

Use of Topical Anaesthetics to Ease Cannulation Pain



**BC Renal
Agency**

An agency of the Provincial
Health Services Authority

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Use of Topical Anaesthetics to Ease Cannulation Pain



1.0 Scope

Pain related to cannulation is a significant concern for some patients. This guideline provides recommendations for the use of topical anaesthetics for the purposes of reducing pain associated with cannulation of fistulas and grafts.

This guideline applies to both adult and paediatric patient populations.

Related Guidelines (BC, Canada, United States and Europe):

- BC Provincial Renal Agency: Cannulation of AV Fistulas and Grafts, 2007.
- The national and international nephrology guidelines make little or no mention of the use of topical anaesthetics including those published by: Canadian Society of Nephrology, Canadian Association of Nephrology Nurses and Technologists, National (US) Kidney Foundation Kidney Disease Outcomes Quality Initiative and European Best Practice Guidelines on Vascular Access.

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2.0 Recommendations & Rationale

Recommendation 1:

Consider using topical anaesthetics [lidocaine 2.5%/prilocaine 2.5% (EMLA®) or liposomal lidocaine 4% (Maxilene-4®)] in patients in which (1) cannulation has been attempted using intradermal lidocaine and the patient continues to complain of pain; or (2) cannulation has not been attempted because patient has a severe fear of needles; and in (3) children 19 and under.

Rationale for limiting the use of topical anaesthetics

Most patients do not report experiencing discomfort with cannulation and do not require a topical anaesthetic. Topical anaesthetics are expensive and there is no published evidence to support widespread or universal use. They have, however, been shown to be effective in patients where significant pain is a concern and intradermal lidocaine has not been effective or in patients with a fear of needles.

Topical anaesthetics that have been approved for use in Canada are (1) lidocaine 2.5%/prilocaine 2.5% (EMLA®); (2) liposomal lidocaine 4% (Maxilene-4®); and (3) tetracaine (AMETOP™). The first two are funded by BCPRA for patients that meet the specified criteria in an effort to support the goal of “fistula first”. BCPRA does not fund the use of tetracaine (AMETOP™); while it is effective, it is more costly than the other two.

Characteristics of Topical Anaesthetics & Intradermal Lidocaine 2%

Table 1: Topical Anaesthetics and Intradermal Lidocaine 2%

	Topical Anaesthetics		
	Liposomal lidocaine 4% (Maxilene-4 [®])	Lidocaine 2.5%/prilocaine 2.5% (EMLA [®])	Intradermal Lidocaine 2% ampoule (Xylocaine [®])
When to apply	30+ min prior to cannulation	60 min prior to cannulation	~2 min prior to cannulation
Duration of action	1-2 hrs (>30 min after removal)	2-3 hrs (1-2 hrs after removal)	5 min-1 hr
Pre-cannulation dose ¹	0.5 in (~ size of nickel) onto each needling site, with or without occlusive dressing	0.5 in (~size of nickel) onto each needling site with occlusive dressing	0.2 mL intradermal injection at each needling site
Prescription required?	No	No	No
Availability	5g & 30g tubes	5g & 30g tubes	5mL single use ampoule
Use in children (cautions)	Children < 2 yrs old: Consult a physician	Contraindicated in pre-term infants (gestational age < 37 weeks). Contraindicated in infants < 1 yr old if on concurrent drugs which increase risk for methemoglobinemia (e.g. sulphonamides, other drugs – see product monograph in CPS).	Yes – approved for use in children
Base cost ² /g	\$1.20/g	\$1.27/g	n/a
Base cost / HD session	\$0.88	\$0.93	\$1.03 (0.95/5mL amp + \$0.08 for syringe and alcohol swab)
Retail cost / 3 mos	\$50-\$60 for 30g tube (30 g tube lasts ~3 mos)	\$48-\$50 for 30g tube (30 g tube lasts ~3 mos)	Not applicable

¹ See CPS product monograph for dosing in children.

² Base cost = cost with no mark-up (hospital cost).

References:

1. Yip A, Soin H, Taddio A. Review of a new topical anesthetic, liposomal lidocaine, for procedural pain in children. *CJHP* 2005;58:148-50.
2. EMLA[®] Official FDA information, side effects and uses. www.drugs.com/pro/emla.html
3. Rx Files 8th ed. Drug Comparison Charts Pediatric Pain: Treatment Considerations. www.rxfiles.ca/rxfiles/uploads/documents/CHT-Pain-Peds.pdf

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Summary of the Literature

Most studies on the use of topical anaesthetics to reduce needling pain have focused on pain associated with venipuncture. Few have focused on pain associated with cannulation of fistulas and grafts. Most studies have involved children.

