TeleHealthHIV

Breakout Session:
Technology for Telehealth

January 21, 2021 at 3PM ET/12PM PT

Learning Objectives/Overview

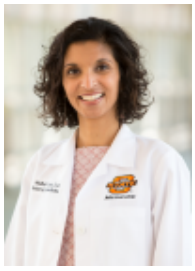
By the end of this session, participants will be able to:

- Describe necessary software and infrastructure for effective telehealth service delivery of HIV clinical care services
- Identify potential HIPAA-compliant technology that can be utilized for telehealth delivery
- Describe upcoming technological advancements and opportunities for telehealth

Submit questions through the Q&A chat box. Questions will be facilitated at the end of the session.

TeleHealthHIV

Introductions - Speakers



Madhuri J. Lad, DO, FACOI, AAHIVS
Asst. Medical Director
Okl. State University
Internal Medicine Specialty Services

Michael Snyder, PhD
Chairman & Professor, Department of Genetics
Director, Center for Genomics and Personalized Medicine

TeleHealthHIV

OSU Telemedicine

Madhuri J. Lad, DO, FACOI, AAHIVS
Assistant Medical Director
Oklahoma State University Internal Medicine Specialty Services

OSU TeleHealth

Learning Objectives

- ● Describe necessary software and infrastructure for effective telehealth service delivery.
- ● Identify potential HIPAA-compliant technology that can be utilized for telehealth delivery.
- ● Describe upcoming technological advancements and opportunities for telehealth.

OSU Internal Medicine Specialty Services Clinic

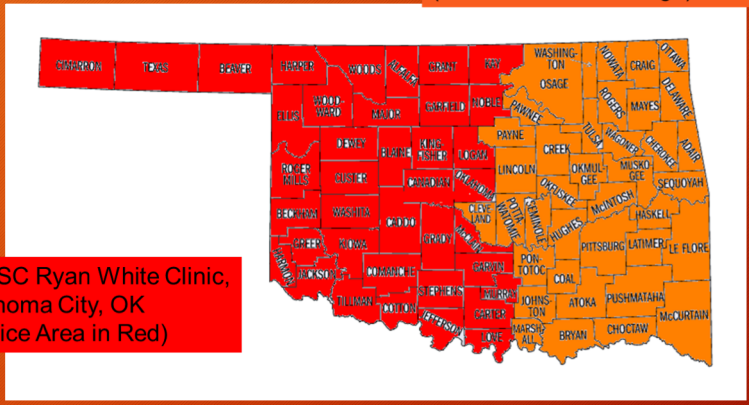
*Established in September 1996 in Tulsa with telemedicine since 2014 for rural areas

*Cared for over 3000 HIV-positive persons since 1996

*Coverage of the eastern half of the state of Oklahoma with Ryan White funding

Oklahoma Service Areas

OSU-CHS Ryan White Clinic, Tulsa, OK
(Service Area in Orange)



OUHSC Ryan White Clinic,
Oklahoma City, OK
(Service Area in Red)

Telemedicine

Patient Case

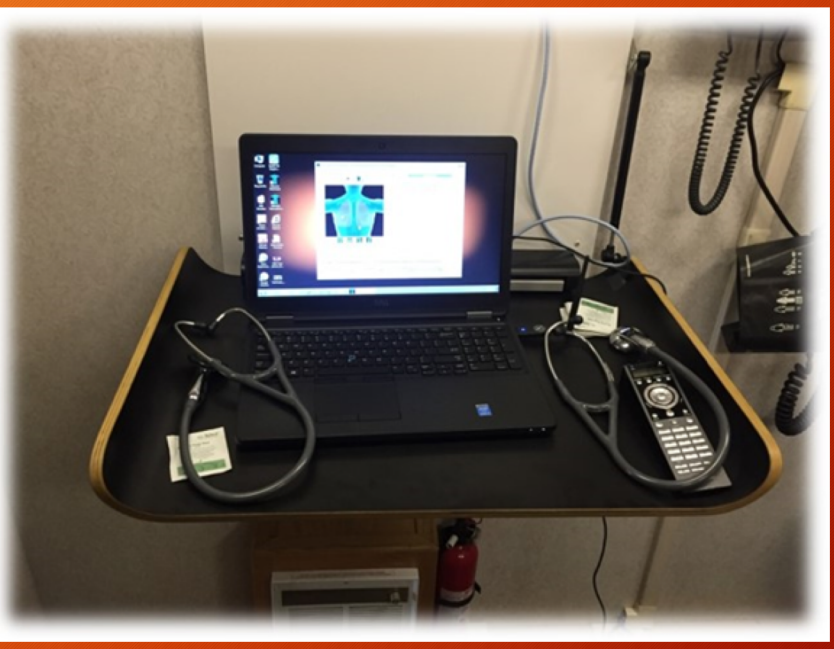
- 55M, HIV-positive in Poteau,OK
- Barrier - transportation
- Treated with Reyataz/Norvir/ Descovy
- CD4=300, VL<20 (scanned)
- Cough – Azithromycin and Flonase prescribed yesterday
- Rash – "itchy spot" on right leg
- Telemed appt
- Labs & appt in Poteau
- Rx refills e-scribed
- Meds/labs reviewed with pt
- Interaction between Flonase and Norvir discussed
- Stethoscope – lungs clear
- Dermascope used to diagnose and treat tinea corporis

Barriers to HIV Care

- Mental Health
- Substance abuse
- Nutrition
- Transportation
- Housing

Mobile Telemedicine Clinic

CENTER FOR RURAL HEALTH



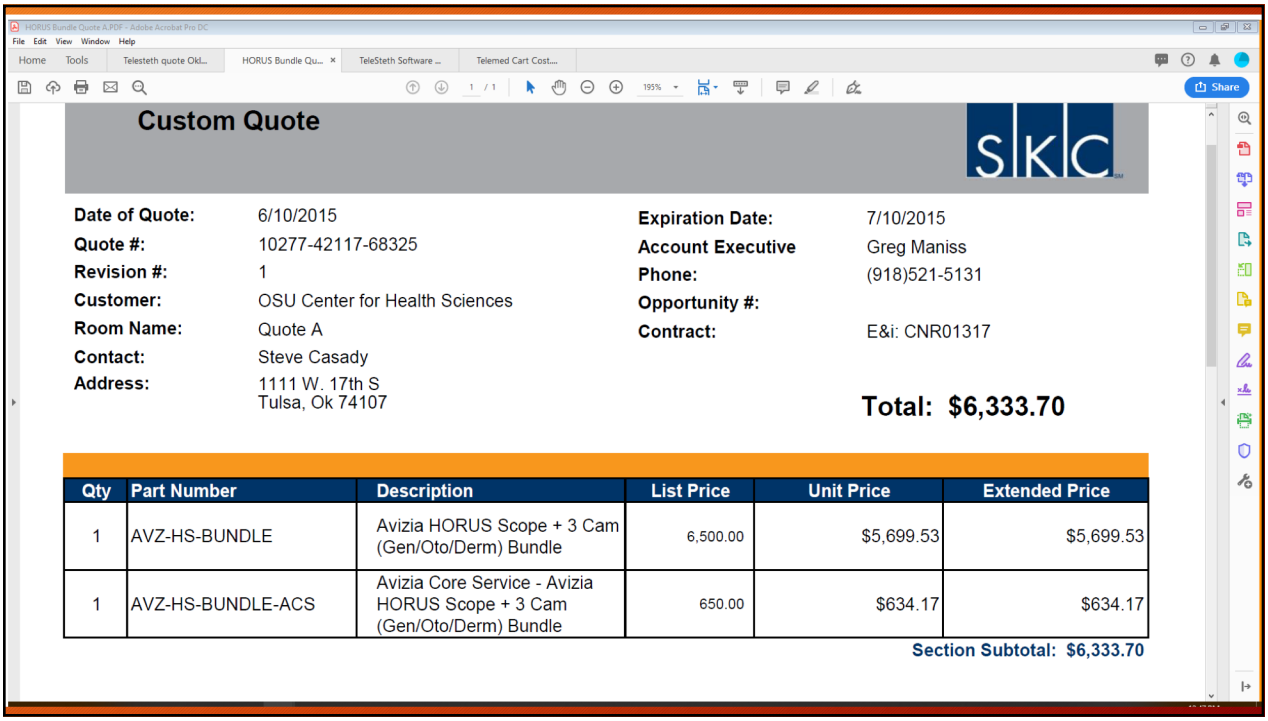
Comparison: Polycom vs. Zoom

POLYCOM

- Expensive $4000-$5000 for unit and annual fee
- High quality camera
- More difficult set-up and use
- Requires updates
- Limited use

ZOOM

- Cost effective
- Easy to use
- Use on desktop, laptop, tablet, or cell phone
- Less equipment
- Multi-purpose platform



