Standardization of Paramedic Services Automatic Mechanical Cardiopulmonary Resuscitation (CPR) Devices

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Recommended by:	General Manager of Community Safety

Report Summary

This report provides a recommendation regarding entering an eight-year sole source contract with ZOLL Medical Canada, Inc., with a possible two-year extension, for the purchase of AutoPulse Compression devices for the Emergency Care and Transport Section of Paramedic Services. The AutoPulse is ZOLL'S mechanical CPR device which provides high-quality compressions that can continue through treatment and transport of the cardiac arrest patient and is compatible with the Services' ZOLL monitor defibrillators.

Resolution

THAT the City of Greater Sudbury approves the standardization of the ZOLL AutoPulse® Compression devices, components and accessories manufactured by ZOLL Canada Inc., pursuant to Procurement Policy #14 – Standardization, until December 31, 2032;

AND THAT the General Manager of Community Safety, be authorized to negotiate, enter into, and execute any required Contract and any ancillary documents required to give effect thereto with an authorized distributor in a form satisfactory to the City Solicitor, as outlined in the report entitled "Standardization of Paramedic Services Automatic Mechanical Cardiopulmonary Resuscitation (CPR) Devices" from the General Manager of Community Safety, presented at the Community and Emergency Services Committee meeting on September 9, 2024.

Relationship to the Strategic Plan, Health Impact Assessment and Climate Action Plans

The standardization of mechanical CPR devices in accordance with this report can improve patient outcomes as a direct result of the clinical technologies described in this report, while also reducing the risk of injury of our paramedics who can remain seated and belted while perform patient care in a moving ambulance.

This report refers to operational matters and has no direct connection to the Community Energy & Emissions Plan.

Financial Implications

The budget to purchase the mechanical CPR devices of $391,000 was approved by Council during the 2024 budget process and is funded through the Capital Financing Reserve Fund – Paramedic Services. The

contribution to the reserve is shared between the City and the Province. Operating costs, estimated at $110 per cardiac arrest where the devices are used, will be funded within the existing operating budget for Paramedic Services.

Background

Greater Sudbury Paramedic Services is responsible for providing pre-hospital emergency care for people experiencing medical and/or traumatic injuries including cardiac arrest. Over the past several years (Table 1) Greater Sudbury Paramedic Services has responded to an average of 182 cardiac arrests per year, a rate of 1.13 per 1,000 population per year.

	Cardiac Arrest or Post Arrest	**Transported Code 4 (Lights and Sirens to Hospital)**
2019	170	99
2020	194	106
2021	184	95
2022	176	93
2023	187	106

Table 1 (Source: Interdev Analytics)

Both Primary Care Paramedics (PCP) and Advanced Care Paramedics (ACP) are specially trained to provide additional care to cardiac arrest patients such as advanced cardiac life support including manual rhythm interpretation and manual defibrillation. The quality and consistency of chest compressions performed during CPR has been demonstrated to impact both the return of spontaneous circulation and patient discharge from hospital following a sudden cardiac arrest.

Greater Sudbury Paramedic Services evaluated the two most widely used mechanical CPR devices in Canada and worldwide, the Stryker Lucas and the ZOLL AutoPulse®. Both Mechanical CPR devices are certified for use by Health Canada and align with the most recent guidelines from the Heart and Stroke recommendations for resuscitation regarding mechanical or automated CPR devices.

Greater Sudbury Paramedics have performed classroom and actual clinical evaluation of the two approved mechanical chest compression devices to explore the feasibility of implementation and the interoperability with the current other medical and technical devices already in use within the Paramedic Service. Quantitative and qualitative data were collected. Clear preference was expressed by paramedics involved in the evaluation for the ZOLL AutoPulse CPR device.

Equipment Compatibility

Greater Sudbury Paramedics currently use the ZOLL X-Advance cardiac monitor. Evaluation criteria included compatibility and ease of data capture of the automated CPR device on this monitor.