Two literature reviews were conducted in BC on the use of topical anaesthetics to reduce needling pain, one in 2008 and one in 2005. A literature search conducted in April 2011 produced no new articles in HD patients.

Use of topical anaesthetics to reduce AV fistula / AV graft cannulation pain in HD patients (2008, St Paul's Hospital):

The literature review concluded that EMLA[®] cream is effective at reducing cannulation pain if applied 60 – 90 minutes prior to needling. No direction was provided about the use of EMLA[®] cream over other topical anaesthetics.

Specifics of the literature review included:

- 7 articles were identified; 1 was published in 2007, 2 in the 1990s and 4 in the 1980s.
- Of the 7 articles, 5 were original studies, 1 reported on 4 different “mini” studies, and 1 reviewed case reports of contact dermatitis in hemodialysis (HD) patients using EMLA[®] cream. Two of the studies were only available as abstracts. The sample sizes in all articles were small (ranged from 25 to 47 patients).
- Of the 6 articles describing studies, 4 studied the effects of EMLA[®] cream and 2 studied the effects of lidocaine topical products (gel and patch; neither of these are available in Canada). There were no studies on the use of Maxilene cream.
- Of the studies using EMLA[®] cream, 3 out of 4 used placebos as comparators (one study used lidocaine injection as a “rescue drug”).
- In the 3 studies using comparators, patients using EMLA[®] cream reported significantly lower amounts of pain than those using placebos.
- In the study not using comparators, EMLA[®] cream was noted to significantly reduce cannulation pain. 87% of patients in one study and 90% in the other reported no pain when

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EMLA[®] cream was used.

- The most common side effect noted in the studies was topical dermatitis (mostly minor but occasionally required discontinuance of the EMLA[®] cream), with the occasional incidence of infection.
- All studies applied the cream 60 – 90 minutes prior to cannulation (most were closer to 90 min).

Comparison of topical anaesthetics (1) liposomal lidocaine 4% (Maxilene-4); (2) EMLA[®]; and (3) tetracaine (AMETOP[™]). (2005, Interior Health pharmacists)

Literature review concluded that the use of liposomal lidocaine would be safe and perhaps less expensive than EMLA[®] cream. Tetracaine was not suggested as it has a higher incidence of vasoconstriction and requires refrigeration.

Specifics of the literature review included:

- 4 randomized controlled trials were reviewed: 1 involved venipuncture, 1 meatotomy and 2 intravenous cannulation. Studies focused on children (ages 1 – 17).
- All trials found liposomal lidocaine to be as efficacious as EMLA[®] and only one found significantly more blanching of the skin with EMLA[®] when compared to liposomal lidocaine. The meatotomy trial found liposomal lidocaine to be more efficacious than EMLA[®] in the 30 minute study arm of one of the groups.
- Allergic reactions and localized adverse effects were similar for all the topical anaesthetics and included localized erythematic swelling and irritation.
- Risk of methemoglobinemia with EMLA[®] if < 3 mos and in < 1 year if on concurrent drugs which increase risk for methemoglobinemia (e.g. sulphonamides, other drugs – see product monograph in CPS).
- Tetracaine is the only product to require refrigeration and also has a higher incidence of vasoconstriction than liposomal lidocaine or EMLA[®].
- Liposomal lidocaine has the shortest onset of action, followed by tetracaine, then EMLA[®]. Tetracaine has the longest duration of action.

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Recommendation 2:

Provide teaching to patients about the correct application (how, how much and when to apply) and the side effects of topical anaesthetics.

Correct application of a topical anaesthetic maximizes the effectiveness of the medication in reducing needling pain. See Table 2 for a patient teaching pamphlet on the correct application of a topical anaesthetic.

Important points to include in teaching include:

- Timing of application and onset of duration.
- Correct application.
- Side effects: redness /rashes or whitening at the site of the application.

Recommendation 3:

For patients who meet the criteria, utilize the protocol in tables 3 and 4 for ordering and filling orders for topical anaesthetics.

Table 2: Application of Topical Anaesthetic Prior to Cannulation of a Fistula or Graft

PATIENT TEACHING PAMPHLET

What is a topical anaesthetic cream?

A topical anaesthetic cream (e.g., EMLA® or Maxilene-4® cream) is used to create a temporary loss of feeling or numbness of the skin before putting in a needle.

