



# REMOTE PATIENT MONITORING - ENGAGING PATIENTS AND IMPROVING COMPLIANCE

Presented by:  
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EVP/Co-founder  
Cloud DX

[clouddx.com](http://clouddx.com)

- **RPM for 8 years**
- **Former Dir. Biz Dev/Trapollo**
- **Involved in some of the largest RPM deployments in USA**
- **Have deployed 1,000's of kits to 10's of thousands of patients**
- **Co-founder Cloud DX 2014**

### Cloud DX

- **Top Tier Vendor in RPM - Full Stack FDA Cleared RPM Solution**
- **Winner Qualcomm Tricorder XPrize - Bold Epic Innovator Award**
- **Endorsed by Canadian Medical Association**
- **Showcased at Microsoft Center of Excellence/Boston**
- **Seen on Smithsonian Channel/Building Star Trek 50 years later**
- **Seen on Discovery Channel/Daily Planet**
- **Canadian Innovation Exchange Top 20**
- **AARP Top 50 Innovation Leader**
- **Seen on TedX Toronto**

# CLINICAL VALIDATION

## Quality Management System

Fully staffed Compliance Department

## Regulatory Clearance

### ISO 13485

Cloud DX Inc. Quality Management System is certified to meet ISO 13485 Standards for medical device manufacturers

### Health Canada

Cloud DX Inc. is licensed by Health Canada as a Medical Device Manufacturer. MDML 70264

### FDA Clearance

Pulsewave® has been cleared by the FDA as an automated blood pressure & pulse rate monitor with computer controls. 510(k) K122443



**HEALTH  
CANADA  
LICENSED**

**FDA  
CLEARED**

# CLOUD DX AWARDS

WINNER



CANADA'S  
MOST  
INNOVATIVE  
COMPANIES



2017  
CONVERGENCE  
AWARD



WT  
INNOVATION  
WORLD CUP



2015 - Winner 2<sup>nd</sup> Place  
2016 - Finalist



VOTED  
BY AARP  
READERS



2015 - Winner  
Startup of the Year



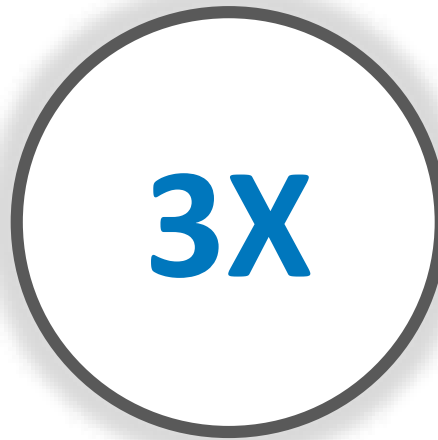
BIGGEST  
UPSIDE  
POTENTIAL  
AWARD

# THE INDUSTRY

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**Healthcare at Home  
is expected to be the  
fastest growing  
industry through  
2024**



**Remote patient  
monitoring industry  
is poised to triple in  
value over the next 3  
years**



**CMS  
Unbundles CPT  
Code 99091 for  
RPM  
CPT 99490 for  
CCM**

## THE CONNECTED HEALTH KIT



## THE CLINICAL MONITORING DASHBOARD





# WEB & MOBILE PORTALS



**Physician dashboard** can track up to 1,000 patients simultaneously.

View at [pulsewavedx.com](http://pulsewavedx.com)

- User name: **DoctorDemo**

- Password: **DoctorDemo**

**Consumer dashboard** delivers 6 vital signs including our unique Cardiac Anomaly Detector.

View at [pulsewavedx.com](http://pulsewavedx.com)

- User name: **Demo1**

- Password: **Demo1**

# How to Design a Successful Remote Patient Monitoring Program





# DETAILS AND WORKFLOW

Financial ROI Reporting	Lost Equipment	EMR Integration	Device Infestation	
	FDA Device Recalls	Inventory Control	Data Analytics	Clinical Work Flow
Shipping Logistics	Vendor Management	Patient Education	Management of FDA Regulated Devices	
	Cellular, WIFI, POTS, Bluetooth	Patient Support	Legal & Compliance	Patient Adherence
Device Sanitize and Repackaging	Device Deployment Models	Device Recovery Models	HIPAA Compliant Clouds Apps.	
	Device Quarantine and RMA Management	Lease vs. Buy vs. Rent	Monitoring Model	Technical Support
Vendor Financial Stability	Patient Selection Criteria	Enrollment Sources & Processes	Reimbursement	
	Device Logistics	Conditions To Be Monitored	Monitoring Model	Technology Selection