Custom Quote

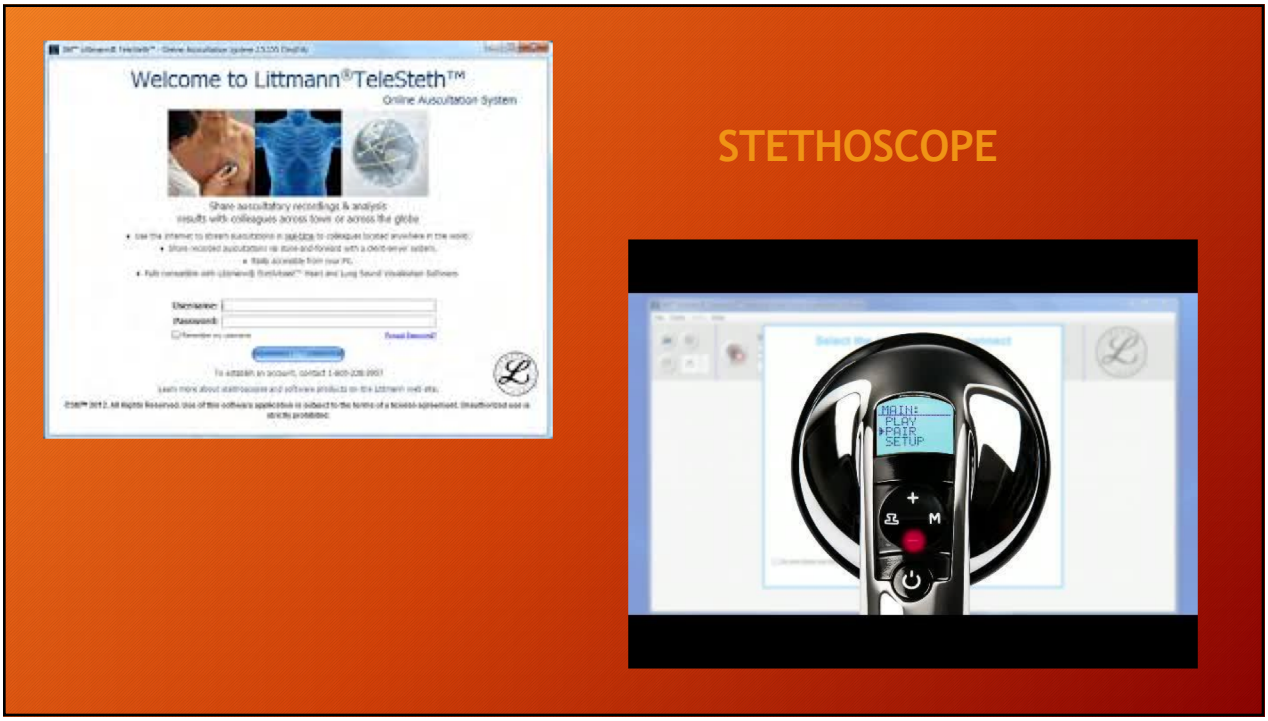
SKC

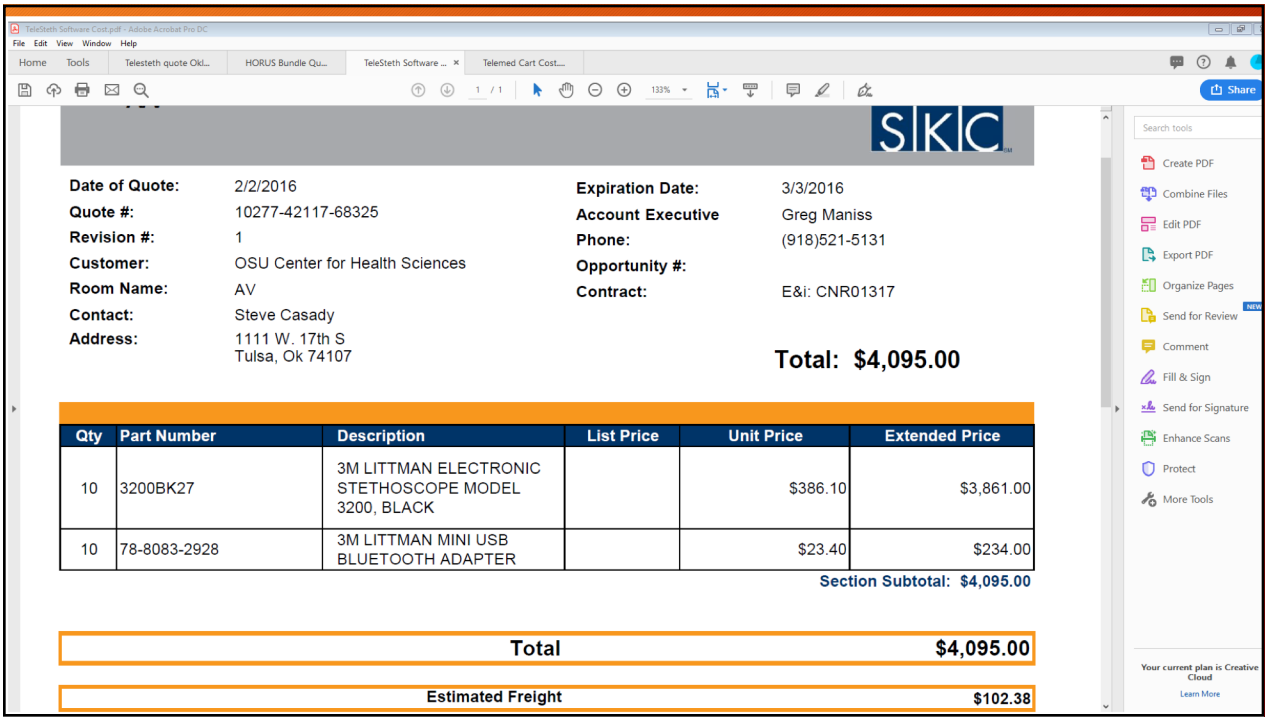
Date of Quote:	6/10/2015	**Expiration Date:**	7/10/2015
Quote #:	10277-42117-68325	**Account Executive**	Greg Maniss
Revision #:	1	**Phone:**	(918)521-5131
Customer:	OSU Center for Health Sciences	**Opportunity #:**	
Room Name:	Quote A	**Contract:**	E&i: CNR01317
Contact:	Steve Casady		
Address:	1111 W. 17th S Tulsa, Ok 74107		

Total: $6,333.70

Qty	Part Number	Description	List Price	Unit Price	Extended Price
1	AVZ-HS-BUNDLE	Avizia HORUS Scope + 3 Cam (Gen/Oto/Derm) Bundle	6,500.00	$5,699.53	$5,699.53
1	AVZ-HS-BUNDLE-ACS	Avizia Core Service - Avizia HORUS Scope + 3 Cam (Gen/Oto/Derm) Bundle	650.00	$634.17	$634.17

Section Subtotal: $6,333.70





SKC

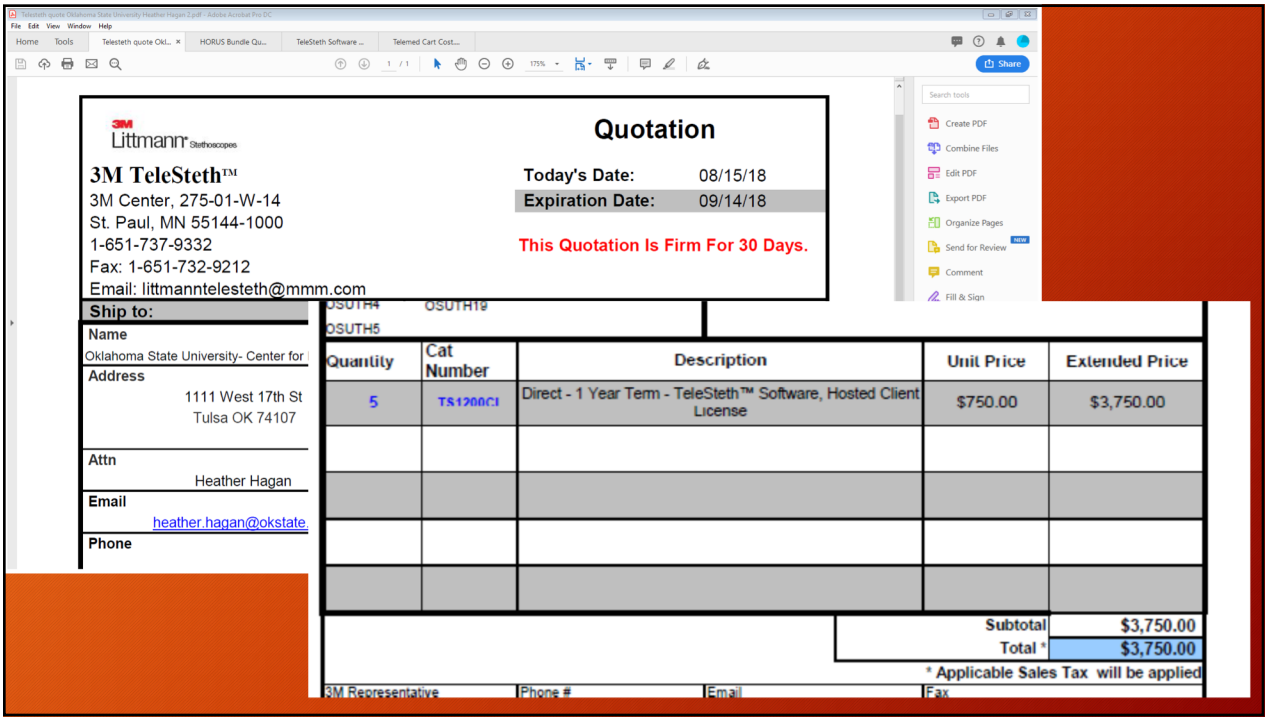
Date of Quote:	2/2/2016	**Expiration Date:**	3/3/2016
Quote #:	10277-42117-68325	**Account Executive**	Greg Maniss
Revision #:	1	**Phone:**	(918)521-5131
Customer:	OSU Center for Health Sciences	**Opportunity #:**	
Room Name:	AV	**Contract:**	E&i: CNR01317
Contact:	Steve Casady		
Address:	1111 W. 17th S Tulsa, Ok 74107		