Are there side effects?

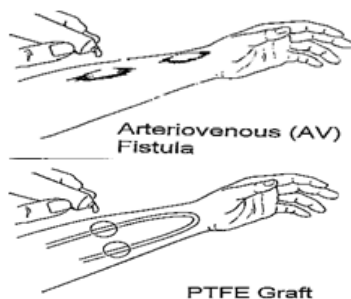
Side effects are rare and may include whitening or redness of the skin and slight puffiness and initial burning or itching on the skin where the cream is applied. These are normal reactions and will disappear without treatment.

When should a topical anaesthetic cream be applied?

A topical anaesthetic cream is best applied at least one hour before dialysis. This allows it enough time to work before putting in a needle.

How is a topical anaesthetic cream applied?

1. Before you leave the hemodialysis unit, ask your nurse which sites she / he plans to needle on the next hemodialysis run.
- * 2. At least one hour before your next hemodialysis run, squeeze about 1.25 cm (0.5 in) of cream or about the size of a nickel onto each of the sites to be needed. If you are not sure which site will be needed, place the cream above or below the last needle site (for site rotation).



- * 3. Wrap a clear plastic wrap around the arm covering the areas that will be needed. Do not spread out the cream or try to rub it into your skin.
4. When it is time for dialysis, remove the plastic wrap, wipe off the cream and clean the entire area with chlorhexidine and alcohol.

DO NOT apply near eyes or on open wounds.

* If your nurse gave you a cap off the top of a heparin vial, substitute these steps for 2 & 3:

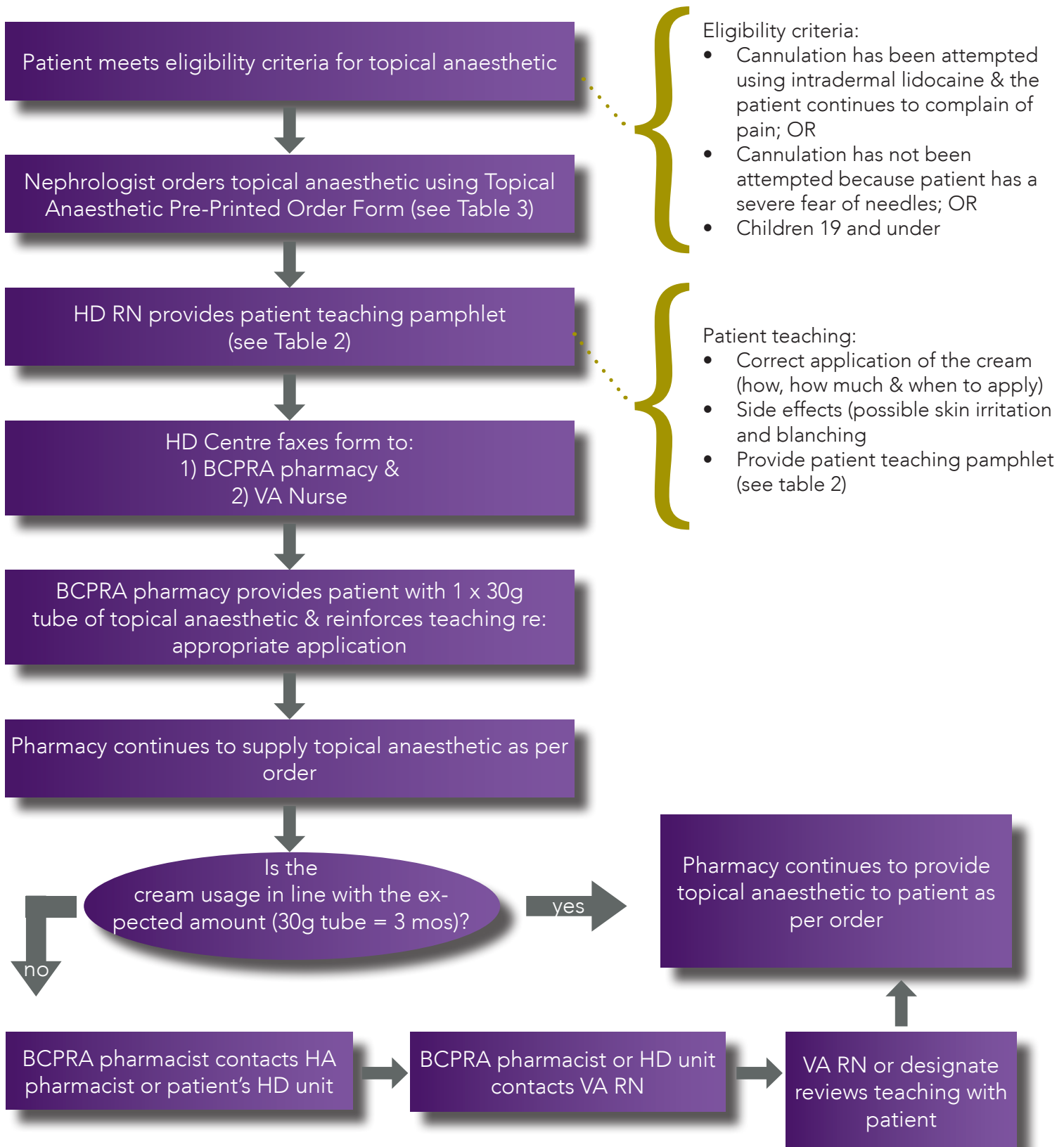
1. Place a thick layer of cream on the back side of the cap.
2. Place the cap over the areas that will be needed and secure with tape.

