# Chronic Disease Management with Telehealth

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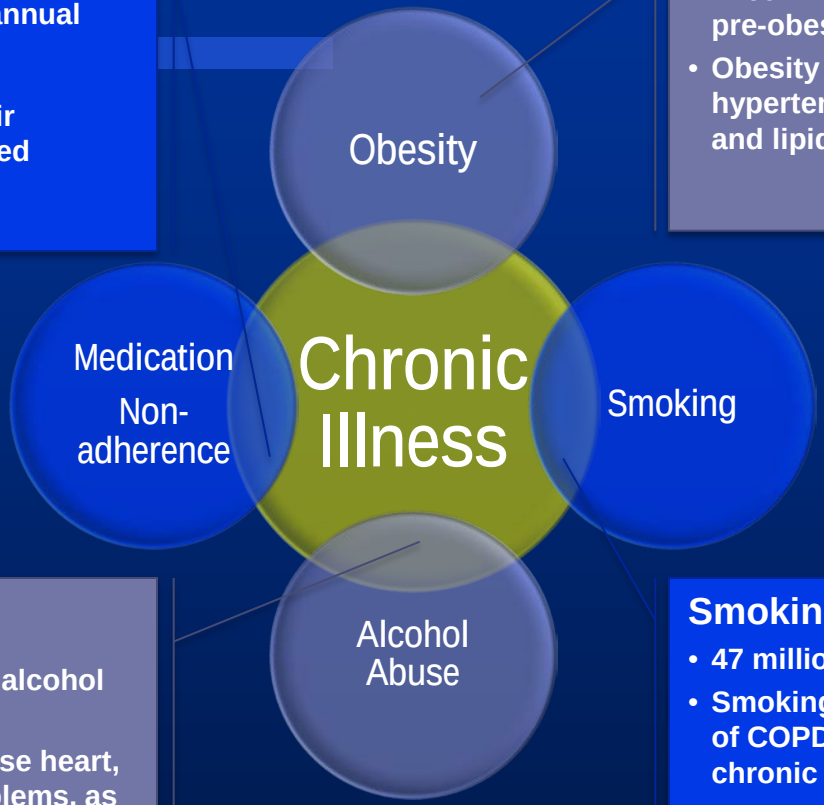
# Poor Lifestyle & Chronic Disease Epidemic

## Medication non-adherence

- Non-Adherence is an annual $290 billion problem
- 50% of do not take their medication as instructed

## Obesity

- >160 million U.S. are overweight , pre-obese, or obese.
- Obesity increases the risk of hypertension, type 2 diabetes, and lipid concentrations.



## Alcohol Abuse

- > 14 million suffer from alcohol abuse or alcoholism.
- Heavy drinking can cause heart, liver and pancreas problems, as well as increase the risk of developing certain cancers.

## Smoking

- 47 million U.S. are smokers.
- Smoking is responsible for 80% of COPD (emphysema and chronic bronchitis) deaths.

# Rural Health and Chronic Disease

**The five most common diagnosis in rural Veterans seen as an out patient include:**

- **Hypertension**
- **PTSD**
- **Diabetes Type II**
- **Depressive Disorder**
- **Hyperlipidemia**

# Rural Veteran Health Care Challenges

- Distance to care
- Transportation
- Lack of specialty care
- Rural provider training
- Older, poorer sicker population
- Lack of mental health care providers
- Difficulty in recruitment and retention of providers to rural areas
- Rural Veteran understanding of VA eligibility and benefits

