Learning Objectives

- Describe the Diabetes Boot Camp Intervention
- Identify key elements for successful patient outcomes
- Discuss the change role of the diabetes educator

Disclosure to Participants

- Notice of Requirements For Successful Completion
  - Please refer to learning goals and objectives
  - Learners must attend the full activity and complete the evaluation in order to claim continuing education credit/hours
- Conflict of Interest (COI) and Financial Relationship Disclosures:
  - Carine Nassar, MS, RD, CDE - No COI/Financial Relationship to disclose
  - Gretchen Youssef, MS, RD, CDE - No COI/Financial Relationship to disclose
- Non-Endorsement of Products:
  - Accredited status does not imply endorsement by AADE, ANCC, ACEP or CDR of any commercial products displayed in conjunction with this educational activity
- Off-Label Use:
  - Participants will be notified by speakers to any product used for a purpose other than the one for which it was approved by the Food and Drug Administration

MedStar Diabetes Boot Camp Conception & Background

- Championed by the Chief Medical Officer
- 18 month period to gather input from system stakeholders including patients
- Integrated into the MedStar Health strategic plan and part of Population Health as of March 2019
Challenges of Diabetes Care Management

1. Reaching A1C goals
   - <53% of US adults w/ DM have A1C<7%
   - (< NHANES 2013)
   - >15% have an A1C> 9%

2. Access to DSMES
   - <7% newly dx T2DM w/private insurance participated in DSMES w/ 12 months of dx
   - 8.14% of Medicare fee for service beneficiaries with newly diagnosed diabetes used DSMES services at least once within 6 months of diagnosis
   - Medical Care. 2017 55(4)

3. Therapeutic Inertia
   - Failure to initiate/intensify therapy despite suboptimal glucose control
     - Multifactorial etiologies including patient/MD factors
     - Impacts adversely on overall "glycemic burden"
   - Lack of timely advancement of the DM medication regimen is common.
     - Outpatients in the US spend an average of 3-5 years with an A1C over 8% before being started on insulin
     - Median time to Rx intensification in pts. failing metformin is 14 months

Lin et al. Endocrine Practice 2016
**MedStar Diabetes Pathway Boot Camp**

1. Discharge to Primary Care
   - In-person
   - "Human engagement"
   - DM assessment
   - DSME/MNT
   - DM Rx management
   - Realtime BG meter
   - Daily BG review
   - Virtual visits
   - Rx intensification & management
   - DSME
   - Care integration.

2. **Diabetes High Risk – High Cost:**
   - A1C > 9
   - Virtual Clinic visits
   - Provider support
   - PCP referral
   - Timely

**Key Innovative Features**

- Ongoing DSME
- CDEs (RD, RN, PharmD, NP)
- Medication management based on approved medication algorithm

**Virtual Clinic (Command Center)**

- Smart meter (cellular enabled)

**Inclusion Criteria**

- Adults with T2DM
- A1C > 9.0%
- PCP/Endo willing to have patient enter the program
- Patient is able and willing to participate in the program
- Active and established patient in the MedStar System

**Exclusion Criteria**

- Active medical issues which would preclude patient concentrating on diabetes management
- High dose steroids
- Pregnant or planning pregnancy
- Patient and/or custodial caregiver unwilling and/or unable to participate in program-related activities
Visit One with CDE

- Deliver the MedStar KNOW Diabetes Knowledge Test on Tonic for Health Platform
- Delivery of education content

Visit One

- Comprehensive Assessment with Focus on:
  - Barriers to medication adherence
  - Taking diabetes medications including insulin administration and medication storage
  - Eating patterns and access to food
  - SMBG
  - Self care behaviors

Visit One

Telcare Real Time Blood Glucose Monitoring System

- Register and Train Patient on use of meter
- No additional charge for cell service
- No uploading of BG values required
- BGs go to HCP dashboard
Visit One - DSMES
Diabetes to Go: Know the Basics About your Diabetes Before You Go Home

