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Absorbable Sutures for General Surgery, Orthopedic Surgery, or Gynecological Surgery: Clinical Effectiveness, Cost-Effectiveness, and Guidelines

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Research Questions

1. What is the clinical effectiveness of absorbable sutures made from one material compared with absorbable sutures made from an alternative material for adult patients undergoing surgery?
2. What is the cost-effectiveness of absorbable sutures made from one material compared with absorbable sutures made from an alternative material for adult patients undergoing surgery?
3. What are the evidence-based guidelines for the use of absorbable sutures in adult patients undergoing surgery?

Key Findings

Six randomized controlled trials and five non-randomized studies were identified regarding the clinical effectiveness of absorbable sutures made from one material compared with absorbable sutures made from an alternative material for adult patients undergoing surgery. Five evidence-based guidelines were identified for the use of absorbable sutures in adult patients undergoing surgery. No literature was identified regarding the cost-effectiveness of absorbable sutures made from one material compared with absorbable sutures made from an alternative material for adult patients undergoing surgery.

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including Medline 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 concept was absorbable sutures. Filters were applied to limit the retrieval to health technology assessments, systematic reviews, and meta analyses, randomized controlled trials, and non-randomized studies, economic studies, and guidelines. The search was also limited to English language documents published between January 1, 2015 and October 15, 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. Open access full-text versions of evidence-based guidelines were reviewed when abstracts were not available.

Table 1: Selection Criteria

Population	Adult patients undergoing general surgery, orthopedic surgery, or gynecological surgery
Intervention	Absorbable sutures made from one material Materials include, but are not limited to: Braided synthetic absorbable sutures - Lactomer/polyester copolymer sutures (e.g., Polysorb) - Polyglactine 910 (e.g., Vicryl or Vicryl rapide)

	- Polyester (e.g., Velosorb Fast) Monofilament synthetic absorbable sutures - Polyglytone 6211 (e.g., Caprosyn) - Synthetic polyester (e.g., Biosyn) - Polyglyconate (e.g., Maxon) - Poliglecaprone 25 (e.g., Monocryl and Monocryl plus) - Polydioxanone (e.g., PDS and PDS II) Natural non-synthetic fibres - Chromic Gut Suture - Mild Chromic Gut Suture - Plain Gut Suture
Comparator	Absorbable sutures made from a different material (any material noted under intervention)
Outcomes	Q1: Clinical effectiveness (e.g., infection rates, safety, breaking or fraying of sutures leading to improper wound healing, wound healing) Q2: Cost-effectiveness (e.g., incremental cost effectiveness ratios) Q3: Recommendations regarding the choice of absorbable material for sutures in general surgery, orthopedic surgery, or gynecological surgery; recommendations regarding best practices for absorbable sutures in general surgery, orthopedic surgery, or gynecological surgery)
Study Designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, economic evaluations, evidence-based guidelines

Results

Six randomized controlled trials[1-6] and five non-randomized studies[7-11] were identified regarding the clinical effectiveness of absorbable sutures made from one material compared with absorbable sutures made from an alternative material for adult patients undergoing surgery. Five evidence-based guidelines[12-16] were identified for the use of absorbable sutures in adult patients undergoing surgery. No health technology assessments or systematic reviews were identified regarding the clinical effectiveness of absorbable sutures made from one material compared with absorbable sutures made from an alternative material for adult patients undergoing surgery. No economic evaluations were identified regarding the cost-effectiveness of absorbable sutures made from one material compared with absorbable sutures made from an alternative material for adult patients undergoing surgery.

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

No literature identified.

Randomized Controlled Trials

1. Ruiz-Tovar J, Llavero C, Jimenez-Fuertes M, Duran M, Perez-Lopez M, Garcia-Marin A. Incisional surgical site infection after abdominal fascial closure with triclosan-coated barbed suture vs triclosan-coated polydioxanone loop suture vs polydioxanone poop

suture in emergent abdominal surgery: a randomized clinical trial. *J Am Coll Surg*. 2020 May;230(5):766-774.
PubMed: PM32113031

2. Sevket O, Takmaz T, Ozcan P, Halici BNA, Islek SH. Hydrosonographic assessment of the effect of two different suture materials on healing of the uterine scar after cesarean delivery: a prospective randomized controlled trial. *Z Geburtshilfe Neonatol*. 2020 Jun 25.
PubMed: PM32588418

3. Başbuğ A, Doğan O, Ellibeş Kaya A, Pulatoğlu Ç, Çağlar M. Does suture material affect uterine scar healing after cesarean section? Results from a randomized controlled trial. *J Invest Surg*. 2019 Dec;32(8):763-769.
PubMed: PM29667541

4. Buresch AM, Van Arsdale A, Ferzli M, et al. Comparison of subcuticular suture type for skin closure after cesarean delivery: a randomized controlled trial. *Obstet Gynecol*. 2017 09;130(3):521-526.
PubMed: PM28796687