# Role of Telemedicine

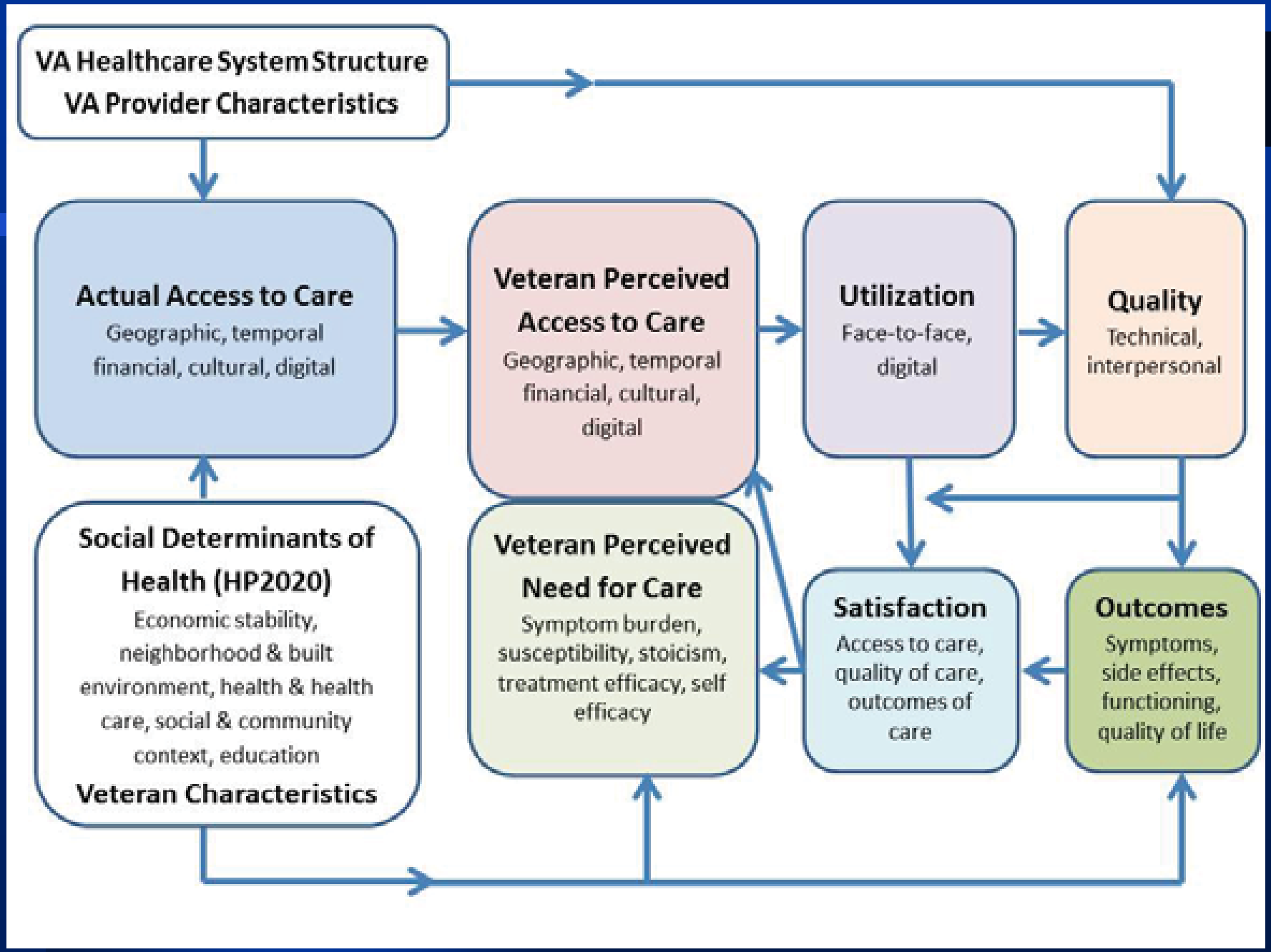
- Off-load primary care visits
- Create new models of care – increase access
- Support for performance incentive goals
- Improves quality measures

# Telehealth Trends

- Transformation of telehealth from increasing access to health care to providing convenience and eventually reducing cost.
- Expansion of telehealth from addressing acute conditions to also addressing episodic and chronic conditions.
- Migration of telehealth from hospitals and satellite clinics to the home and mobile devices.