- Know Your Diabetes Numbers: Sugar and A1C
- Know when your Blood Sugar is Low
- Know when your Blood Sugar is High
- When to call your Doctor or go to the ED
- Basic Meal Planning
- Checking your Blood Sugar
- Know your Diabetes Medications

Boot Camp Medication Algorithm

- Developed by MedStar Endos & CDEs with input from PCPs
- NP/CDE use PCP ordered DM medication management algorithm
- NP or Boot Camp MDs review and sign off on rx or medication titration
- Hard stops for NPs/ CDEs

Diabetes Medication
Shared Decision Making

- Insurance coverage & cost
- Reduction in A1C
- Frequency
- Risk of hypoglycemia
- Weight change
- Main side effects
Visit Two in 1-2 Weeks

Visit Two with CDE
- Review use of BG meter and BG patterns
- Food intake/meal planning
- Medication barriers and adherence
- Medication management
- DSMS Plan
- Warm Hand-off to the Virtual Clinic

Weeks 3-12
MedStar Virtual Control Center
Managed by Nurse Practitioners
- Contacts patient via phone, text, email a minimum 1 time a week
- Review BG Patterns
- Medication Adherence Strategies
- Medication titrations
- DSMES
Monitoring of Telcare Dashboard

- Patient informed that Telcare dashboard is Not monitored 24/7
- Should contact PCP or go to ED when unable to contact Virtual Clinic
- Reviewed week days 8 AM – 4 PM
- Allows for teachable moments, problem solving and targeted education

Week 12

- Patient “graduates” and returns to PCP or Endo
- Recommendations sent to referring provider which may include follow-up with CDE and Endo (NP or physician).
- Follow on dashboard until 6 months
- Sustaining strategies

Boot Camp Combined Phase 1 & 2
Demographics

<table>
<thead>
<tr>
<th></th>
<th>Case</th>
<th>Control</th>
<th>p-val</th>
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<tbody>
<tr>
<td>Age, mean(SD)</td>
<td>56.7 (10.0)</td>
<td>57.4 (12.1)</td>
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<tr>
<td>Female</td>
<td>225 (62)</td>
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<tr>
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<td>5 (1)</td>
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<tr>
<td>Medicaid</td>
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<tr>
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<tr>
<td>Private</td>
<td>134 (2)</td>
<td>129 (3)</td>
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<tr>
<td>Self Pay</td>
<td>5 (2)</td>
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A1C Results

Risk for Acute Care Utilization at 90 days: Boot Camp Patients
- Overall risk for acute care utilization: 51%
- Risk for inpatient admissions: 77%
- Risk for ED visits: 38%
- p < 0.001

Outcomes, Program Spread and Sustainability

Carine Nassar, MS, RD, CDE
Program Director, MedStar Diabetes Institute
**Diabetes Boot Camp: Outcomes, Spread and Sustainability**

- **Outcomes**
  - Glycemic Control
  - Resources Utilization
  - Patient and Provider Satisfaction

- **Spread**
  - Sustainability Strategies

---

**Boot Camp Combined Phase 1 & 2 Results**

- A total of 366 patients have completed the boot camp with end of intervention A1C available as of February 2018.
- Completed patients were matched with chart controls using a propensity score matching procedure at a 1:1 ratio for age, sex, race/ethnicity, insurance group, and baseline A1C. Matched controls received standard diabetes care through their PCPs.

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**Boot Camp Combined Phase 1 & 2 Demographics**