Total: $4,095.00

Qty	Part Number	Description	List Price	Unit Price	Extended Price
10	3200BK27	3M LITTMAN ELECTRONIC STETHOSCOPE MODEL 3200, BLACK		$386.10	$3,861.00
10	78-8083-2928	3M LITTMAN MINI USB BLUETOOTH ADAPTER		$23.40	$234.00

Section Subtotal: $4,095.00

Total	**$4,095.00**
Estimated Freight	**$102.38**



3M Littmann Stethoscopes

3M TeleSteth™
3M Center, 275-01-W-14
St. Paul, MN 55144-1000
1-651-737-9332
Fax: 1-651-732-9212
Email: littmanntelesteth@mmm.com

Quotation

Today's Date: 08/15/18
Expiration Date: 09/14/18

This Quotation Is Firm For 30 Days.

Ship to:
Name
Oklahoma State University- Center for
Address
1111 West 17th St
Tulsa OK 74107
Attn
Heather Hagan
Email
heather.hagan@okstate.
Phone

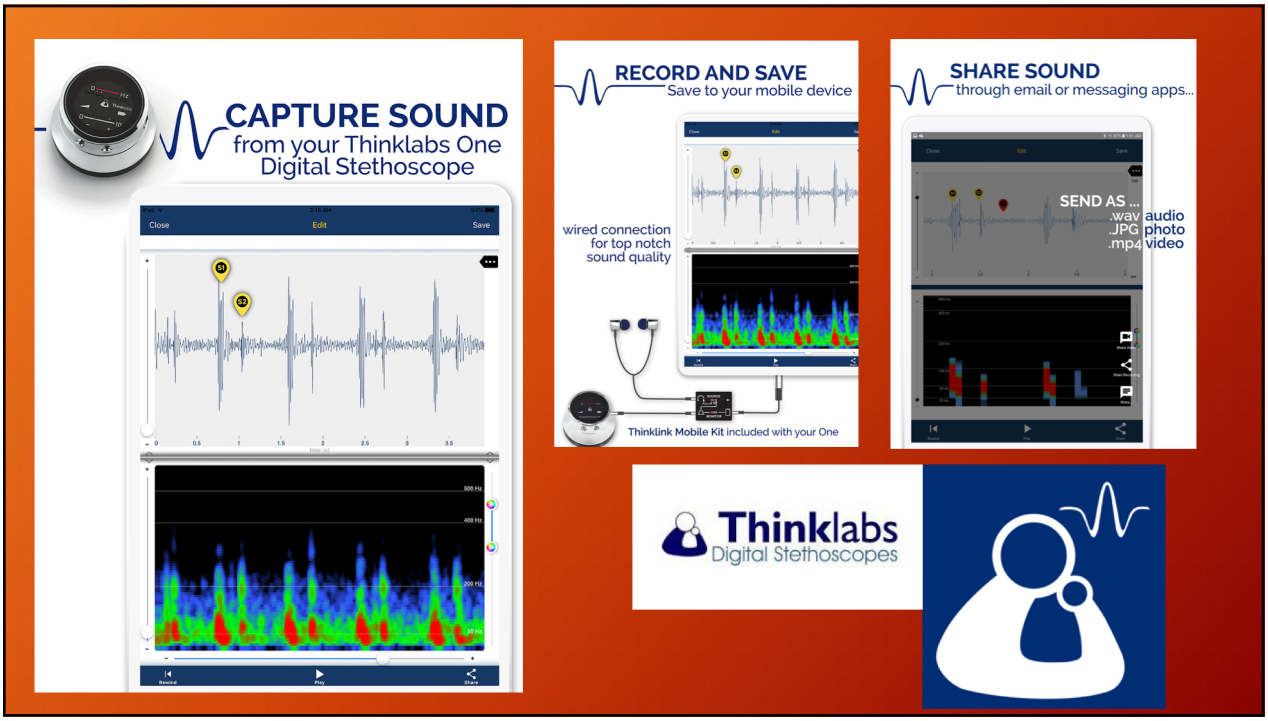
OSUTH4 OSUTH19
OSUTH5

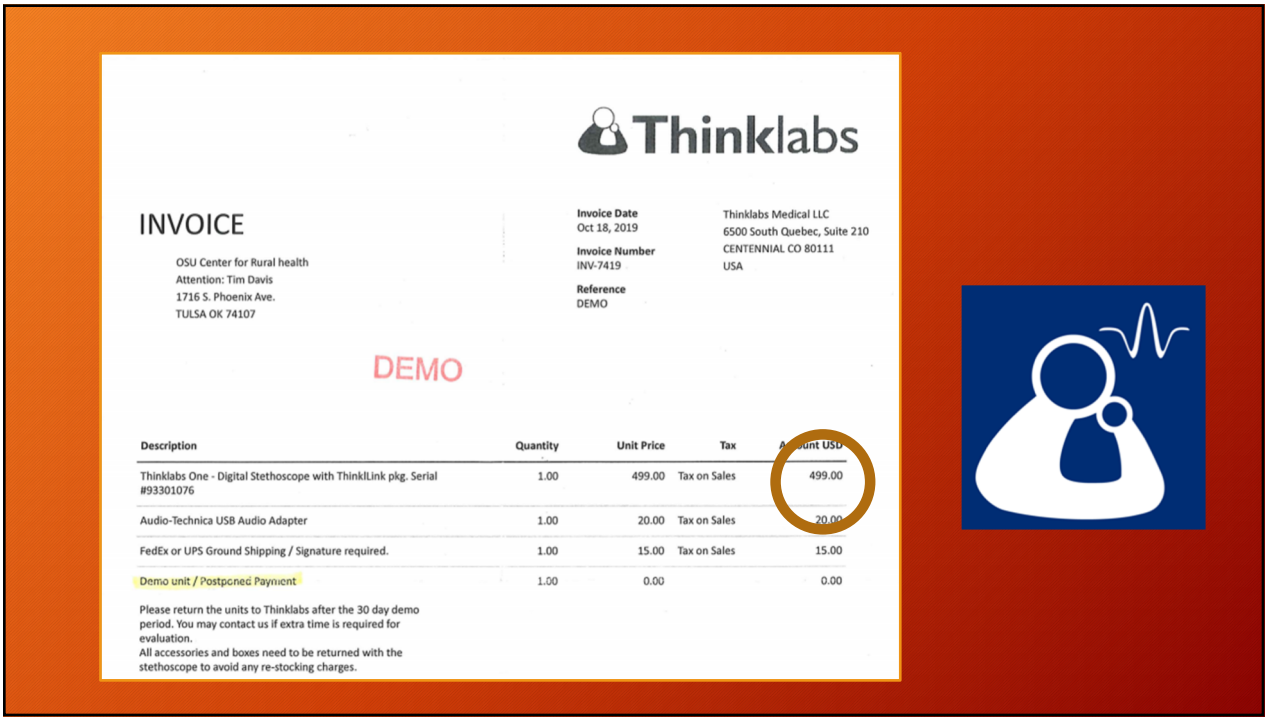
Quantity	Cat Number	Description	Unit Price	Extended Price
5	TS1200CI	Direct - 1 Year Term - TeleSteth™ Software, Hosted Client License	$750.00	$3,750.00