# Telehealth Trends

- Low-cost virtual visits (less than $50 per visit) around the clock for the “most common, most irritating, most inconvenient” conditions.
- By contrast, it takes an average of 20 days to secure a 20-minute appointment with a physician that includes travel and waiting
- Telehealth may increasingly deliver intensive services to the 20% of persons who account for 80% of health care expenditures.


VA Healthcare System Structure
VA Provider Characteristics
Actual Access to Care
Geographic, temporal financial, cultural, digital
Veteran Perceived Access to Care
Geographic, temporal financial, cultural, digital
Utilization
Face-to-face, digital
Quality
Technical, interpersonal
Social Determinants of Health (HP2020)
Economic stability, neighborhood & built environment, health & health care, social & community context, education
Veteran Characteristics
Veteran Perceived Need for Care
Symptom burden, susceptibility, stoicism, treatment efficacy, self efficacy
Satisfaction
Access to care, quality of care, outcomes of care
Outcomes
Symptoms, side effects, functioning, quality of life

# Leveraging VA telemedicine infrastructure

- VA is a leader in telemedicine - an ideal venue for implementing telemedicine-based care
- VA has built a nationwide network of Home Telehealth (HT) nurses
  - Typically used for telemonitoring, but not for delivering the intensive disease management
- Because HT infrastructure is ubiquitous throughout VA, this approach gives unique potential for scalability

# Veterans Study to Improve the Control of Hypertension

## The V-STITCH Study

VA Health Services Research
Investigator Initiated Award, 2001-06

# The V-STITCH Study

- A randomized controlled trial testing a nurse administered, telephone interventions designed to improve BP control
- Durham VAMC General Medicine Clinics
- Patients with hypertension on medications
- 24-month intervention and follow-up