<table>
<thead>
<tr>
<th></th>
<th>Cases N=366 (N=%)</th>
<th>Controls N=366 (N=%)</th>
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<td>56.7(10.0)</td>
<td>55.4(12.0)</td>
<td>0.08</td>
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<tr>
<td>Female</td>
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<td>225(62)</td>
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<tr>
<td>White</td>
<td>494(87)</td>
<td>535(91)</td>
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<td>A1C</td>
<td>7(6)</td>
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<tr>
<td>Self-Pay</td>
<td>8(2)</td>
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Three Months A1C Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Case</th>
<th>Controls</th>
<th>Case Effect</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline A1C (%)</td>
<td>11.3 (17.7)</td>
<td>11.3 (14.0)</td>
<td>0.13</td>
<td>0.53</td>
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<tr>
<td>60 Day A1C (%)</td>
<td>8.1 (11.3)</td>
<td>8.6 (13.8)</td>
<td>-0.8</td>
<td>&lt;0.001</td>
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<tr>
<td>Change in A1C (%)</td>
<td>-3.04 (1.86)</td>
<td>-3.44 (2.13)</td>
<td>-0.4</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Percentage A1C Lowering</td>
<td>-26.3 (14.6)</td>
<td>-22.0 (17.5)</td>
<td>-14.3</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>N reaching A1C &lt; 7%</td>
<td>197 (51)</td>
<td>66 (17)</td>
<td>OR &gt; 5.5</td>
<td>3.8, 8.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>N reaching A1C &lt; 7%</td>
<td>30 (76)</td>
<td>18 (5)</td>
<td>OR &gt; 7.0</td>
<td>3.6, 12.9</td>
<td>&lt;0.001</td>
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</tbody>
</table>

*Odds Ratio

A1C Results

Utilization of Acute Care Services

- In addition to A1C, number of ED visits and hospitalizations also collected for 3 months pre and post baseline to assess impact of Boot camp on acute care utilization if any
- Data obtained for both boot camp cases and controls
- Evaluated and analyzed raw data and risk ratios
Risk for Acute Care Utilization at Baseline

- Boot Camp patients had a 53% higher risk of having had an acute care utilization encounter (ED and/or hospitalization) in the 90 days prior to baseline as compared to controls
- Boot Camp patients had a 300% higher risk of having had an inpatient hospital stay in the 90 days prior to baseline
- Data confirms that high risk patients are being referred to the Boot Camp

Pre and Post Hospitalization data: Cases vs. Controls

<table>
<thead>
<tr>
<th>Metric</th>
<th>Cases</th>
<th>Controls</th>
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<td>Pre-</td>
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<tr>
<td>Post-</td>
<td>4</td>
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<tr>
<td>Reduction</td>
<td>- 79%</td>
<td>+ 14.0%</td>
</tr>
<tr>
<td>90 day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-</td>
<td>39</td>
<td>12</td>
</tr>
<tr>
<td>Post-</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Reduction</td>
<td>- 76.9%</td>
<td>+ 58.3%</td>
</tr>
</tbody>
</table>

* P value = 0.036 for cases vs control post-intervention

Risk for Acute Care Utilization at 90 days: Boot Camp Patients

- Overall risk for acute care utilization: 51%
- Risk for inpatient admissions: 77%
- Risk for ED visits: 38%
- p < 0.001
Risk for Acute Care Utilization at 90 days: Matched Controls

• Overall risk for acute care utilization: small decrease, NSS

• Risk for inpatient admissions: increased, NSS

• Risk for ED visits: \( \downarrow \) 34%
  \[ p < 0.03 \]

Cost Analysis and Return on Investment

• Based on analysis of 732 patient cohort and actual hospitalization cost data, a diabetes patient participating in the Boot Camp is projected to save $3,086.40 annually in averted hospitalization costs

• Full cost analysis and return on investment modeling in progress based on: cost of Boot Camp per patient, insurance reimbursement for in person visits, cost of new medications, hospitalizations averted, etc

Patient and Provider Satisfaction

• Patients and providers were queried about their satisfaction with the pilot program during pathway 1 (N=98):
  – 94% of participants reported being very satisfied with the intervention, with 98% very satisfied with their progress. Participants also reported high satisfaction with the structure of the program.