Subtotal	$3,750.00
Total *	$3,750.00

* Applicable Sales Tax will be applied

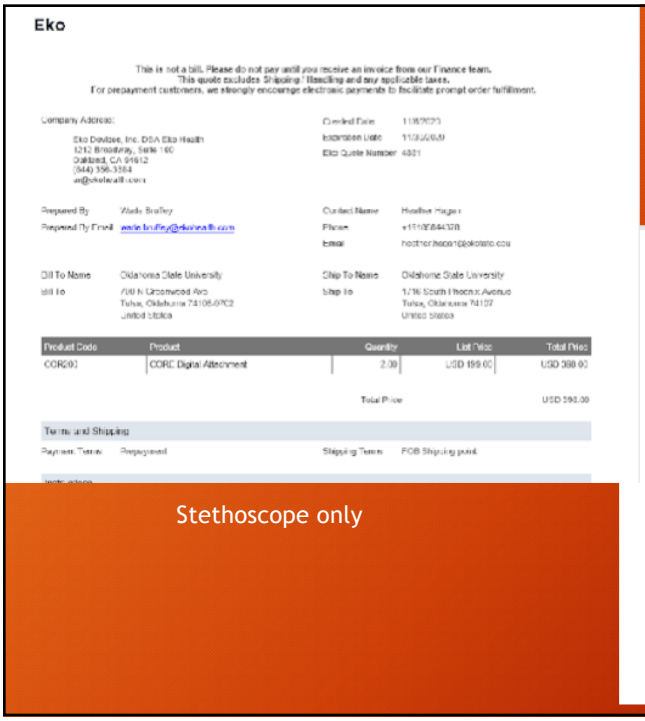
3M Representative | Phone # | Email | Fax


CAPTURE SOUND
from your Thinklabs One
Digital Stethoscope
RECORD AND SAVE
Save to your mobile device
wired connection
for top notch
sound quality
Thinklink Mobile Kit included with your One
SHARE SOUND
through email or messaging apps...
SEND AS ...
.wav audio
.JPG photo
.mp4 video
Thinklabs
Digital Stethoscopes


Thinklabs
INVOICE
OSU Center for Rural health
Attention: Tim Davis
1716 S. Phoenix Ave.
TULSA OK 74107
Invoice Date
Oct 18, 2019
Invoice Number
INV-7419
Reference
DEMO
Thinklabs Medical LLC
6500 South Quebec, Suite 210
CENTENNIAL CO 80111
USA
DEMO
Description
Quantity
Unit Price
Tax
Amount USD
Thinklabs One - Digital Stethoscope with ThinklLink pkg. Serial #93301076
1.00
499.00
Tax on Sales
499.00
Audio-Technica USB Audio Adapter
1.00
20.00
Tax on Sales
20.00
FedEx or UPS Ground Shipping / Signature required.
1.00
15.00
Tax on Sales
15.00
Demo unit / Postponed Payment
1.00
0.00
0.00
Please return the units to Thinklabs after the 30 day demo period. You may contact us if extra time is required for evaluation.
All accessories and boxes need to be returned with the stethoscope to avoid any re-stocking charges.

ELEVATING THE STANDARD
OF STETHOSCOPE MONITORING.

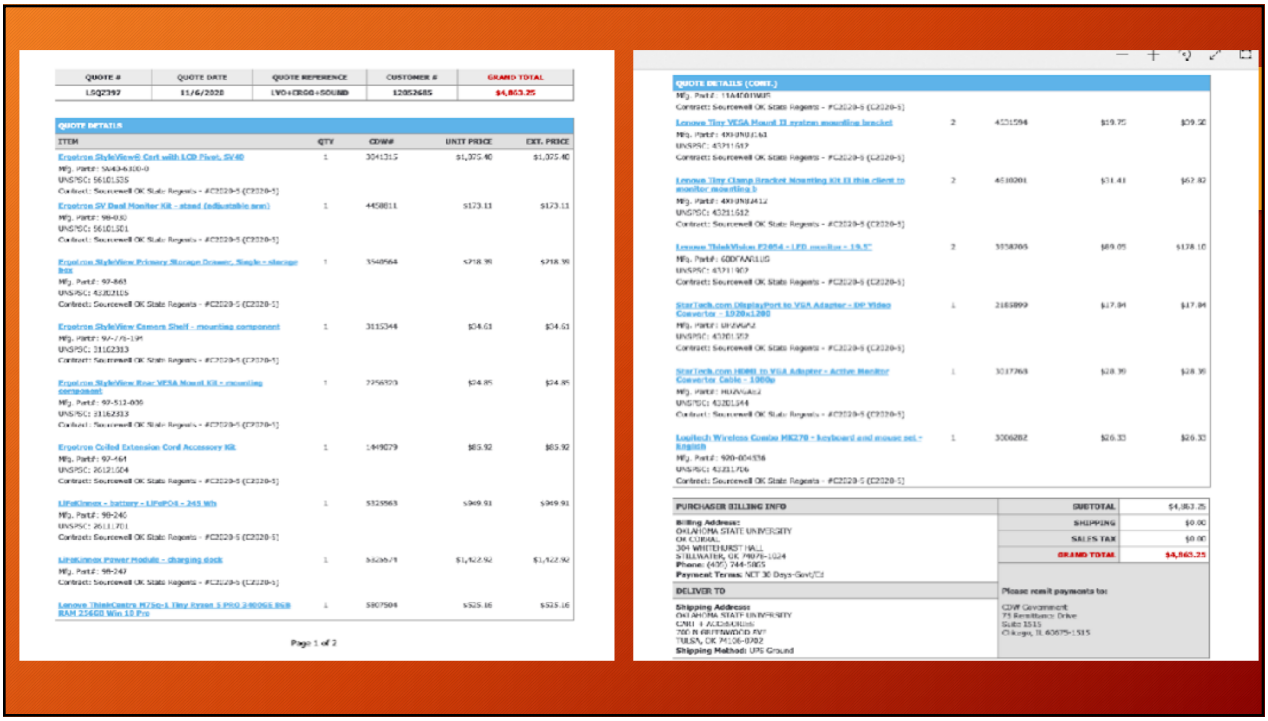
Eko



Stethoscope only

Eko

Stethoscope and ECG



QUOTE #	QUOTE DATE	QUOTE REFERENCE	CUSTOMER #	GRAND TOTAL
LSQ2397	11/6/2020	LVD+CRDB+SOUND	12052685	$4,863.25

QUOTE DETAILS

ITEM	QTY	CDW#	UNIT PRICE	EXT. PRICE
Ergotron StyleView® Cart with LCD Pivot, SV40 Mfg. Part#: SA40-6300-0 UNSPSC: 56101535 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	3041315	$1,305.40	$1,305.40
Ergotron SV Dual Monitor Kit - stand (adjustable arm) Mfg. Part#: 98-0XX UNSPSC: 56101501 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	4458011	$123.13	$123.13
Ergotron StyleView Primary Storage Drawer, Single - storage bin Mfg. Part#: 97-863 UNSPSC: 43202115 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	3548964	$718.99	$718.99
Ergotron StyleView Camera Shelf - mounting component Mfg. Part#: 97-7[illegible]-195 UNSPSC: 31162313 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	3115344	$54.63	$54.63
Ergotron StyleView Rear VESA Mount Kit - mounting component Mfg. Part#: 97-512-036 UNSPSC: 31162313 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	7256923	$24.85	$24.85
Ergotron Coiled Extension Cord Accessory Kit Mfg. Part#: 97-464 UNSPSC: 26121604 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	1449079	$65.92	$65.92
LiFeGreen - battery - LiFePO4 - 245 Wh Mfg. Part#: 98-240 UNSPSC: 26111701 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	5329563	$369.91	$369.91
LiFeGreen Power Module - charging dock Mfg. Part#: 98-242 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	5329571	$1,422.92	$1,422.92
Lenovo ThinkCentre M75q-1 Tiny Ryzen 5 PRO 3400GE 8GB RAM 256GB Win 10 Pro	1	5807504	$525.16	$525.16

Page 1 of 2

QUOTE DETAILS (CONT.)