# A SUCCESSFUL RPM PROGRAM

## *WHAT ELEMENTS ARE ESSENTIAL?*

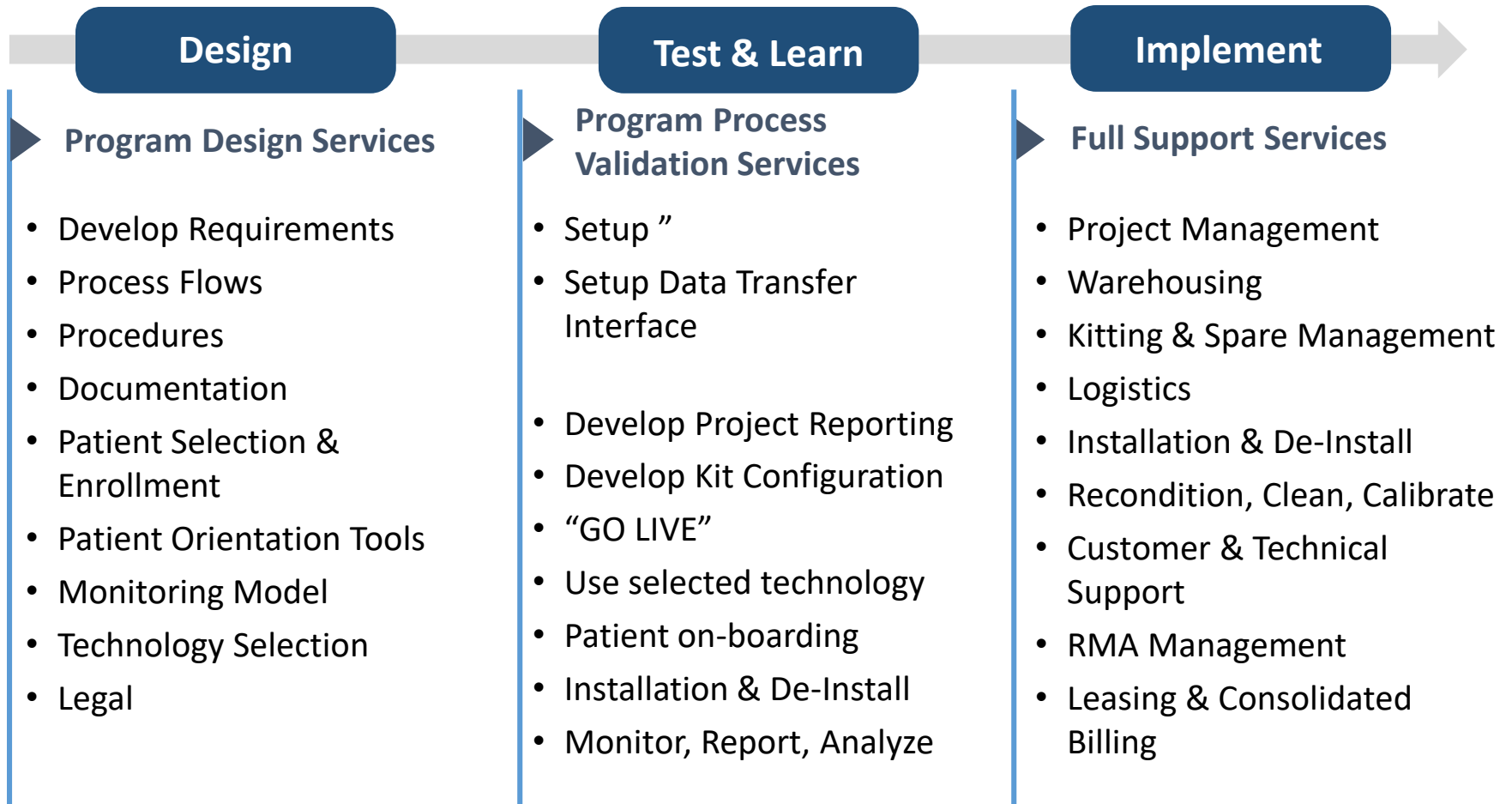
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- Goal Setting and Developing a Sustainable Model
- Patient Selection Criteria
- Enrollment Sources & Processes
- Deployment Model
- Monitoring Model
  - Adherence
  - Clinical
- Technology Selection
- Technical and Customer Support
- Device Recovery and Recycling
- On-going Measurement and Reporting:
  - Data Collection:
    - Clinical
    - Operational
- Project & Program Management Reporting