# Patient Intervention

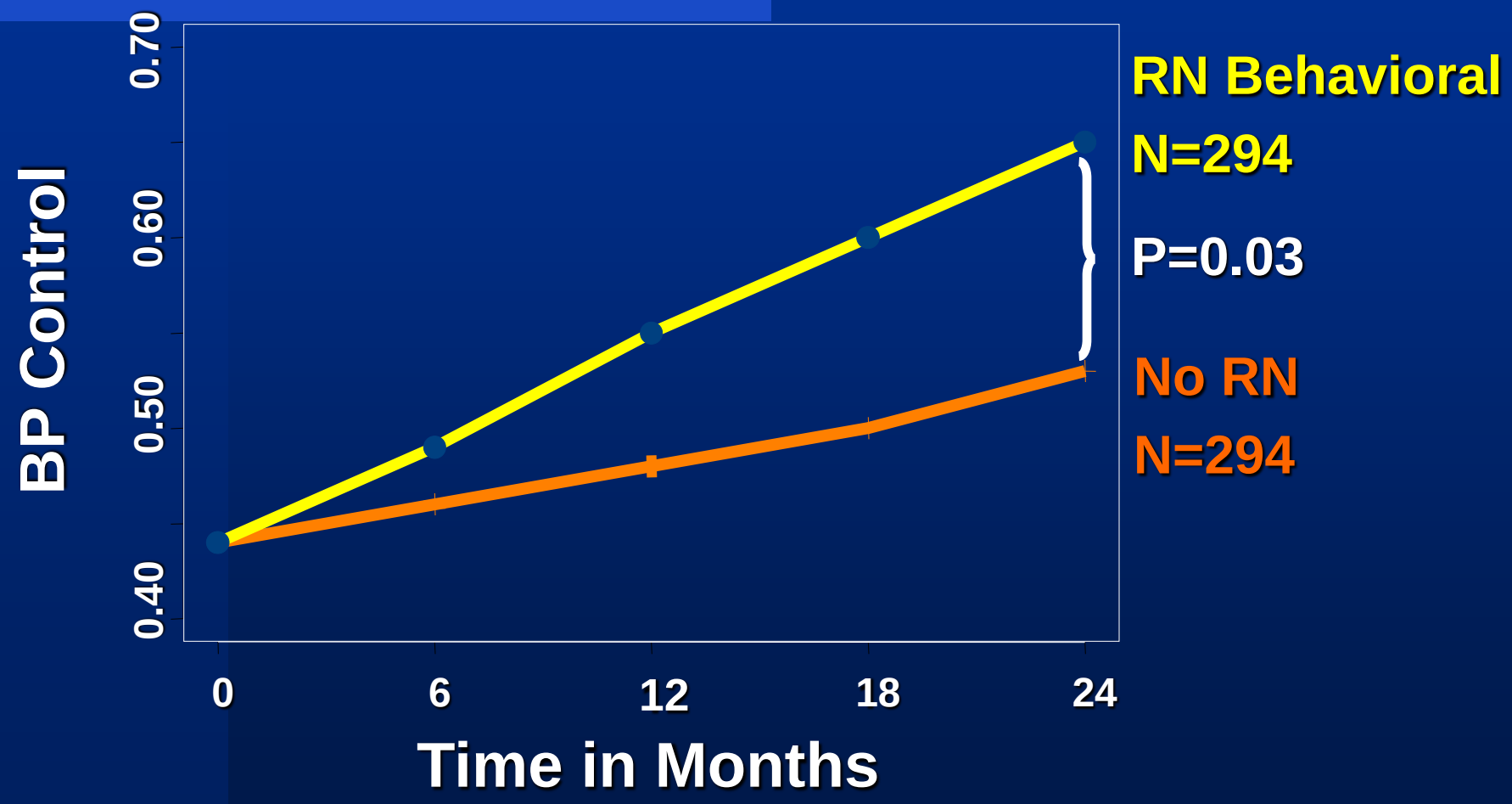
## Frequency of Nurse-based calls

| | |
|---|---|
| 1st & 13th months | Physician Interaction, Memory, Literacy, Side effects |
| 3rd & 15th months | Hypertension knowledge, Memory, Literacy, Side effects, Missed appointments, Pill refills |
| 5th & 17th months | Lifestyle, Memory, Literacy, Side effects, Missed appointments, Pill refills |
| 7th & 19th months | Social Support, Memory, Literacy, Side effects, Missed appointments, Pill Refills |
| 9th & 21st months | Physician Interaction, Memory, Literacy, Side effects, Missed appointments, Pill Refills |
| 11th & 23rd months | Memory, Literacy, Side effects, Missed appointments, Pill refills |
| Any month | Patient initiated |

# Patient Characteristics (N=588)

| | |
|---|---|
| Male | 98% |
| Mean age | 63 years (21-87) |
| White | 57% |
| African American | 40% |
| High school or less | 51% |
| Inadequate income | 23% |

# Nurse Behavioral Intervention vs. None
# Secondary Analysis



# Nurse Behavioral Intervention vs. None Secondary Analysis

- Among the 216 patients with diabetes, intervention patients had a mean reduction in HbA1c of 0.46% (p=0.03) relative to controls.

# Compliance with Nurse Telephone Intervention

- Patients completing all 12 scheduled study calls: 85%
- Average length of call: 3 minutes (SD 2.5 min)

# Average Behavioral Intervention Costs Per Patient over 24 months

| Cost Category | Patients Overseen by Nurse | | |
|---|---|---|---|
| Number of Patients | 1120 | 840 | 560 |
| Direct Costs/per patient | $70 ($61-$81) | $94 ($82-$109) | $141 ($123-$163) |

# Summary

- Brief telephone intervention improved BP control by 21% at 24 months
  - 12.6% improvement compared to the non-behavioral group
- No increase in clinic utilization
- Cost effective

# Hypertension Intervention Telemedicine Study (HINTS)

Department of Veterans Affairs,
Grant IIR 04-426 (2005-2008)

Career Scientist Award 08-027 (2008-2013)

# Hypertension Intervention Nurse Telemedicine Study (HINTS)

## Design

- An 18-month randomized controlled trial
- 593 veterans enrolled; 49% African Americans
- Focus on patient self-management
  - The nurse administered patient intervention
  - Home BP monitoring
  - Medication management by MDs