Lenovo Tiny VESA Mount II system mounting bracket Mfg. Part#: 4XF0N82163 UNSPSC: 43211507 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	2	4551594	$19.75	$39.50
Lenovo Tiny Clamp Bracket Mounting Kit II thin client to monitor mounting b Mfg. Part#: 4XF0N82612 UNSPSC: 43211502 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	2	4618201	$31.41	$62.82
Lenovo ThinkVision P24h-2 FHD monitor - 23.8" Mfg. Part#: 60DFAAR1US UNSPSC: 43211903 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	2	5558305	$89.05	$178.10
StarTech.com DisplayPort to VGA Adapter - DP Video Converter - 1920x1200 Mfg. Part#: DP2VGA2 UNSPSC: 43201503 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	2165899	$17.84	$17.84
StarTech.com HDMI to VGA Adapter - Active Monitor Converter Cable - 1080p Mfg. Part#: HD2VGAA2 UNSPSC: 43201344 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	3017769	$28.39	$28.39
Logitech Wireless Combo MK270 - keyboard and mouse set - English Mfg. Part#: 920-004536 UNSPSC: 43211706 Contract: Sourcewell OK State Regents - #C2029-5 (C2020-5)	1	3006282	$26.33	$26.33

PURCHASER BILLING INFO		
Billing Address: OKLAHOMA STATE UNIVERSITY OK CORAL 304 WHITEHURST HALL STILLWATER, OK 74078-1024 Phone: (405) 744-5865 Payment Terms: NET 30 Days-Govt/Ci	SUBTOTAL	$4,863.25
	SHIPPING	$0.00
	SALES TAX	$0.00
	GRAND TOTAL	$4,863.25
DELIVER TO Shipping Address: OKLAHOMA STATE UNIVERSITY GNU X ACCRARUM 700 N GREENWOOD AV TULSA, OK 74106-0702 Shipping Method: UPS Ground	Please remit payments to: CDW Government 75 Remittance Drive Suite 1515 Chicago, IL 60675-1515	

Merchandise Total	47,727.22	-37,927.44
Shipping	477.27	
Document Total	$48,204.49	

ove quoted pricing is valid until 6/05/2015.

The Polycom® RealPresence® Practitioner Cart® 8000, developed for Polycom by Rubbermaid Healthcare, helps healthcare professionals bring expert care to patients from a distance.

Equipment costs

- Cart with monitor $5000
- Steth program $1200
- Steth + ECG $400
- Scopes $7000
- Zoom

- Total = $13,600

47,727.22
477.27
$48,204.49

Staff

- **Telemedicine bus driver** requires a commercial driver's license and competent with technology of equipment, software, and connectivity
- **Nurse** required for rooming (vitals, med rec, PHQ-9) and needs to be competent with equipment. Documentation in EMR.
- **Physician** needs to be competent with the equipment and coding

Challenges

- Weather or mechanical issues for bus, maintenance and fuel costs
- Wifi and stethoscope connectivity
- Software updates
- Inexperienced staff on telemedicine equipment
- Cancelled appointments or “no shows”
- Secure site location of bus & Storage of bus when not in use
- Referrals in rural areas
- Time spent driving to and from location
- Inefficient use of time of bus driver/IT and nurse

Overcome Challenges

- Reschedule due to weather or mechanical issues for telemed bus
- Wifi hotspot or direct cable connection to local network
- Use of cell phones if Wifi connectivity issues
- Anticipation of software updates
- Use of earbuds instead of stethoscope improved sound/connection
- Education of staff on telemedicine equipment
- Secure and discrete location of bus and test signal strength
- Contract with hospital for use of building space for telemedicine

Eastern Oklahoma Medical Center in Poteau

Caring Hands FQHC in McAlester

Connectivity Issues

- Test area for signal strength. Weather, trees, and buildings all effect signal strength.
- Direct cable connection to a local network is best. Usually difficult to obtain due to security issues.
  - Wifi on the telemed bus
  - Hotspot
  - Mulitple cell signals (AT&T, Verizon)

PROS AND CONS OF TELEMED

PROS

- Convenience
- Affordable
- Saves time and transport

CONS

- Connectivity issues
- Loss of personal touch
- Difficult for complicated cases
- Limited physical exam

Future Goals

- Secure signed contract with outlying hospitals for use of space
- Combine HIV telemedicine days with other OSU departments to share expenses
- Recruit additional patients to reduce barriers to care
- Offer other services, such as counseling or test and treat programs
- Coordinate with FQHC's to refer new HIV positive patients in rural areas for care through telemedicine
- Start a third telemedicine location in eastern Oklahoma
- Share our experiences with other programs

Thank you to my telemedicine staff!

Madhuri J. Lad, DO, FACOI, AAHIVS
Assistant Medical Director
Oklahoma State University Internal Medicine Specialty Services

Detection of COVID-19 and RVI Using Wearables

Michael Snyder
Stanford University

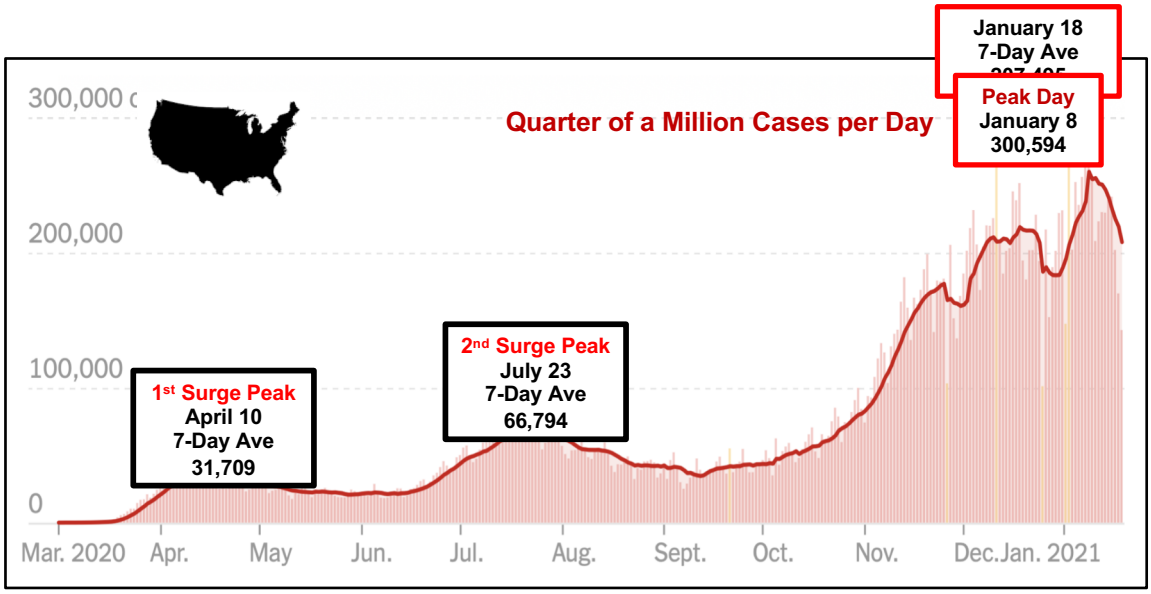
January 21, 2021

Conflicts: Personalis, Genapsys, SensOmics, Qbio, January, Protos, Fitricine, Mirvie, Oralome

United States COVID-19 Cases

From Rob Jackler

January 18



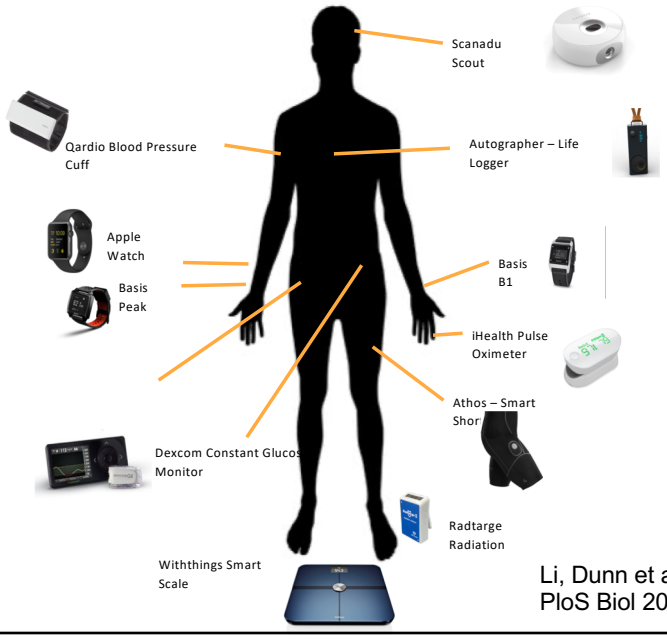
https://www.nytimes.com/interactive/2020/us/coronavirus-us-cases.html

Current Test: PCR

- Slow (2-3 days)
- Expensive ($120/test)