5. Odijk R, Hennipman B, Rousian M, et al. The MOVE-trial: Monocryl R vs. Vicryl Rapide TM for skin repair in mediolateral episiotomies: a randomized controlled trial. *BMC Pregnancy Childbirth*. 2017 Oct 16;17(1):355.
PubMed: PM29037181

6. Ohira G, Kawahira H, Miyauchi H, et al. Synthetic polyglycomer short-term absorbable sutures vs. polydioxanone long-term absorbable sutures for preventing incisional hernia and wound dehiscence after abdominal wall closure: a comparative randomized study of patients treated for gastric or colon cancer. *Surg Today*. 2015 Jul;45(7):841-845.
PubMed: PM25556881

Non-Randomized Studies

7. Chihara N, Suzuki H, Sukegawa M, et al. Absorbable barbed suture device for laparoscopic peritoneal closure after hernia repair via the transabdominal preperitoneal approach: a single-center experience with 257 cases. *Asian J Endosc Surg*. 2019 Apr;12(2):162-166.
PubMed: PM29992794

8. Roumeliotis L, Graham NM. Barbed suture and glue in skin closure during lower limb arthroplasty: reduced delayed discharge due to wound exudate. *J Wound Care*. 2019 Nov 02;28(11):784-789.
PubMed: PM31721663

9. Naz S, Memon SA, Jamali MA, Ahmed MR, Almani T. Polydioxanone versus polypropylene closure for midline abdominal incisions. *J Ayub Med Coll Abbottabad.* 2017 Oct-Dec;29(4):591-594.
PubMed: PM29330984

10. Uchino M, Ikeuchi H, Matsuoka H, et al. Advancement of buried muco- subcutaneous sutures for ostomy creation in surgery for ulcerative colitis. *Hepatogastroenterology*. 2015 Jun;62(140):817-820.
PubMed: PM26902008

Ad-Hoc Analysis of a Randomized Controlled Trial (Not Randomized by Suture Type)

11. Tuuli MG, Stout MJ, Martin S, Rampersad RM, Cahill AG, Macones GA. Comparison of suture materials for subcuticular skin closure at cesarean delivery. *Am J Obstet Gynecol*. 2016 Oct;215(4):490.e491-495.
PubMed: PM27179440

Economic Evaluations

No literature identified.

Guidelines and Recommendations

12. Queensland Clinical Guidelines. Primary postpartum haemorrhage [*Maternity and neonatal clinical guideline*]. Brisbane, Australia: Queensland Health. 2020 Sep; https://www.health.qld.gov.au/__data/assets/pdf_file/0015/140136/g-pph.pdf Accessed 2020 Oct 22.
See: Section: 3.5.3 Uterine rupture – Treatment, pg. 25

13. Queensland Clinical Guidelines. Perineal care [*Maternity and neonatal clinical guideline*]. Brisbane, Australia: Queensland Health. 2020 Sep; https://www.health.qld.gov.au/__data/assets/pdf_file/0022/142384/g-pericare.pdf Accessed 2020 Oct 22.
See: Flow Chart: Perineal assessment and repair, pg. 4; Section 6.2.1 Types of repair, pg. 23; and Section 6.2.2 Table 26: Repair of OASIS p.24

14. National Institute for Health and Care Excellence. Caesarean section [*Clinical guideline CG132*]. London, England: NICE; 2019 Sep [*updated*]: https://www.nice.org.uk/guidance/cg132/resources/caesarean-section-pdf-35109507009733 Accessed 2020 Oct 22.
See: Section: 1.4.6.14

15. American College of Obstetricians and Gynecologists' Committee on Practice Bulletins—Obstetrics, Cichowski S, Rogers R. Practice bulletin no. 165: prevention and management of obstetric lacerations at vaginal delivery. *Obstet Gynecol*. 2016 Jul;128(1):226-227.
PubMed: PM27333355

16. Muysoms FE, Antoniou SA, Bury K, et al. European Hernia Society guidelines on the closure of abdominal wall incisions. *Hernia*. 2015 Feb;19(1):1-24.
PubMed: PM25618025

Appendix — Further Information

Systematic Reviews & Meta-Analyses

Mixed Comparators

17. Henriksen NA, Deerenberg EB, Venclauskas L, Fortelny RH, Miserez M, Muysoms FE. Meta-analysis on materials and techniques for laparotomy closure: the MATCH review. *World J Surg*. 2018 Jun;42(6):1666-1678.
PubMed: PM29322212

18. Patel SV, Paskar DD, Nelson RL, Vedula SS, Steele SR. Closure methods for laparotomy incisions for preventing incisional hernias and other wound complications. *Cochrane Database Syst Rev*. 2017 Nov 03;11:CD005661.
PubMed: PM29099149

Randomized Controlled Trials

Alternative Population

19. Ramkumar Ceyar KA, Thulasidoss GP, Raja Sethupathy Cheeman S, Sagadevan S, Panneerselvam E, Krishna Kumar Raja VB. Effectiveness of knotless suture as a wound closure agent for impacted third molar - a split mouth randomized controlled clinical trial. *J Craniomaxillofac Surg*. 2020 Oct;48(10):1004-1008.
PubMed: PM32873466