# A WELL DEVELOPED PROCESS

*WHAT STEPS TO TAKE?*



# ALL THE MOVING PIECES

*ARE YOU PREPARED?*

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## PATIENT ENROLLMENT CHALLENGES

- On average as high as **30%** of patients who initially agree to the program, will decide not to participate prior to installation of the equipment
- Over 24 months of **10,900** patients enrolled in nationwide RPM programs, **3,400** requested to cancel after their initial consent.

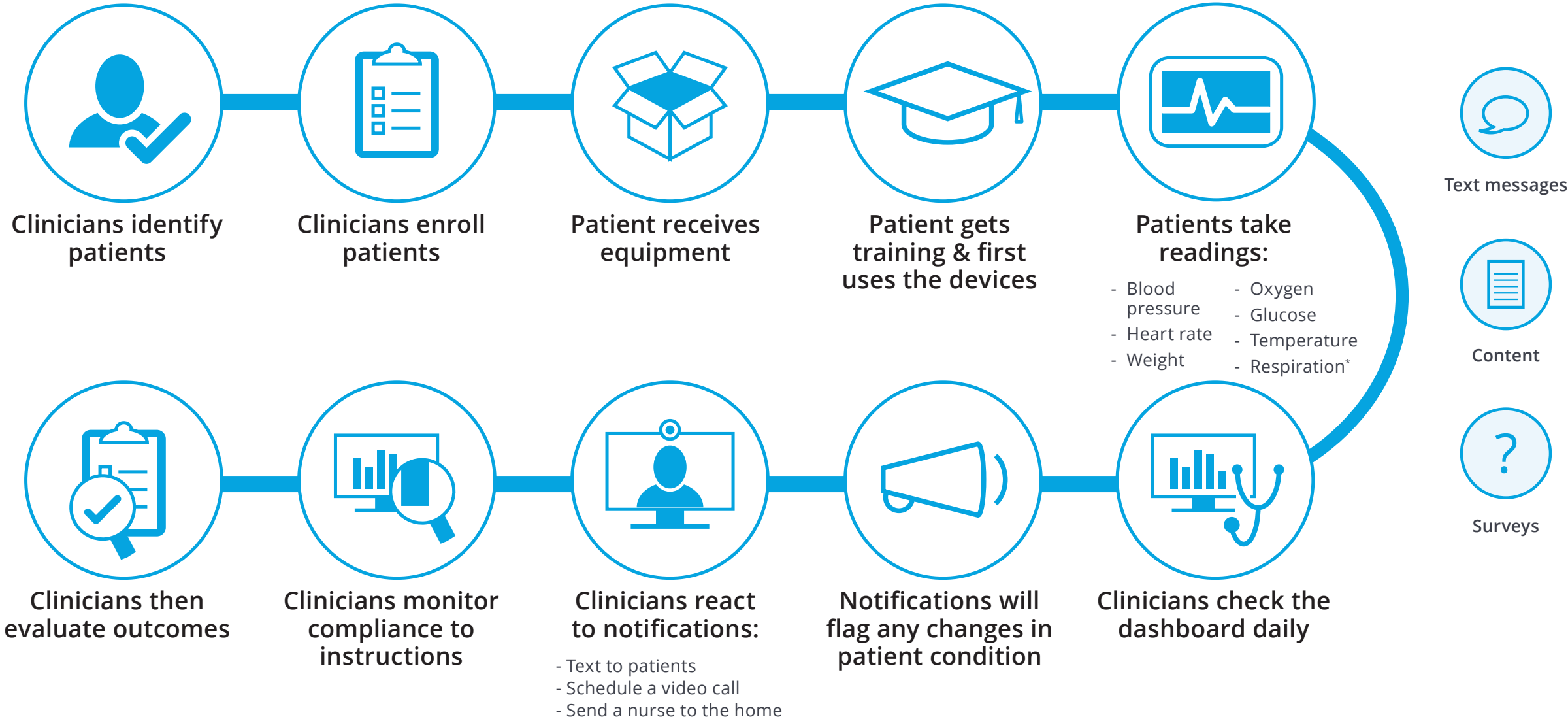
## CALL VOLUME CHALLENGES

- A total of **122,119** non-clinical calls were made in support of **10,986** patients over a 12 month period.
- That's an average of **11 non-clinical calls per patient** throughout their time on monitoring.
- A recent program required **7,714** calls non-clinical calls to support **434** patients in **1** year alone.