41

Wearable Sensors: Over 900 Devices

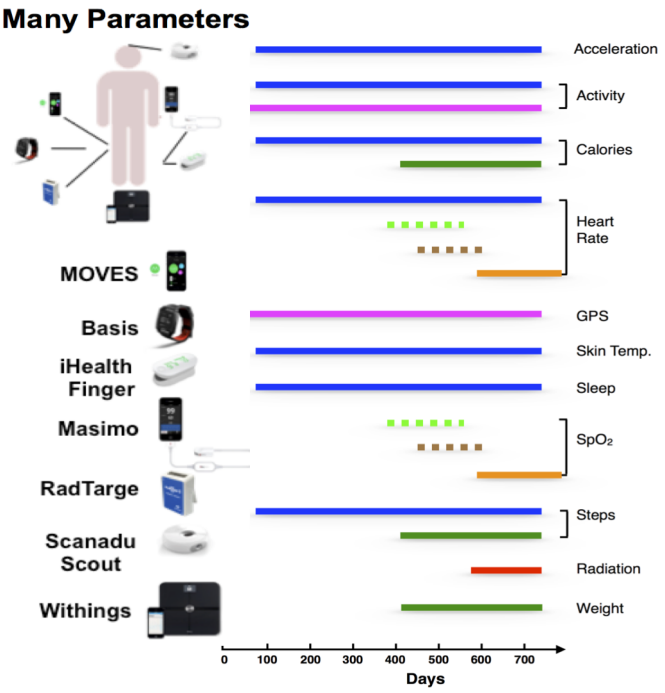


Li, Dunn et al.
PloS Biol 2017

- ➢ **Worn by millions of people (20% of US)**
- ➢ **Make 100Ks of measurements each day**

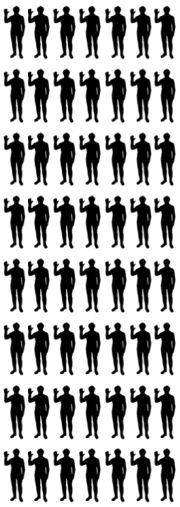
Sensors Make Many Types of Measurements

HR, HRV, Respiration Rate, SpO2, Skin Temp, Blood Pressure



Li, Dunn et al. PloS Biol 2017

Longitudinal Personal Omics Profiling



Omics Measurements

Biosensors

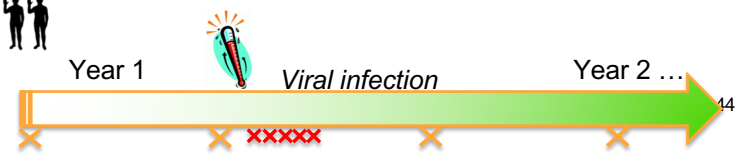
Genome
Epigenome
Transcriptome
Proteome
Cytokines
Metabolome
Lipidomics
Autoantibody-ome
Microbiome (Gut, Urine, Nasal, Tongue, Skin)

Billions of Measurements!

Clinical Tests Questionaires

Stress Echos Glucose Control

109 Individuals



8 yrs

49 Major Health Discoveries

Metabolic

1 MODY mutation (gene)
1 ABCC8 Mutation (gene)
14 New Diabetes

Cardiovascular

6 Carotid Plaques (imaging)
1 Atrial Fib. (wearable)
1 RMB20 mutation (gene)
1 Reduced LVEF/GLS (imaging)
3 Dilated L. Atrium (imaging)
1 Pharmagenomic (gene)

Other

1 Sleep Apnea (wearable)
1 SLC7A9 mutation (cystinuria risk)
2 Macroalbuminuria

Heme/Onc

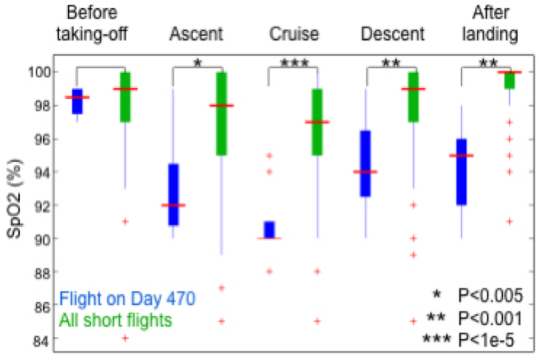
7 Oncologic Risk Genes (Thyroid Cancer in 1)
1 Lymphoma (Imaging)
1 MGUS (IgM)
1 Smoldering Myeloma (IgM)
1 α Thalassemia (Clinical)
1 β Thalassemia (Gene/Clinical)
1 Pros1 Mutation (gene)

Infectious

1 Lyme Disease (wearable)

Rose, Contrepois et al. Nat. Medicine 2019

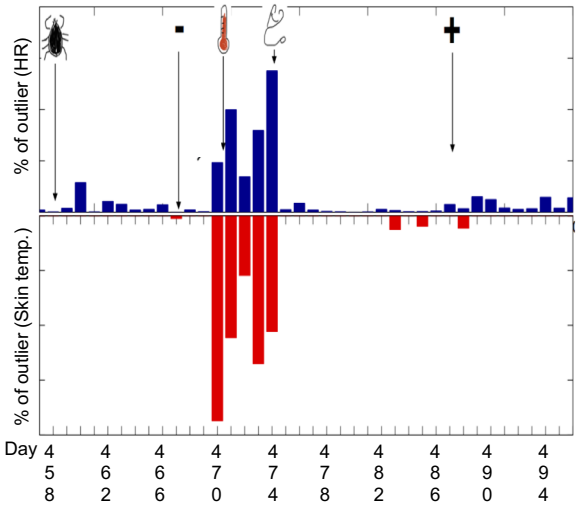
Early detection of Lyme disease



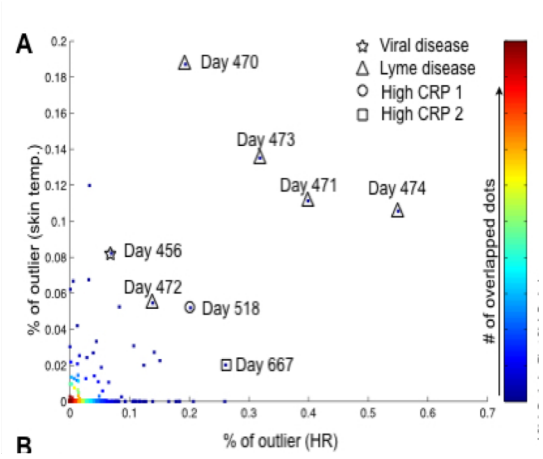
Digital Health: Tracking Physiomes and Activity Using Wearable Biosensors Reveals Useful Health-Related Information

Xiao Li, Jessilyn Dunn, Denis Salins, Gao Zhou, Wenyu Zhou, Sophia Miryam Schüssler-Fiorenza Rose, Dalia Perelman, Elizabeth Colbert, Ryan Runge, Shannon Rego, Ria Sonecha, Somalee Datta, Tracey McLaughlin, Michael P. Snyder

