




CITY OF HAMILTON
HEALTHY AND SAFE COMMUNITIES DEPARTMENT
Hamilton Paramedic Service

TO:	Chair and Members Emergency and Community Services Committee
COMMITTEE DATE:	May 16, 2019
SUBJECT/REPORT NO:	Intraosseous Needle Replacement (HSC19025) (City Wide)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Russell Crocker (905) 546-2424 Ext. 7739
SUBMITTED BY:	Michael Sanderson Chief, Hamilton Paramedic Service Healthy and Safe Communities Department
SIGNATURE:	

RECOMMENDATION

- (a) That Council approve the standardization of Arrow® EZ-IO® Intraosseous Vascular Access System manufactured and sold by Teleflex Medical Canada Inc., pursuant to the City's Procurement Policy, Section 4.14, Policy #14 – Standardization, until December 31, 2027;
- (b) That the Arrow® EZ-IO® Intraosseous Vascular Access System devices, components and accessories be obtained on a single-source basis from Teleflex Medical Canada Inc.;
- (c) That the Chief of the Hamilton Paramedic Service, or his designate, be authorized and directed to enter into and sign, on behalf of the City of Hamilton, all negotiated agreements and all necessary associated documents with Teleflex Medical Canada Inc., with content acceptable to the General Manager of Healthy and Safe Communities Department, and in a form satisfactory to the City Solicitor for the purchase of the Arrow® EZ-IO® Intraosseous Vascular Access System devices, components and accessories; and,
- (d) That a sum not to exceed \$100,000 be authorized to be charged to 2019 Capital Project ID 7641951102 to fund the initial acquisition of Arrow® EZ-IO® Intraosseous Vascular Access System devices, components and accessories, with all subsequent costs to be charged to the Paramedic Service Operating Budget.

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EXECUTIVE SUMMARY

Hamilton Paramedic Service has an obligation to not only treat patient's illnesses and injuries with efficiency and knowledge, but to ensure that treatments provided are done so in a humane way. With improvements in technology in obtaining circulatory access through a patients' bone, Hamilton Paramedic Service is recommending the replacement of its current manual intraosseous needle, to a more humane and efficient device being used throughout the health care community.

This would be accomplished by the purchase of the Arrow EZ Intraosseous (IO) Needle that allows for circulatory access that cannot be obtained by conventional means. This type of access in critically ill/injured patients, allows the paramedic to give potentially lifesaving medications or fluids that would otherwise not be possible.

The Arrow® EZ-IO® Intraosseous Vascular Access System is proprietary to Teleflex Incorporated and there are no alternative Intraosseous Vascular Access systems suitable for use on both adult and paediatric patients available on the market.

Currently, Hamilton Paramedic Service uses a manual device that has limited use to the paediatric population and a higher risk of inadvertent injury to the paramedic. The proposed device can be used on both adult and paediatric patients and due to the ease of use, poses less risk of injury to the paramedic.

This advancement in technology has been adopted by several paramedic services in Ontario including but not limited to the City of Guelph, Six Nations First Nation, County of Brant, The Regional Municipality of York, ORNGE, The Regional Municipality of Halton and the County of Middlesex-London.

In the 2019 Budget, Council allocated \$172,000.00 in annual Block Capital funding for end-life replacement of in-service Paramedic Service helmets through Project ID 7641951102 (Paramedic Helmet Replacement). The replacement helmet which was selected in consultation with the Joint Occupational Health and Safety Committee (JOHSC) complies fully with all standards and requirements but is significantly less expensive than the item it replaced; with the full replacement requiring less than \$30,000 of the allocated funding to complete.

It's proposed that up to \$100,000 of this approved funding be authorised to be expended to fund the initial procurement of Arrow® EZ-IO® Intraosseous Vascular Access System devices, components and accessories, with all subsequent costs to be charged to the Hamilton Paramedic Service Operating Budget. All remaining funds in Project ID 7641951102 will then revert to the appropriate reserve. As a result, there is no additional impact to the net levy.

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FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial: Initial roll out for this equipment has been estimated at approximately \$100,000 based on other paramedic service input. This cost is all inclusive and includes medical grade drills, needles, carrying cases and training devices. Once initial rollout is completed, needle replacement costs are comparable to the current needles being used. Drill replacement will be required at a cost of approximately \$300/unit, however the manufacturer states the drill is good for approximately 500 insertions or 10 years depending on a variety of factors. This cost is expected to be minimal as based on the numbers above, it is not expected that 500 insertions will be completed by any one paramedic and that in most cases the drill will be replaced at the 10-year mark provided optimal conditions are met.

This would prove beneficial in 3 ways:

- HPS could reprogram funds to a piece of equipment within its existing funding
- With both the I.O. needles and helmets purchased, there would still be a savings of \$50,000 to the tax levy
- Provide paramedics a piece of equipment that can be used to assist in the health and well-being of City of Hamilton residents

Staffing: There are no staffing implications associated with Report HSC19025.