• Among 33 providers referring patients, 10 (30%) completed a satisfaction survey. All reported being very satisfied with the structure and quality of care and requested that the boot camp become an established program in the healthcare system.
**Overall Impact of the Diabetes Pathway Boot Camp**

- Significantly greater A1C lowering than standard of care over 90 days: -3.06 vs. -1.44%
- Significant reduction in ER and inpatient admissions as compared to baseline; and significant reductions in inpatient admissions as compared to standard of care.
- High satisfaction from patients and referring providers
- Mandate from healthcare system to spread to additional sites

---

**Diabetes Pathway Boot Camp Program Spread**

- Pilot boot camp program (N=98): offered at 3 hospital based hubs to patients of system providers with clinics located at those hubs.
- Phase 2: Expanded program (N=268): offered at 5 hospital based hubs + 1 clinic to patients of all system providers via 1 click order in EMR.
- Phase 3 (current): offered at 7 hospital based hubs +1 clinic, additional locations being identified. Patients have to have a system provider and EMR.

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**Challenges to Program Spread**

- Educator availability at the various sites under consideration.
- Physician or NP oversight at each location.
- Extensive training required for site staff prior to conducting visits 1 and 2 without central program staff present.
- Availability of office space.
- Reimbursement model for visits 1 and 2 vary by location and state.
- Need for reimbursement for Virtual Center calls
Program Spread Strategies

- RD, CDE hired to augment one large hub’s enrollment capacity and act as “roving” educator to primary care practices that are 1) high referrers and/or 2) too far from the hubs. Roving educator provides 2 initial in-person visits at these additional sites.
- Virtual control center capacity increased with more NP coverage to provide additional educator oversight.
- Reimbursement for virtual visits by NPs utilizing remote monitoring codes is being explored.

Sustainability of Improved Glycemic Outcomes

- What happens to the pathway patients once they complete the boot camp? Are their improved glycemic outcomes sustained?
- If no one is watching…
  - do patients maintain
  - newly acquired self-care
  - behaviors?

What Happened to A1C Results Post Pathway v 1.0, n=98

- Reviewed A1C data at 6 months and 12 months post Boot camp completion
- Many A1Cs not available for long term follow up: patient did not return for clinic visits, insurance and provider changes, etc
- Small data set
What does long term A1C data tell us?

- Two conclusions drawn from A1C drift data despite limited data:
  - The Diabetes Pathway Boot Camp intervention has a long term impact.
  - One year after completion,
    - 80% of patients with follow up A1C had lower A1Cs than prior to the pathway; and
    - 57% had an A1C that was still at least 2 points lower than baseline.
- Some of the gains are lost over time for a subset of patients
- Long term sustaining strategies are needed to ensure more patients maintain their gains.
Boot Camp Sustaining Strategies
Under Investigation

• Teaching clinic based: Internal medicine physician champion leads a team of rotating residents in providing long term surveillance and follow up for boot camp completers followed by clinic providers.
• Remote coaching using BioTel coaching system: Blood glucose data monitored by remotely located CDEs who calls patients to provide ongoing DSME, including addressing highs and lows. No medication adjustments provided but CDE will call Provider if concerned about BG trends.

Sustaining Strategies

• Glytec cloud-based software analyzes patient glucose data from smart meter and calculates adjustments to a patient’s insulin dose regimen.
  – Recommendations sent to Provider/CDE who then contacts patient to determine if any lifestyle change occurred that may have impacted blood glucose control.
  – If appropriate, insulin change recommendations discussed with patient and implemented.

Sustaining Strategies Status

• 3 strategies being tested at different hubs
• Long term A1C data continues to be a challenge to obtain
• Patient focus groups and Provider feedback: preference for pathway staff to provide long term follow up to ensure sustainability of glycemic improvements and continuity of care.
• Under consideration: monthly follow-up call by VCC NPs
Conclusions

- The technology enabled MedStar Diabetes Boot Camp has proven to be effective in reducing A1C and acute care utilization as compared to standard of care.
- Patients and providers have expressed high satisfaction with the program.
- System spread is an incremental process that requires careful site selection with identification of local providers and champions.

Future Challenges

- Challenges to spread include: staffing, facilities, reimbursement models and need for training and oversight from the bootcamp’s central office staff.
- Improved glycemic outcomes can erode over time for a subset of patients indicating the need for robust sustaining strategies.