Published: January 12, 2017 • https://doi.org/10.1371/journal.pbio.2001402

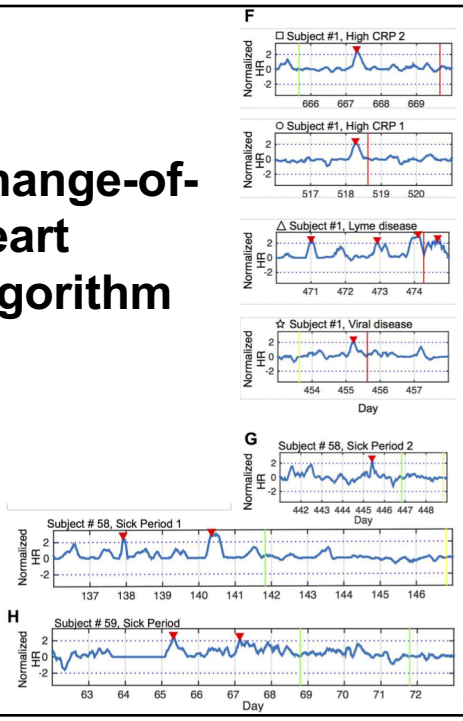


Detects All Days of Illness

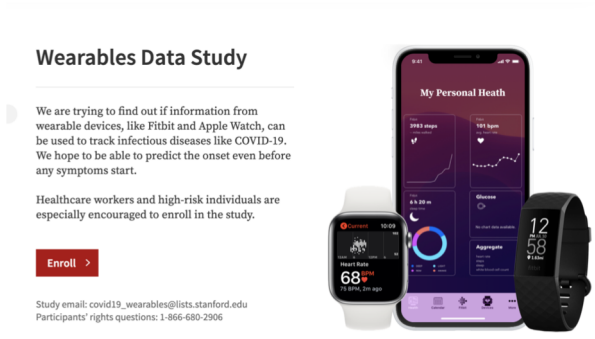


Li, Dunn et al. PloS Biol 2017

Change-of-Heart Algorithm



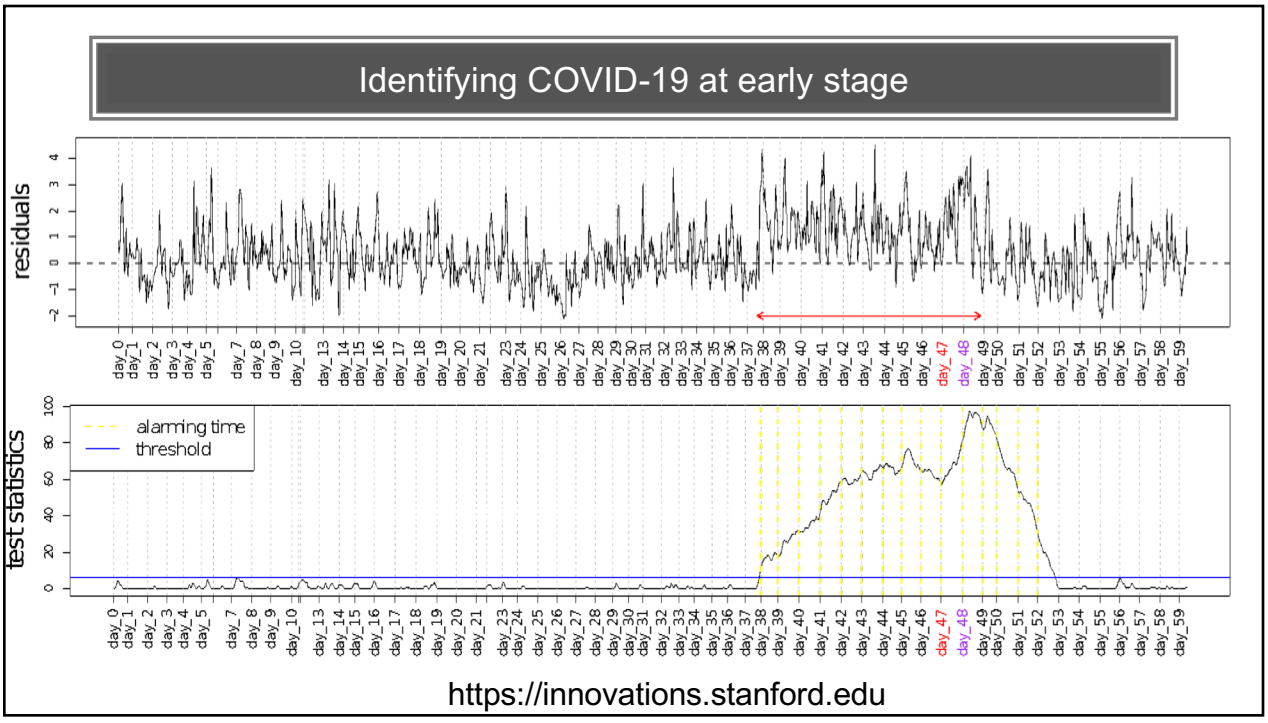
COVID-19 Infectious Disease Study

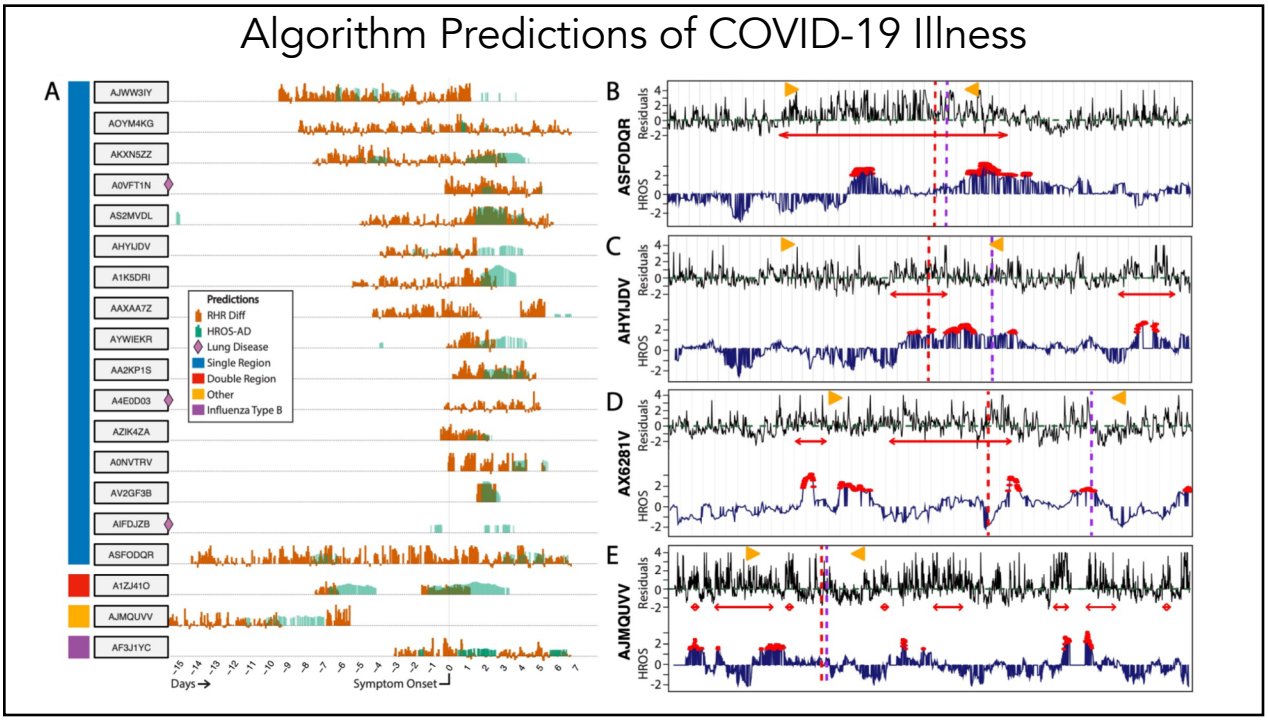


Launched IRB Approved Study

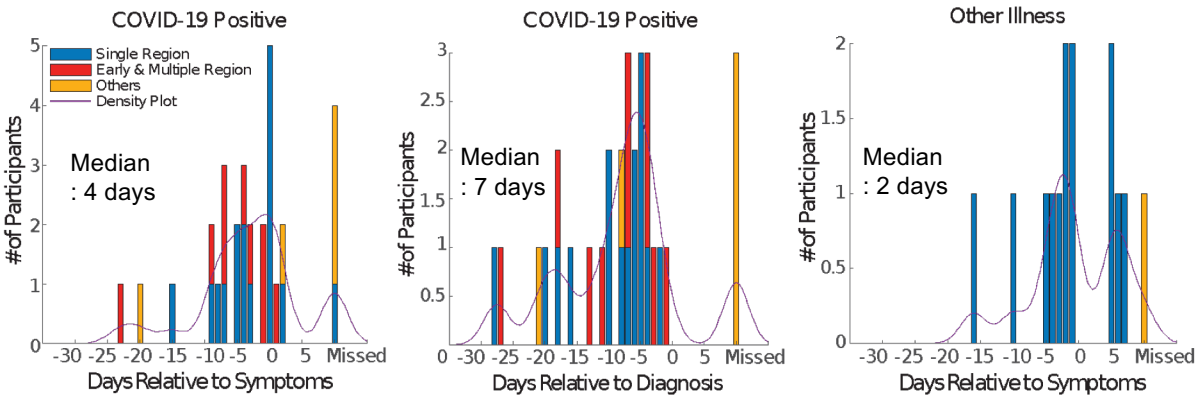
Partnering with Leading Companies E.g. Fitbit, Garmin

>5000 Enrolled >30 COVID-19 Positives (Golden dataset)


Identifying COVID-19 at early stage
residuals
test statistics
alarming time
threshold
https://innovations.stanford.edu