Adapted from the patient teaching pamphlet developed by Vancouver General Hospital Pharmacy Department, with thanks.



The information in this pamphlet is provided for educational and information purposes, and to support discussion with your health care team about your medical condition and treatment. It does not constitute medical advice and should not substitute advice given by your physician or other qualified health care professional.

Table 3: Protocol for Ordering Topical Anaesthetic Cream (Algorithm)



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PRESCRIBER'S ORDERS

Refer to Guideline: Use of Topical Anaesthetic to Ease Cannulation Pain
(<http://www.bcrenalagency.ca/committees/pvas/ProvGuide.htm>)

Date and Time	Table 4: Topical Anaesthetic Orders: Easing Cannulation Pain (Items with check boxes must be selected to be ordered) (Page 1 of 1)
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Dialysis Modality	<input type="checkbox"/> In-Center HD	<input type="checkbox"/> Community HD	<input type="checkbox"/> Home HD
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Rationale for ordering (check all that apply):

- Cannulation has been attempted using intradermal lidocaine and the patient continues to complain of pain.
- Cannulation has not been attempted because patient has a severe fear of needles.
- Children 19 and under.

Teaching completed:

RN to provide teaching & teaching sheet to patient re application of topical anaesthetic.

Prescription:

- Lidocaine 2.5%/prilocaine 2.5% (EMLA®), dispense 1 x 30 g tube.
- Liposomal lidocaine 4% (Maxilene-4®), dispense 1 x 30 g tube.

Directions:

Apply at least 1 hour before each hemodialysis run.

- 1. Squeeze about 1.25 cm (0.5 in) of cream or about the size of nickel onto each of the sites to be needed.
2. Wrap a clear plastic wrap around the arm covering the areas that will be needed.
OR
- 1. Place a thick layer of cream on the back side of a cap (provided by nurse).
2. Place the cap over the areas that will be needed and secure with tape.

FAX order to the BCPRA pharmacy (fax #: (____)____ - _____) AND send a copy to the Vascular Access Nurse at _____ Hospital (fax #: (____)____ - _____).

Enter medication into PROMIS.

Printed Name	Signature	College ID	Pager
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3.0 References