## PATIENT SUPPORT CHALLENGES

- **530** patients generated **1,150** support tickets in one month.
- **398** support tickets were device or software related.
- **752** were related to contact information requests, scheduling issues, information requests, and other program related questions.

\*Details above provided by Trapollo



\*in beta testing - final validation 2018



# RPM FAILURES - NOT ANY MORE



### Device kits are too expensive

Standard remote monitoring kits are based on off-the-shelf medical devices and old-fashioned internet gateways. These kits can cost up to \$1,500 per patient.

**Cloud DX Connected Health Solutions** for Remote Monitoring are priced 60% to 80% lower than the competition



### Devices are intimidating

Medical devices are no fun to use. Arm cuffs are uncomfortable. Interfaces are monochrome, and very technical. The implications are discouraging.

**Cloud DX Connected Health devices & software** are futuristic, bright, colorful and easy to use. They speak to an optimistic outcome.



### Vital Sign Data is not integrated

Typically vital signs are gathered one at a time, written down & (often but not always) typed into the patient record. Errors are all too common.

**Cloud DX vital signs** are generated in the cloud and are available via secure API. We integrate with major EMRs and care coordination solutions.



### Data Provenance Issues

Across the care continuum, devices are not calibrated against each other. Patient-generated data is rarely trusted by doctors.

**Cloud DX Connected Health Kits** are designed to work together in the clinic and at home; raw signals are analyzed and compared in the cloud ensuring result accuracy.



### Primitive Devices and Data

Current systems integrate basic data from primitive devices that provide little insight.

**Cloud DX** procures raw data from sensors on our platform that can be mined to produce a number of insights, both diagnostic and predictive, on individual health.

# BENEFITS FROM RPM



## Improves Outcomes

- Better Patient Adherence
- Early Complication Warning
- Patient Ownership



## Saves Money

- Admission and Re-Admission Reduction
- Reduces Transportation Cost
- Creates Staff Efficiency



## Generate Revenues

- Frees up Hospital Bed Space by Reducing Length of Stay
- Increase the Number of Patients that can be Managed



## Delivers ROI

*When Used Effectively*

- ROI's of over 200% achieved
- Scales Quickly
- Clinical Adoption

# WHY TELEHEALTH WITH REMOTE MONITORING?



### Patient Engagement & Education

Cloud DX technology enables connection between patient and care team. Patients say that using Cloud DX Connected Health makes them feel more in control of their health, learning how to cope better with chronic illness and gaining **peace of mind**. These benefits have increased patient engagement up to 90% and user **satisfaction** to 100% in recent studies .



### Early Warning of Changes to Vitals

Clinicians & patients **receive early warning** that a condition has deteriorated, even if the patient doesn't feel any symptoms. Intelligent Cloud DX software looks for **patterns in vital sign data** that indicate a real change, not a false alarm. Patients learn to recognize "normal" and become adept at tracking health changes, freeing up clinician resources.



### Lowest-cost Interventions eg: Homecare

Once notified, the care team can **intervene quickly** eg: with a homecare nurse visit, an urgent care center appointment or a telehealth video consult. Delivering care early means fewer ER visits, fewer hospital admissions, shorter hospital stays and **dramatic cost savings**. Studies show that patients also get better faster, and die less often.



### Better Outcomes

Cloud DX **evidence** of better outcomes continues to grow: a patient's need for supplemental oxygen was uncovered; another patient **avoided major organ failure** due to early warning by Cloud DX; yet another patient's crippling edema was brought completely under control with remote monitoring and timely intervention. There are many additional examples.