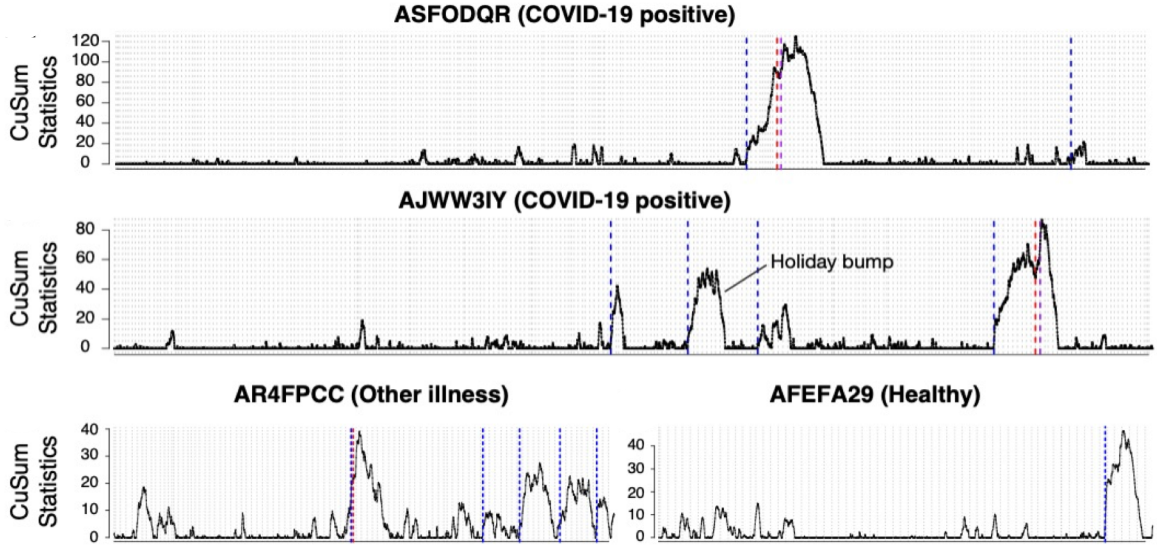

Algorithm Predictions of COVID-19 Illness
A
B
C
D
E
Predictions
RHR Diff
HROS-AD
Lung Disease
Single Region
Double Region
Other
Influenza Type B
Days
Symptom Onset
ASFODQR
AHYIJDV
AX6281V
AJMQUVV
Residuals
HROS

Summary of Early Detection

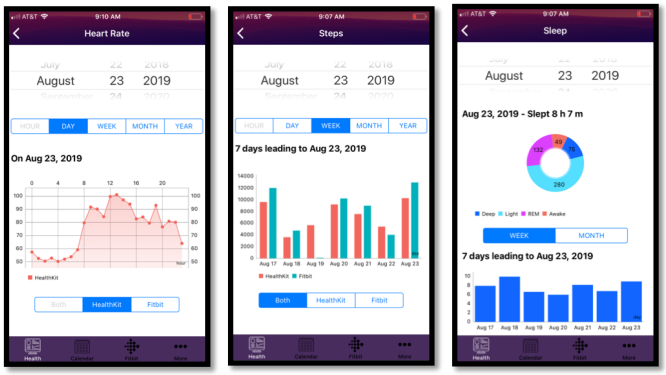


Elevated Heart Rate: 7 Beats/Min

Phase 2: Online Real-Time Detection - CuSum



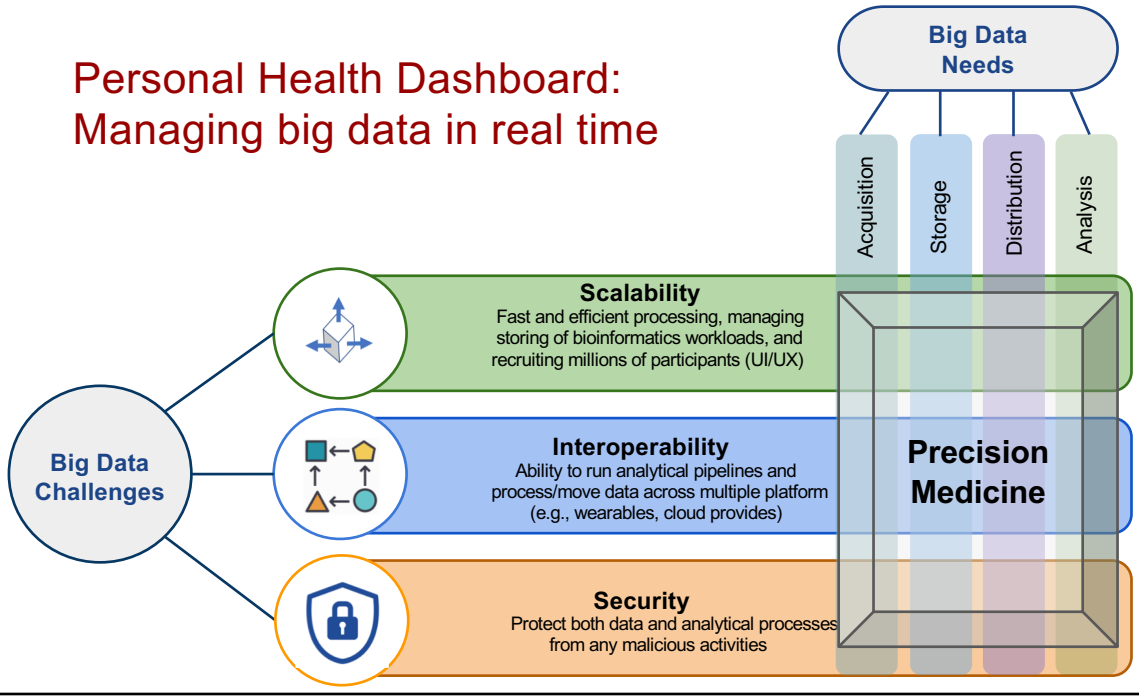
My Health Dashboard UI



- Visualize and monitor your health data at different resolutions

https://innovations.stanford.edu

Personal Health Dashboard: Managing big data in real time



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Wearable sensor d… symptoms for COV…

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Title: Longitudinal Physiological Data from a Wearable Device Identifies SARS-CoV-2 Infection and Symptoms and Predicts COVID-19 Diagnosis

Authors: Robert P. Hirten MD[1,2], Matteo Danieletto PhD[2,3], Lewis Tomalin PhD[4], Katie Hyewon Choi MS[4], Micol Zweig MPH[2,3], Eddye Golden MPH[2,3], Sparshdeep Kaur BBA[2], Drew Helmus MPH[1], Anthony Biello BA[1], Renata Pyzik MS[5], Ismail Nabeel MD[9], Alexander Charney MD[3,6,7], Benjamin Glicksberg PhD[2,3], Matthew Levin MD[8], David Reich MD[8], Dennis Charney MD[10,14], Erwin P Bottinger MD[2], Laurie Keefer PhD[1,6], Mayte Suarez-Farinas PhD [3,4], Girish N. Nadkarni MD[2,11,12], Zahi A. Fayad PhD[5,13]

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1. The Dr. Henry D. Janowitz Division of Gastroenterology, Icahn School of Medicine at Mount Sinai, New York, NY, USA

Summary

1. COVID-19 is associated with alterations in heartrate, steps, and sleep
   85% detection

1. Built an online detection system for detection of COVID-19 in real time
   63% detected before or at symptom onset in "real-time" algorithm

3. Set up a system to scale to millions of people

https://innovations.stanford.edu

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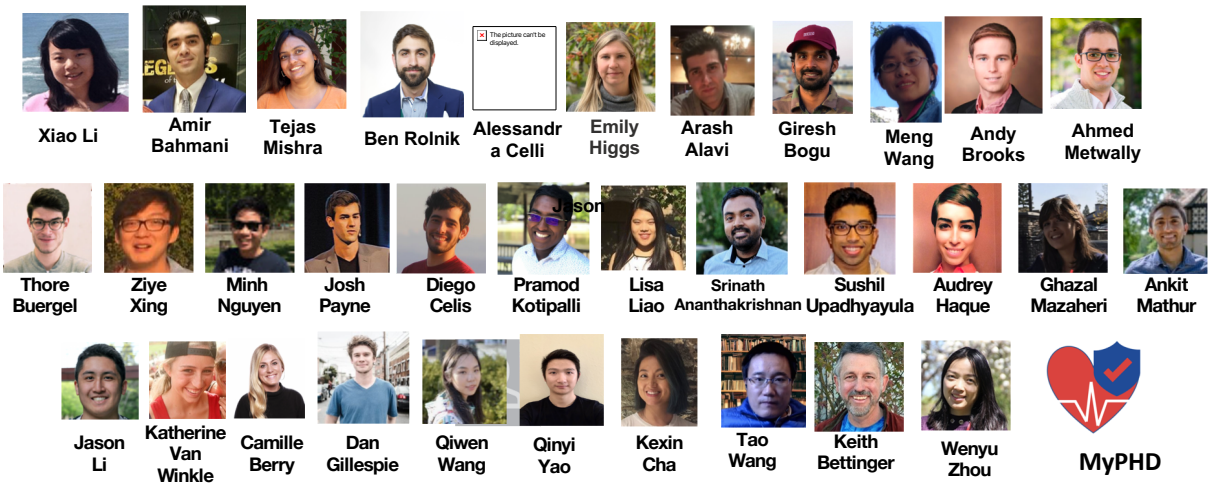
The Wearables Team



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TeleHealthHIV

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www.HealthHIV.org/TeleHealthHIV