# Baseline Characteristics (N=593)

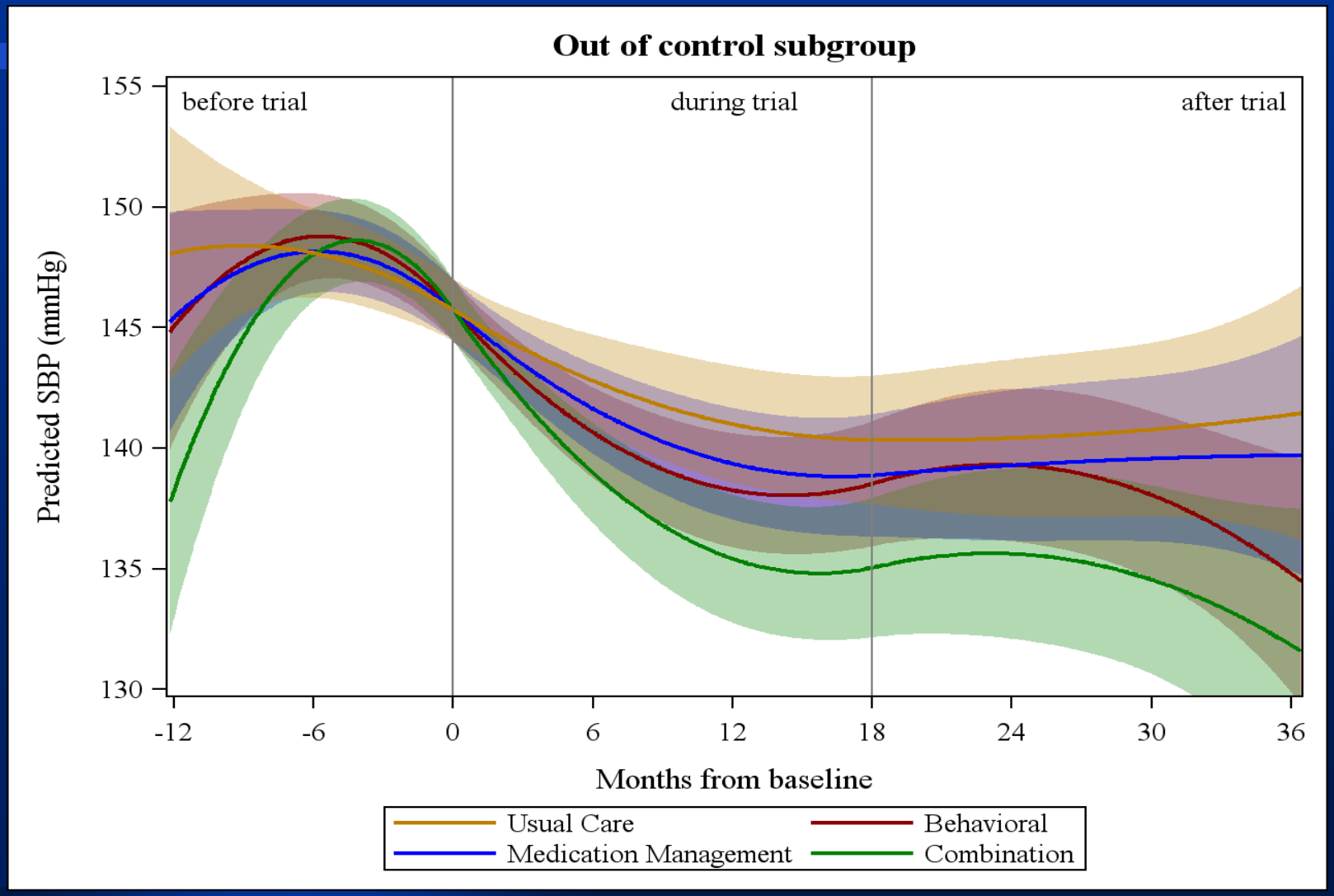
| | |
|---|---|
| Mean age (range) | 64 (30-89) |
| Male | 92% |
| White | 49% |
| African American | 48% |
| Not high school graduate | 13% |
| Low literacy level (< 9th grade) | 38% |
| Inadequate income | 18% |