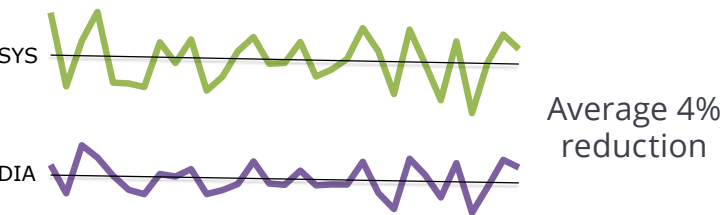


# CASE STUDIES

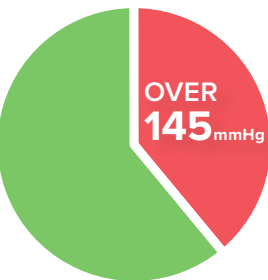
# OUR RESULTS

## Improved Outcomes

Reduced Average BP in a 40 Patient Cohort in Ontario Canada



Detected Accurate Percentage of Hypertensive Users in Large Population Health Study



**38.74%**  
Systolic Over 145mmHg  
= Hypertension

**121/74** mmHg  
Avg Blood Pressure  
in Ontario in 2015

## Testimonials



*"Pulsewave® detected an irregular heart beat, quickly and non-invasively revealing a serious heart condition!"*

– Anil Gupta, MD  
Cardiologist, Toronto, ON



*"I am using Pulsewave® remote monitoring in my practice and I have been impressed by the results."*

– Sandy Sharma, MD  
Obstetrician, Oakville ON

## Academic Studies

Qualitative Assessment of a Non-Invasive Vital Sign Monitor with Secure Home-Based Video Conferencing Patient Engagement Platform:  
The e-Clinic Pilot Study - 2015

Medication detection via bio-signal analysis – An initial study conducted at UNB with caffeine administration - 2016

Assessment of the Non-Invasive Pulsewave Health Monitor for Blood Pressure Determination in a Clinical Setting of Cardiovascular Catheterization - 2015



Ontario Health Region

CHF & COPD Deployment	n=38	
Duration	6 months	
Age distribution	54-97 years	
Care plan adherence	Previous <b>67%</b>	Cloud DX <b>91%</b>
Estimated ER visits avoided	<b>2</b>	
Estimated admissions avoided	<b>6</b>	
Patient satisfaction	<b>&gt;90%</b>	

*“My CHF patients are now better able to manage their condition. They know what to look for and they know what to do if their vital sign readings indicate a deterioration in their health.”*

– Shannon, RN

RECENT RESULTS



Geriatric RPM Pilot	n=37
Duration	90 days
Age distribution	55-75 years
Multiple co-morbidities: arthritis, cancer, asthma, lung disease, diabetes	
Before pilot:	
“Technology makes me nervous/uncomfortable”	36%
After pilot:	
“I want to keep using Cloud DX technology; I am confident”	100%

*“Patients reported an increased awareness of their condition and felt more comfortable managing their care at home, with the added security of remote monitoring; we were pleased to report a 100% satisfaction rating with all participants expressing a desire to keep the equipment in their home after the pilot ended”*