20. Gupta D, Sharma U, Chauhan S, Sahu SA. Improved outcomes of scar revision with the use of polydioxanone suture in comparison to polyglactin 910: a randomized controlled trial. *J Plast Reconstr Aesthet Surg.* 2018 Aug;71(8):1159-1163.
PubMed: PM29724622

21. Sridhar J, Kasi S, Paul J, et al. A prospective, randomized trial comparing plain gut to polyglactin 910 (Vicryl) sutures for sclerotomy closure after 23-gauge pars plana vitrectomy. *Retina*. 2018 Jun;38(6):1216-1219.
PubMed: PM28492428

22. Koide S, Smoll NR, Liew J, et al. A randomized 'N-of-1' single blinded clinical trial of barbed dermal sutures vs. smooth sutures in elective plastic surgery shows differences in scar appearance two-years post-operatively. *J Plast Reconstr Aesthet Surg*. 2015 Jul;68(7):1003-1009.
PubMed: PM25840525

Alternative Comparator – Coated vs. Non-Coated

23. Tae BS, Park JH, Kim JK, et al. Comparison of intraoperative handling and wound healing between (NEOSORB R plus) and coated polyglactin 910 suture (NEOSORB R): a prospective, single-blind, randomized controlled trial. *BMC Surg*. 2018 Jul 06;18(1):45.
PubMed: PM29980202

Unclear Comparator

24. Chan VWK, Chan PK, Chiu KY, Yan CH, Ng FY. Does barbed suture lower cost and improve outcome in total knee arthroplasty? A randomized controlled trial. *J*

Arthroplasty. 2017 05;32(5):1474-1477.
PubMed: PM28089469

Non-Randomized Studies

Alternative Comparator

25. Bazzi AA, Osmundsen BC, Hagglund KH, Aslam MF. Anatomical outcomes based on suturing technique during vaginal mesh attachment in robotic sacrocolpopexy. *Female Pelvic Med Reconstr Surg*. 2019 Mar/Apr;25(2):105-108.
PubMed: PM30807409

No Comparator

26. Kang E, Collins JC. Primary umbilical hernia repair: a large-volume single-surgeon study. *Am Surg*. 2019 Oct 1;85(10):1159-1161.
PubMed: PM31657315

27. Yoshimatsu K, Sagawa M, Yokomizo H, et al. Subcuticular suturing with closed suction drainage for wound closure following stoma reversal. *J Nippon Med Sch*. 2018;85(3):183-186.
PubMed: PM30135346

Mixed Population

28. Gfroerer S, Baumann P, Schwalbach AK, Smirnoff A. Prospective international multicenter observational study of Novosyn R Quick for skin closures in adults and children (SKINNOQ). *BMC Surg*. 2019 May 02;19(1):47.
PubMed: PM31046730

Unclear Comparator

29. Bracale U, Merola G, Cabras F, Andreuccetti J, Corcione F, Pignata G. The Use of barbed suture for intracorporeal mechanical anastomosis during a totally laparoscopic right colectomy: is it safe? A retrospective nonrandomized comparative multicenter study. *Surg Innov*. 2018 Jun;25(3):267-273.
PubMed: PM29577831

Alternative Population

30. Linz C, Kunz F, Kraus J, et al. Stable fixation with absorbable sutures in craniofacial surgery. *J Craniomaxillofac Surg*. 2016 May;44(5):622-625.
PubMed: PM27017106

31. Gazivoda D, Pelemis D, Vujaskovic G. A clinical study on the influence of suturing material on oral wound healing. *Vojnosanit Pregl*. 2015 Sep;72(9):765-769.
PubMed: PM26554107

Guidelines & Recommendations

Unclear Methodology

32. Perineal trauma assessment, repair and safe practice [*guideline*]. Victoria, Australia: The Royal Women's Hospital; 2020 Jul:
https://thewomens.r.worldssl.net/images/uploads/downloadable-records/clinical-guidelines/perineal-trauma-assessment-repair-and-safe-practice_280720.pdf

Accessed 2020 Oct 22.
See: Repairing the tear, pg. 4-6

Review Articles

33. Nahas FX, Faustino LD, Ferreira LM. Abdominal wall plication and correction of deformities of the myoaponeurotic layer: focusing on materials and techniques used for synthesis. *Aesthet Surg J*. 2019 03 14;39(Suppl_2):S78-S84.
PubMed: PM30869750

Additional References

34. Ethicon. Plus antibacterial sutures: evidence summary. Somerville (NJ): Ethicon; 2019: https://www.jnjmedicaldevices.com/sites/default/files/user_uploaded_assets/pdf_assets/2019-06/103240-181127_Plus_EvidenceSummary_192_CA.pdf
Accessed 2020 Oct 22.