Legal: Any agreements with Teleflex Medical Canada Inc., will be reviewed and approved for content by Legal Services.

HISTORICAL BACKGROUND

Hamilton Paramedic Service (HPS) is responsible for providing pre-hospital emergency care for people experiencing medical and/or traumatic injuries. With an annual call volume of approximately 70,000 events in 2018, HPS has seen an average increase of 5% per year during past years.

Advance Care Paramedics (ACP's) are specially trained to provide additional care that Primary Care Paramedic's (PCP) cannot under *Ambulance Act Regulation 257/00*. Although the conditions in which these medical procedures are infrequent, the ability to perform it in the pre-hospital care environment may result in a life being saved. To ensure continued proficiency in these specialized medical procedures, there are two key components that must be considered:

- Adequate initial and continued training
- Type of equipment used

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As one of the original paramedic services to employ ACP's in the Province of Ontario, HPS has long been considered a leader in paramedicine and must continue to keep pace with other paramedic services in Ontario to ensure optimal care for its residents.

Intraosseous (I.O.) infusions have long been utilized in the pre-hospital care environment on paediatric patients, when intravenous (IV) initiation is difficult due to a variety of physiological factors. As a result, I.O.'s are routinely used on critically ill paediatric patients when drug and/or fluid administration is required. In more recent times, this procedure is used routinely on adults, where IV initiation is difficult or not possible.

The I.O. procedure has historically been performed manually, using a large needle with a “cork screwing” motion to insert it into the patient’s bone. Completing this procedure manually is sometimes difficult on paediatrics, because of the increased movement of the limb while “cork screwing” the needle (as shown in diagram 1). This can also cause an inadvertent larger diameter hole being created which in turn can cause displacement of the needle. In addition to this, adult bones are “calcified” and therefore much harder in comparison to paediatrics, making the use of manual I.O. needles on this population not possible. Finally, due to the exposed needle and “cork screwing” action during insertion, there is a higher likelihood of inadvertent needle stick injuries to ACP's and the related exposure to blood borne pathogens.

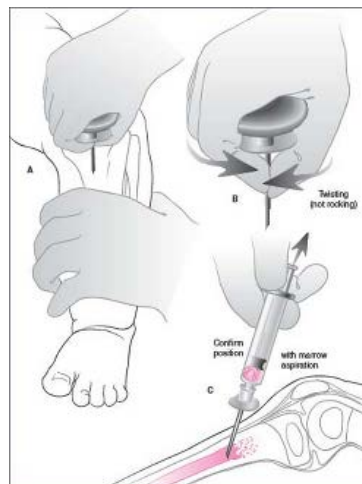
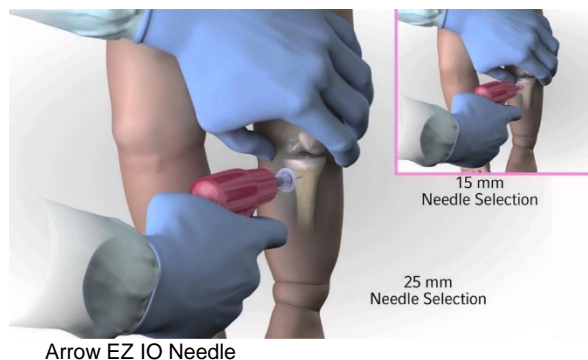


Diagram 1
Cook Medical IO Needle

In more recent times, the medical community has introduced much safer and more humane equipment to complete I.O. insertions. This involved the use of a medical grade drill and refined needles (as shown in diagram 2) that increase the success of the procedure in the following ways:



Arrow EZ IO Needle

1. Less likely to cause injury to the paramedic during the procedure because of the absence of the “cork screwing” motion being replaced by a drill
2. Less discomfort on the patient, as the drill can insert the needle within seconds, not minutes
3. Reduction in delay of venous access to administer fluid or drugs because of the procedure being completed within seconds

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4. Increased comfort level of the paramedic performing the procedure and therefore increased success of the procedure as the tactile application of the equipment is much simpler¹

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

The proposed EZ Intraosseous Needle meets the requirements of the Ministry of Health and Long Term (MOHLTC) Land Ambulance Equipment Standards. In addition to this, they do meet all Health Canada standard for use on patients.

By-law 17-064 Procurement Policy, Section 4.14, Policy #14 – Standardization requires Council approval for any standardization of a Good where the standard results in a single source purchase of \$10,000 or greater.

RELEVANT CONSULTATION

The Centre for Pre-Hospital Education and Research (CPER) that is responsible for providing medical oversight and paramedic certification, has approved this piece of equipment for use.

Corporate Finance, Procurement Section has been consulted with respect to adherence to the City's Procurement Policy and have provided comment on this report.