ZOLL NXT

The ZOLL AutoPulse® NXT CPR board works wirelessly to integrate with our existing monitors the ZOLL AutoPulse® also utilizes what is called “ShockSync” technology. These technologies work together to wirelessly calculate the optimal time when the heart is best able to respond to paramedic treatments such as defibrillation of the heart at the least measured impedance. This enhancement will allow paramedics to align with the most current American Heart Association guidelines, of almost no “hands off” time. The ZOLL AutoPulse® board and ZOLL X-Series monitor will also allow for Greater Sudbury Paramedics to integrate CPR Feedback/Defibrillation data into its existing ePCR ZOLL data platform Code Review. The addition of the AutoPulse® to the existing cardiac monitoring technology and resuscitation data recorded would allow for a more robust and integrated call review for quality assurance (QA) and quality improvement (QI) purposes and patient outcome data.

Lucas 3.1

The Lucas 3.1 also aligns with the most current American Heart Association guidelines for mechanical CPR and the Lucas can provide Greater Sudbury Paramedic Service with Wi-Fi and Bluetooth data retrospectively. Feedback can be uploaded after a call to the PhysioControl cloud platform for review. The Lucas 3.1 currently has no compatibility with our existing ZOLL cardiac monitors. The CPR and call information would be housed virtually on a PhysioControl platform and for QA/QI would need to retrospectively be merged individually with the data files from our current cardiac monitor. This could prove laborious and difficult to reconcile for Greater Sudbury Paramedic Services at this time.

Patient Movement and Ease of Use

Both the Lucas and the AutoPulse® were evaluated by Greater Sudbury Paramedics. Testing and evaluation included movement through a variety of scenarios including elevators, hallways, stretcher loading, and movement in and out of the ambulance. Both the Lucas and ZOLL mechanical CPR devices proved to do an efficient and equal job of providing adequate mechanical CPR in a static position on the ground or the stretcher. However, when evaluated by Greater Sudbury Paramedics the devices in patient movement such as up/down the stairs or to ambulance the AutoPulse® was rated as superior by the testing paramedics. The ZOLL AutoPulse® had less movement errors or conveyance errors and fewer interruptions in compressions requiring physically resetting, or properly aligning the device. This reduced “hands off” time.

Although the ZOLL has a larger footprint (21.98 lbs. weight) vs Lucas (weight of 17.6 lbs.), it has an integrated movement or conveyance device attached. The Lucas required the use of a secondary conveyance device such as a backboard or scoop (18 lbs. scoop and 19 lbs. longboard), or another stretcher device. This requires paramedics to utilize an additional piece of equipment separate from the Lucas. From a paramedic operating perspective this adds additional equipment needed to be brought to the patient’s side and the overall weight carried by paramedics. Research and other evaluations show that securing the patient to the Lucas and then a secondary device to be difficult, time consuming and did not provide a good lifting base or ergonomic way of getting the patient up/down the stairs and out to the stretcher. Alternatively, paramedics would have to wait until the patient was on the stretcher to apply the device. Paramedics have noted they were not able to adequately secure the patient to the device and the cross-body strapping technique to safely restrain the patient could not be used effectively. The ZOLL proved easier to use when it came to smaller and tighter areas of extrication as the legs could be “dropped” while still providing adequate safe extrication.

Conclusion

Upon review of the automatic mechanical CPR devices, there are only two Health Canada authorized devices available, the preferred ZOLL device and the Lucas device. Purchasing the Lucas device would result in additional cost and activities for quality assurance and quality improvement as it does not integrate with the current cardiac monitor defibrillator. Further, the clear preference in field evaluation and testing from the involved paramedics was for the ZOLL AutoPulse® NXT-CPR board. The recommendation is to standardize on the preferred device.

Resources Cited

Prehospital Evidence-Based Practice - General Cardiac Arrest Care

https://emspep.cdha.nshealth.ca/LOE.aspx?VProtStr=General%20Cardiac%20Arrest%20Care&VProtID=132