Chest compression effectiveness with vs without feedback

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Abstract

The objective of this experiment is to assess clinician perceived versus actual compression quality, and to evaluate the impact of using feedback from the Laerdal CPRMeter2 on compression quality. In our setup, we have a total of eighty four participants (43 from the Royal Alex and 41 from the Misericordia hospital). We monitored CPR quality based on the guidelines by Heart and Stroke, which breaks down chest compression effectiveness into three areas- Release, Depth and Rate. Proper Guidelines: Compress the chest at least 5cm (2inches); Compress at a rate of 100 to 120 beats per minute; Allow the chest to recoil completely after each compression. Clinical Setup: A convenience sample of participants performed two minutes of uninterrupted chest compressions on a Laerdal Resusci Anne with a CPRmeter2 on top without feedback, followed by a two minute rest period to fill out a Q.I tracking form. They later repeated the two minutes of chest compressions with the display of the CPRmeter uncovered, with the feedback visible. The chest compression metrics from the trials were compared using a data tracking form. From the data collected, enough evidence shows that the CPRmeter2 is able to improve release, rate and overall CPR quality. After filling out the survey, all of the nurses agree that the device is very useful in giving feedback and should be used in future CPR classes. Furthermore, data collected from the Q.I tracking forms indicates that nurses and other health clinicians are inadequate in predicting their own CPR abilities. Often times, nurses would either overpredict or underpredict their scores on the CPR meter.From the data gathered, the CPRmeter2 is going to be used for training in future CPR classes. Just recently, the device has been incorporated into code calls in the emergency department at the Misericordia. A T-test was done on the findings from the experiment to test if the means of two sets of data are significantly different from each other. Based on our findings, the t-test values for rate, release, and overall quality are statistically significant, meaning that the null hypothesis is rejected.

Key words:
CPR, chest compressions, cardiac arrest

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Introduction

Background

- Cardiac arrest is a sudden loss of heart function resulting in death.
- About 40,000 cardiac arrests happen in Canada (one every 13 minutes)
- Effective chest compressions provide provide circulation to the body and brain, and increase patient survival
- The Misericordia Community Hospital (MCH) and Royal Alexandra Hospital (RAH) Emergency Departments (ED) are trying to increase patient survival by improving chest compression effectiveness

Objectives

- Evaluating the effectiveness of ED staff chest compressions with and without feedback using the Laerdal CPR Meter2.
- Compare nurse experience/training to their ability to accurately self-monitor chest compression quality.

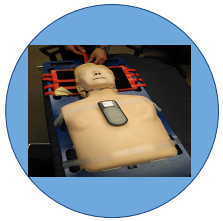
Methods

1. Do two minutes of chest compressions without feedback from device.
2. Fill out QI tracking form.
3. Do two minutes of chest compressions with feedback from device.
4. Record Data on Excel.

In the experiment, we have clinical staff perform two separate trials of chest compressions on a CPR mannequin for two minutes.

1. Do two minutes of chest compressions without feedback from device.

2. Fill out QI tracking form.



3. Do two minutes of chest compressions with feedback from device.

4. Record Data on Excel.

Figure 1: Clinical setup for nurses

Results

Data Collected at Hospital Sites

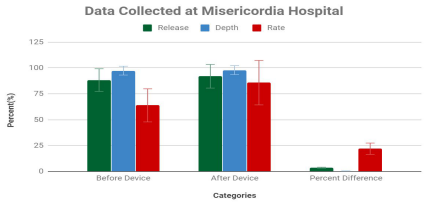


Figure 2: The data collected from the Misericordia Based on the results every category improved and overtime there was a lower standard deviation score.

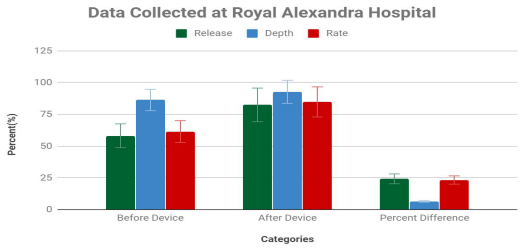
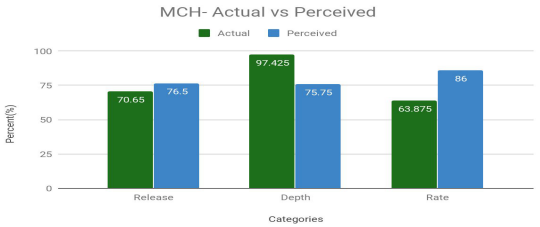


Figure 3: The data collected from the Royal Alexandra. Based on the results every category improved and overtime there was a lower standard deviation score.



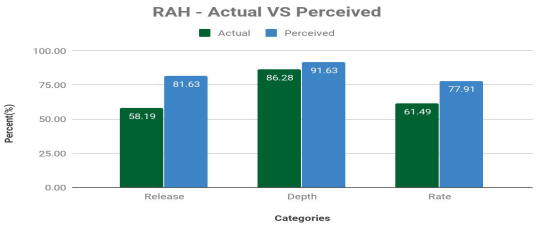


Figure 4: Actual vs Perceived values for Royal Alexandra Hospital.

Discussion

Statistical Significance and Survey Results

Participant Survey Results	
Average Years of Training	11.84682469
Frequency of giving CPR	Some What Frequently
Self Evaluation of CPR Ability	Intermediate to Advanced
Opinion on CPR Meter	Very Useful

Figure 5. Survey Form Results

Summary of Data Collected from the Two Hospital Sites					
Hospitals	Comparison	Release	Depth	Rate	Overall Score(%)
Misericordia Hospital	Before	88.31	97.43	63.88	83.2
	After	91.95	97.88	85.83	91.88
	C.I	12.41577	4.380537	25.0506	13.94896897
	T-Test	5.06E-05	0.352042	0.000423	1.22275E-06
Royal Alexandra Hospital	Before	58.19	86.28	61.49	68.65
	After	82.42	92.77	84.83	86.67
	C.I	16.05531	9.726834	13.99063	13.25759237
	T-Test	6.6E-08	0.022112	4.16E-06	0.000000066

Figure 6: Summary Data from both Hospital Sites.

- Feedback improves chest compression release and rate.
- Feedback does not result in statistically significant improvements in depth.
- The CPR Meter2 will be used at the MCH and RAH in the future.

Conclusion

- Clinicians cannot accurately self-monitor chest compression quality.
- Feedback data can be used in training and clinical practice.
- Feedback improves release and rate and overall chest compression quality.
- All participants described the device was useful.
- T-Test analysis demonstrates proves statistically significant improvements in chest compression quality.

References

1. Regular Heart vs Cardiac Arrest Heart, accessed August 5, 2019 https://medicalxpress.com/news/2019-02-aha-news-heart-stopping-drama-on-screen.html
2. Heart Model, accessed August 5, 2019 http://nirmanhitech.com/cardiac-ct.html
3. T-test, accessed August 5, 2019 https://www.investopedia.com/terms/t/t-test.asp

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