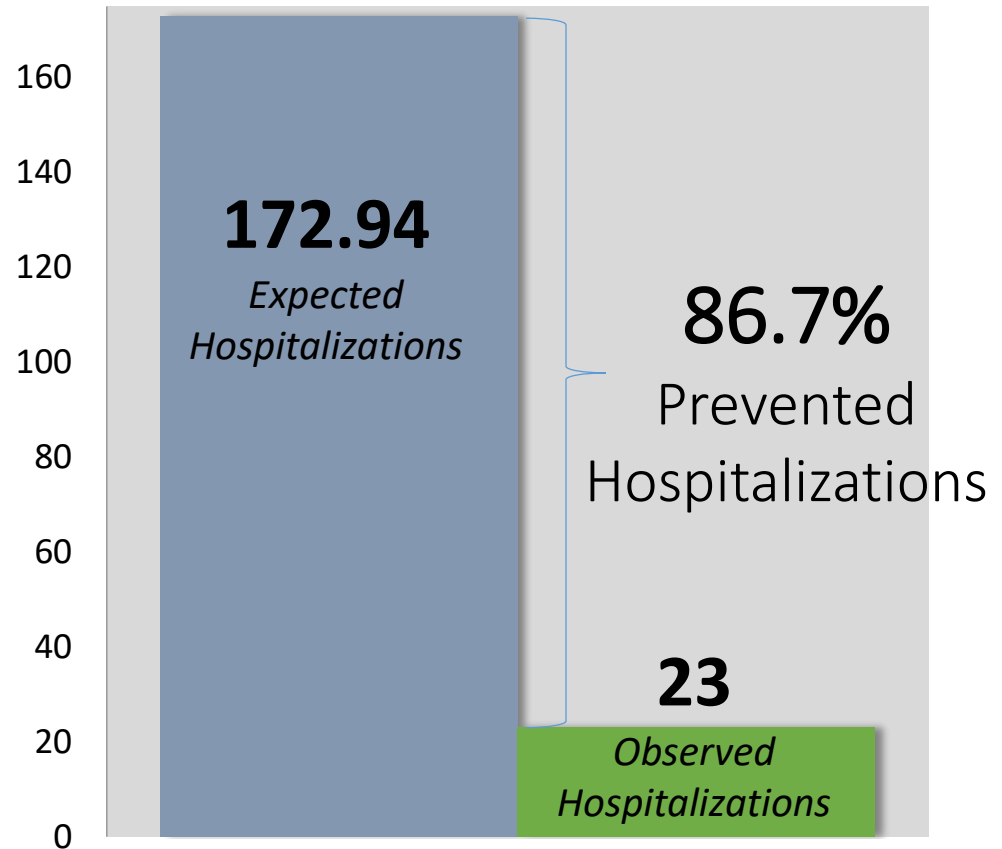
*– Sarah Rhoads, PhD, DNP, APRN*

# PATIENT'S HOSPITALIZATIONS

ANTICIPATED VS. REALIZED

- ✓ Fifteen month period
- ✓ Reviewed 122 patients

***Saved more than  
\$7.4 million in  
healthcare charges***



***“The Cloud DX Connected Health Kit was instrumental in saving my life; I had no obvious symptoms, I just didn’t feel well. The oximeter identified a pulse rate of 197/beats per minute. I went to the hospital immediately where I was diagnosed with ventricular tachycardia, a side effect from a new medication.”***

*– William L, 66, Cambridge ON*

*“I felt very secure, and very, very comfortable knowing someone was looking out for me. I knew I would get a call if I had a problem. I also noticed that hospital visits were much more efficient, I was seen faster and I was taken more seriously because I had this information with me. The thought of not having the equipment now actually makes me incredibly anxious”*

*– Jeannine O, 75, Cambridge ON*



## PATIENT TESTIMONIALS

*“Pulsewave Dx is a truly amazing product, easy to use and accessible online. It was a lifesaver for me! During my first obstetrician visit, Dr Sharma provided me with the Pulsewave blood pressure monitoring kit as part of my prenatal care. Within minutes I was set up to have my blood pressure routinely monitored from home. It was simple to use and each result was recorded and stored for easy retrieval as well as sent directly to my doctor. Throughout my pregnancy I had peace of mind, knowing that my blood pressure was being monitored and within the normal range. On the day of my preop visit, my blood pressure was high. Subsequently, Pulsewave Dx allowed me to monitor from home and seek medical intervention immediately. Because of the prompt dx of hypertension, our son was born by emergency c/s that day resulting in a safe delivery. Thanks Pulsewave Dx!”*

*– Sandra P., 32, Oakville ON*

## CASE STUDIES

### CHF, Male, 70

Nurse said, “this is a success story!” and shared that 6 months ago when he was brought into the program he “couldn’t walk 5 steps” without great difficulty due to extreme swelling in almost his entire body, from his feet/legs to his face. Last week she went to discharge him from the pilot and he was outside hammering in fence posts--he now has no swelling, lungs are clear and has been stable for 2 months.

### CHF, Female, 81

Had two CHF exacerbations (couldn’t breathe, full of fluid) and treated at home instead of calling 911 and in hospital. caught early (due to weight trending and O<sub>2</sub>). Prior to this, she didn’t have home oxygen and the Nurse was able to convince the Doctor (who was initially resistant) to have her assessed for home-O<sub>2</sub>. She qualified and now has home O<sub>2</sub>.

### CHF, Female, 85

Low O<sub>2</sub> alerted nurse that patient required oxygen. Was able to be treated at home and avoided a hospital visit.



### CHF, Female, 83

Client went to ER due to bradycardia and general weakness; heart rate was 30/bpm. Admitted with hyperkalemia and AKI (acute kidney injury). This patient was experiencing symptoms, so she may have gone to the hospital anyway, unlike some of our other patient stories but her low heart rate was detected and she was able to receive the care she required.

**THANK YOU**



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