- Anderson C, Danielson K, Ladefoged J. (1989). EMLA® cream for pain prevention in hemodialysis patients. *Dialysis Transplantation*;18:684-5.
- Canadian Pharmacists Association. Compendium of Pharmaceuticals and Specialties. "AMETOP".(2005). Ottawa, On. 112
- Canadian Pharmacists Association. Compendium of Pharmaceuticals and Specialties. "EMLA". Ottawa, Ontario. (2005). 718-721
- Chen BK, Cunningham BB. (2001). Topical anesthetics in children: agents and techniques that equally comfort patients, parents and clinicians. *Curr Opin Pediatr*;13 (4):324-330
- Eichenfield LF, Funk A, Fallon-Frielanders B. (2002). A clinical study to evaluate the efficacy of ELA-Max (4% liposomal lidocaine) as compared with EMLA® (Eutectic Mixture of Local Anesthetics) cream for pain reduction of venipuncture in children. *Pediatrics*. 109:1093-1099
- Eidelman A, Weiss JM, Lau J, Carr DB. (2005). Topical anesthetics for dermal instrumentation: a systematic review of randomized controlled trials. *Ann Emerg Med*. 46:343-351
- EMLA Official FDA information, side effects and uses. www.drugs.com/pro/emla.html
- Ferndale Laboratories, Inc. L.M.X 4 & 5 product Monograph.(April 2005). Ferndale, Michigan.
- Foldavari M, Gesztes A, Mezei M. (1990). Dermal drug delivery by liposome encapsulation: clinical and electron microscopic studies. *J Microencapsul*. 7:479-489.
- Kitamoto Y, Kano T, Mishima M, Matshushita K, Yasumoto N, Nakano M, et al. Dermal patch anesthesia: pain-free puncture of blood access in hemodialysis patients. (1992). *American Journal of Kidney Diseases*; 20(4):489-91.
- Kleiber C, Sorenson M, Whiteside K, Gronstal BA, et al. (2002). Topical anesthetics for intravenous insertion in children: a randomized equivalency study. *Pediatrics*. 110:758-761
- Koh JL, Harrison D, Myers R, Dembinski R et al.(2004). A randomized, double-blind comparison study of EMLA® and ELA-Max® for topical anesthesia in children undergoing intravenous insertion. *Pediatric Anesthes*. 14:977-982
- Kundu S, Achar S. Principles of office anesthesia, part II: topical anesthesia. (2002). *Am Fam Physician*. 66:99-102.
- Le Coz CJ, Cribier BJ, Heid E. Patch testing in suspected allergic contact dermatitis due to EMLA® cream in haemodialyzed patients. (1996). *Contact Dermatitis*;35:316-7.

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Ooi, K. Differences of pain anesthetic effect expression on using lidocaine tape in hemodialysis patients. (2007). The Pharmaceutical Society of Japan. 127(11):1797-99.

Peters H, Moli F. (1995). Pharmacodynamics of a liposomal preparation of local anesthesia. *Arzneimittelforschung*. 45:1253-1256.

RGR Pharma, Ltd. Maxilene-4 & 5 product monograph. Windsor, Ontario. (August 2002).

Rx Files 8th ed. Drug Comparison Charts Pediatric Pain: Treatment Considerations. www.rxfiles.ca/rxfiles/uploads/documents/CHT-Pain-Peds.pdf

Smith DP, Gjellum M. (2004). The efficacy of LMX versus EMLA® for pain relief in boys undergoing office meatotomy. *J Urol*. 172:1760-61

Taddio A, Gurguis M, Koren G. Lidocaine-prilocaine cream versus tetracaine gel for procedural pain in children. (2002). *Ann Pharmacother*. 36:687-692.

Van Kan H, Egberts A, Rijnvos W, et al. Tetracaine versus lidocaine-prilocaine for preventing venipuncture-induced pain in children. (1997). *Am J Health Syst Pharm*. 54:388-392.

Watson AR, Symkiw P, Morgan AG. Topical anaesthesia for fistula cannulation in haemodialysis patients. (1998). *Nephrol Dial Transplant* 3:800-2.

Wehle B, Bjornstrom M, Cedgard M, Danielsson K, Ekernas A, Gutierrez A et al. Repeated application of EMLA® cream 5% for the alleviation of cannulation pain in haemodialysis. (1989). *Scand J Urol Nephrol* 23:299-302.

Wong D. (2003). Topical local anesthetics: two products for pain relief during minor procedures. *Am J Nurs*. 103:42-45.

Yip Am, Soin H, Taddio (2005) Review of a new topical anesthetic, liposomal lidocaine, for procedural pain in children. *CJHP*.58(3):148-150

Zempsky W, Cravero J, (2004). and the Committee on Pediatric Emergency Medicine and Section on Anesthesiology and Pain Medicine. Relief of pain and anxiety in pediatric patients in emergency medical systems. *Pediatrics*.114;1348-1353.

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4.0 Sponsors

This provincial guideline was developed to support improvements in the quality of vascular access care delivered to patients with chronic kidney disease in BC. Based on the best information available at the time it was published, the guideline relies on evidence and avoids opinion-based statements where possible. When used in conjunction with pertinent clinical data, it is a tool health authorities and health professionals can use to develop local guidelines.

Developed by a Vascular Access Working Group of multidisciplinary care providers from across BC, the guideline was approved by the Provincial Vascular Access Services Team, the BC Provincial Renal Agency Pharmacy & Formulary Review Committee and Medical Advisory Committees. It has been adopted by BCPRA as a provincial guideline.

5.0 Effective Date

November 18, 2011

- This guideline is based on scientific evidence available at the time of the effective date; refer to www.bcrenalagency.ca for most recent version.