrombosis	• BP-DES decreased very late definite/probable stent thrombosis compared to PP-DES
Zhang J, 2014[41]	• MA • 12 studies • N= 15,155	• CAD patients	• BP-DES vs DP-DES	• Definite and probable stent thrombosis • Definite stent thrombosis • Early stent thrombosis • Late stent thrombosis • Very late stent thrombosis	• No statistically significant differences in definite/probable stent thrombosis, definite stent thrombosis, early stent thrombosis or late stent thrombosis between groups • BP-DES decreased very late stent thrombosis compared to DP-DES
Zhang X, 2014[42]	• MA • 76 RCTs • N= >15 000	• Patients undergoing PCI	• SES vs PES	• Restenosis • Stent thrombosis	• SES decreased restenosis and stent thrombosis compared to PES
Zhang Y, 2014[43]	• MA • 15 RCTs • N= 17,068	• CAD patients	• BP-DES vs DP-DES	• Definite/probable stent thrombosis	• No statistically significant differences between groups

BES= biolimus-eluting stents; BP-BES= biodegradable polymer biolimus-eluting stents; BP-DES= biodegradable polymer drug-eluting stents; BP-EES= biodegradable polymer Everolimus-eluting stents; BP-SES= biodegradable polymer sirolimus-eluting stents; CAD= coronary artery disease; CKD= chronic kidney disease; CoCr-EES= cobalt-chromium everolimus-eluting stents; DES= drug-eluting stents; DP-DES= durable polymer drug-eluting stents; DP-EES= durable polymer everolimus-eluting stents; DP-SES= durable polymer sirolimus-eluting stents; EES= everolimus-eluting stent; MA= meta analysis; NMA= network meta analysis; NR= not reported; PCI= percutaneous coronary intervention; PES= paclitaxel-eluting stents; PF-DES= polymer free drug-eluting stents; PP-DES= permanent polymer drug-eluting stents; RCT= randomized controlled trial; SES= sirolimus-eluting stents; SR= systematic review; ST= stent thrombosis; ZES= zotarolimus-eluting stent

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Health Technology Assessments

No Literature Identified

Systematic Reviews

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Appendix — Further Information

Health Technology Assessments

No Abstract Available

44. Synergy bioabsorbable polymer drug-eluting stent system (Boston Scientific) for treatment of coronary artery disease. Lansdale (PA): Hayes; 2016. Accessed 2019 Aug 12.

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