Digital Care Transformation: Report from the First 10,000 Patients Enrolled in a Remote Algorithm-based Cardiovascular Risk Management Program to Improve Lipid and Hypertension Control

Disclosures

AJB: National Institutes of Health grant T32HL007604 (P. Libby – PI)

JP: Consulting from Alnylam, Amgen, Medicines Company, Novartis, Sanofi.

TAG: Consulting fees from Amgen and Medicines Co (now Novartis)

NDLF: Research funding and scientific advisor to Recor Medical

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All other authors have no disclosures
Background

• Undertreatment of hypertension (HTN) and hypercholesterolemia remains a persistent clinical challenge

• 30-50% of patients do not receive optimal medical treatment – even though most treatment options are generic

• The shift towards remote health has the potential to revolutionize care but raises concerns for deepening the “digital health divide” thus exacerbating health inequities

• We developed a remote program to address these gaps in care

References:

Patel N et al. J Am Coll Cardiol 2019
Methods

- We report the outcomes from an ongoing clinical program within the Mass General Brigham health system starting 1/2018
- Patients identified by provider referral and electronic health record (EHR) screening for HTN or LDL-cholesterol (LDL-c) optimization to achieve guideline recommended targets
- Exclusion criteria: pregnant, planning pregnancy or breastfeeding, eGFR<30
  - HTN program: Severe aortic stenosis, renal artery stenosis, heart failure with reduced EF
- HTN management was enabled by WiFi, cellular, and Bluetooth devices
- Mass General Brigham and AllWays Health Partners Insurance funded the program at no additional cost to patients
Methods - Digital Care Transformation

Patient Navigators

- Non-licensed
- High-contact model
- Provide Education
- Gather Data

Pharmacists

- Prescribe and up-titrate Rx as part of a Collaborative Drug Treatment Management Program

Digital Technology

- Patient relationship management software to provide:
  - Patient-relationship tasks
  - Decision support
  - Communication

Remote Care Delivery Platform

- Device Data / Remote Physiologic Monitoring
- Labs / Med Rx
- Omni-channel communication
- Education
- EHR integration

Workflow Automation (Customer Relationship Management)
Patient Disposition in the Combined Hypertension and Lipid Programs

- Screened \( n=28,473 \)
- Eligible on EHR screen \( n=20,454 \)
- Ineligible \( n=8,019 \)
- Contacted \( n=18,444 \)
- To be Contacted \( n=2,010 \)
- Enrolled prior to 7/1/21 \( n=10,803 \)
- Unreachable, Declined or Unable to Join \( n=7,641 \)

**Lipid Program**
- Medically-managed \( n=9,547 \)
- Unreachable -1,780
- Withdrew -501, Referred to MD -298
- Maintenance 2,753 (40%)
- Active Titration 1,555 (23%)

**HTN Program**
- Medically-managed \( n=9,547 \)
- Unreachable -929
- Withdrew -202
- Referred to MD -234
- Maintenance 1,492 (44%)
- Active Titration 510 (15%)

Pts can be in both programs

Data locked 10/1/21
## Enrolled Baseline Characteristics

<table>
<thead>
<tr>
<th>Baseline Characteristics</th>
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<tbody>
<tr>
<td>Age &gt;75yo</td>
<td>12%</td>
</tr>
<tr>
<td>Female</td>
<td>55%</td>
</tr>
<tr>
<td>Non-White</td>
<td>29%</td>
</tr>
<tr>
<td>Non-English Speaking</td>
<td>8%</td>
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<table>
<thead>
<tr>
<th>Lipid Categories</th>
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<tbody>
<tr>
<td>Established ASCVD</td>
<td>29%</td>
</tr>
<tr>
<td>Diabetes (no ASCVD)</td>
<td>22%</td>
</tr>
<tr>
<td>LDL &gt;190 mg/dl (no ASCVD or Diabetes)</td>
<td>26%</td>
</tr>
<tr>
<td>High-risk primary prevention</td>
<td>23%</td>
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ASCVD: Atherosclerotic CardioVascular Disease  
LDL-c: Low-density lipoprotein cholesterol
How did we do this?

100,663 Phone calls
424,482 BP values
74,027 Lab evaluations
27,885 New prescriptions
Overall Blood Pressure Results

Office/Referral BP
- Qualifying SBP
- Qualifying DBP

Initial Home BP
- Baseline SBP
- Baseline DBP

Last Program BP
- Exit SBP
- Exit DBP

*p<0.0001 for all comparisons with Exit BP

All Enrolled Patients (n=3367)

Systolic BP
- Δ=10/6 mmHg

Diastolic BP
- Δ=12/7 mmHg

Patients who Achieved Maintenance (n=1492)
Blood Pressure Results in Selected Populations who Reached Maintenance

*p<0.0001 for all comparisons with Exit BP*

<table>
<thead>
<tr>
<th>Race</th>
<th>White (n=986)</th>
<th>Black (n=231)</th>
<th>Other Race (n=275)</th>
<th>Hispanic (n=198)</th>
<th>Non-English Speaking (n=142)</th>
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</thead>
<tbody>
<tr>
<td>Blood Pressure (mmHg)</td>
<td>148 136 125 82 77 71</td>
<td>149 140 123 84 84 74</td>
<td>147 137 125 83 80 73</td>
<td>147 138 125 82 80 73</td>
<td>149 136 126 82 78 73</td>
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BWH | Brigham and Women's Hospital

Harvard Medical School Teaching Hospital

Mass General Brigham
Overall LDL-c Results

- **All Enrolled Patients (n=6887)**
  - Baseline: 145 mg/dL
  - Exit: 100 mg/dL
  - *p* < 0.0001

- **Patients who Achieved Maintenance (n=2753)**
  - Baseline: 140 mg/dL
  - Exit: 70 mg/dL
LDL-c Results in Selected Populations who Reached Maintenance

*p<0.0001 for all comparisons*

<table>
<thead>
<tr>
<th>Race</th>
<th>Baseline (n)</th>
<th>Exit (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White (n=2028)</td>
<td>139</td>
<td>69</td>
</tr>
<tr>
<td>Black (n=293)</td>
<td>140</td>
<td>74</td>
</tr>
<tr>
<td>Other Race (n=432)</td>
<td>145</td>
<td>70</td>
</tr>
<tr>
<td>Hispanic (n=286)</td>
<td>145</td>
<td>72</td>
</tr>
<tr>
<td>Non-English Speaking</td>
<td>152</td>
<td>75</td>
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</table>
Lipid Lowering Therapy between Baseline and Exit in Patients who Reached Maintenance (n=2,753)

Prescription Rate (%)

- HI Statin: Baseline 40%, Exit 55%
- Low/Med Statin: Baseline 39%, Exit 38%
- Ezetimibe: Baseline 9%, Exit 20%
- PCSK9i: Baseline 1%, Exit 5%
- No Medication: Baseline 19%, Exit 3%

*p<0.001
Summary - a remote, algorithm-driven management program:

• Effectively improves HTN and LDL-c in high-risk patients
• Reduces need for in-person visits and physician time
• Highlights the persistent challenges for longitudinal care
• Delivers equitable remote care across traditionally underserved populations
Conclusion

This program has the potential to expand remote healthcare delivery, increase access to care, reduce health inequities, and improve healthcare quality – our research illustrates its performance in a learning health system.
A collaborative effort!