ANALYSIS AND RATIONALE FOR RECOMMENDATION

I.O. initiation is a widely used and accepted practice in the medical and military communities for establishing venous access in critically ill or injured patients. Historically these needles have been manually inserted, which may have impeded the efficiency and safety of both the paramedic and the patients.

The Ministry of Health and Long-Term Care (MOHLTC) Provincial Equipment Standards for Ontario Ambulance Services standard regulates the specifications and quantities of equipment that must be carried on paramedic vehicles. Currently HPS uses the Cook I.O. needle, which meets regulatory requirements and therefore poses no immediate risk of being in violation of the legislation. After consultation of the applicable standards, it is confirmed that the proposed Arrow EZ-IO would also meet the required regulations set forth by the MOHTLC.²

¹ Centre for Pre-Hospital Education and Research. (2018, December 1). Advanced Care Paramedic - Medical Directives. Hamilton, Ontario, Canada

² Helm M, H. B. (2015, December). EZ-IO intraosseous device implementation in german Helicopter Emergency Medical Service. *Resuscitation*, 43-7

The current Cook I.O. needle that is used by HPS can only be used on paediatrics that are <2 years of age. As a result, this does limit the paramedics options in obtaining venous access on patients >2 years of age, where IV initiation may be difficult or not possible.

In a recent review of 196,993 electronic patient care records (ePCR's), there were 330 (0.17%) cases where I.O. was attempted. It should be noted that these numbers reflect only paediatric attempts, as the current devices do not allow for use of person's >2 years of age. The intraosseous usage by paramedics chart is attached as Appendix "A" Report HSC19025.

As a result, it is suggested that the use of this procedure is limited and any additional assurance including continued training/familiarization of this procedure and improved equipment would be beneficial to ensure competence and confidence by paramedics.³ In the past 10 years, advancements in I.O. technology for use by health care professionals including paramedics has assisted to eliminate the problems noted above. The Arrow EZ-IO is a device that uses a medical grade drill to insert I.O. needles in both paediatric and adult populations. This type of technology is now routinely used in both the hospital and military environments due to the efficiency, reduction in training costs and success of the procedure in using this device.

It should be noted that there are no clinical differences between the infusion of fluid or the administration of a drug via I.O. versus IV⁴. As a result, if IV initiation cannot be completed, the Advance Life Support Patient Care Standard (ALSPCS)⁵ recommends the use of I.O. as an alternative route of venous access. In addition to this, the Centre for Pre-Hospital Education and Research who provides medical oversight for HPS, has only endorsed the use the Arrow EZ-IO for use on patients, which is currently being used by Guelph, Six Nations, Brant and Dufferin County Paramedic Services.

Although rare, complications of I.O. insertion by manual or EZ-IO device remain the same which include:

- Undetected extravation
- Fracture of the bone
- Fat or air emboli
- Soft tissue injury
- Compartment syndrome

³ MOHLTC - Emergency Health Regulatory and Accountability Branch. (2018, May 1). Provincial Equipment Standards for Ontario Ambulance Services. Toronto, Ontario, Canada: Queens's Printer for Ontario

⁴ Ohchi, K. N. (2015). Comparison of mechanical and manual bone marrow puncture needle for intraosseous access; a randomized simulation trial. *Springer Plus*

⁵ Smith S, B. B. (2016). The effects of sternal intraosseous and intravenous administration of amiodorone in a hypovolemic swine cardiac arrest model. *American Journal of Disaster Medicine*, 11:271

ALTERNATIVES FOR CONSIDERATION

None

ALIGNMENT TO THE 2016 – 2025 STRATEGIC PLAN

Healthy and Safe Communities

Hamilton is a safe and supportive city where people are active, healthy, and have a high quality of life.

Our People and Performance

Hamiltonians have a high level of trust and confidence in their City government.

APPENDICES AND SCHEDULES ATTACHED

Appendix “A” to Report HSC19025: Intraosseous Usage by Paramedics

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Intraosseous Usage by Paramedics

Year 2016	111
CTAS 1-Resus	111
Cardiac/Medical Arrest-(01)	99
350 - IV Cannulation Unsuccessful	96
358 - Intraosseous Cannulation Successful	4
Post Arrest-(55)	12
350 - IV Cannulation Unsuccessful	12
Year 2017	116
CTAS 1-Resus	116
Cardiac/Medical Arrest-(01)	95
350 - IV Cannulation Unsuccessful	93
358 - Intraosseous Cannulation Successful	4
359 - Intraosseous Cannulation Unsuccessful	1
Post Arrest-(55)	21
350 - IV Cannulation Unsuccessful	21
Year 2018	103
CTAS 1-Resus	103
Cardiac/Medical Arrest-(01)	76
350 - IV Cannulation Unsuccessful	67
358 - Intraosseous Cannulation Successful	6
359 - Intraosseous Cannulation Unsuccessful	4
Post Arrest-(55)	27
350 - IV Cannulation Unsuccessful	27
Grand Total	330