# Hypertension Intervention Nurse Telemedicine Study (HINTS)

## Summary Results

- Among veterans with poor baseline BP control
  - Systolic BP decreased in the combined group by 14.8 mm Hg (95% CI: -21.8, -7.8) at 12 months
  - Systolic BP decreased 8.0 mm Hg (95% CI: -15.5, -0.5) at 18 months.

# Estimated SBP with 95% Confidence Regions among the Subgroup with Inadequate BP Control at Baseline (n=243)



# SCALABLE telemedicine

- Scalability = The extent to which an intervention shown to be efficacious under research conditions can be expanded under real-world conditions to effectively reach a greater population

- The literature is littered with interventions that are **efficacious**, but not **effective** – because they can't realistically be implemented

•Milat AJ, et al. Health Promot Int. 2013;28(3):285-98

# •Limitations of Telehealth and Potential Solutions.

**Table 1.** Limitations of Telehealth and Potential Solutions.

| Limitation | Potential Solution |
|---|---|
| Reimbursement | |
| Limited and fragmented insurance coverage of telehealth | Increase evidence base (especially with rigorously designed studies) for the ability of telehealth to improve access or care at a reasonable cost |
| Potential for excess health care utilization | Show the ability of telehealth to reduce utilization of expensive in-person services (e.g., emergency department visits) over the short term; account for full economic value of telehealth, including costs borne by patients, families, and facilities[37]; acknowledge the limitations of and limited evidence base for current care models; expand commercial insurance coverage through additional state telehealth parity laws; adopt policies to expand Medicare coverage of telehealth; set flexible limits on the utilization of high-cost remote services |
| Clinical issues | |
| Lower quality of patient–physician relationship, physical examination, and care with remote visits than with in-person visits | Could combine remote care with in-person care, including traditional house calls; implement low-cost, user-friendly peripheral devices to facilitate remote clinical assessments (e.g., vital signs) |
| Potential for abuse (e.g., overprescribing of narcotics) | Require initial in-person visit for the prescription of high-risk medications or limit remote prescribing of them |
| Fragmentation of care among multiple providers | Create alternative telehealth care models within integrated delivery systems; develop and use interchangeable electronic health records to facilitate sharing of information among diverse providers |
| Legal issues, such as state licensure laws, need for credentialing at multiple sites, and liability concerns | Accelerate implementation of the Interstate Medical Licensure Compact[38]; enact federal legislation, such as the TELE-MED Act of 2015,[39] to enable Medicare participating providers to provide services to any Medicare beneficiary; streamline credentialing process at remote sites by allowing reliance on privileging decisions at hub sites; inform patients about limitations of and alternatives to telehealth and obtain consent |
| Social issues, such as differential access to telecommunications technologies based on social and geographic factors, resulting in many underserved populations | Increase broadband access nationally; provide underserved persons with smartphones or related technologies to increase access to care; conduct dedicated outreach and provide technical support to persons with limited access or familiarity with new technologies |

# Advanced Comprehensive Diabetes Care (ACDC)

# ACDC overview

- Objective: To foster comprehensive telemedicine-based management of PPDM as a feasible, real world option within VA
- Design: 6-month pilot randomized trial evaluating a telemedicine approach for PPDM that was specifically designed for scalability within VA
- Population: 50 Veterans with insulin-requiring type 2 diabetes meeting PPDM criteria
  - HbA1c persistently >9.0% (based on a minimum of 2 values) over the prior year despite management by Durham VA Primary Care or Endocrinology

# ACDC intervention design

- **ACDC comprises 4 evidence-based, telephone-delivered components that address factors contributing to PPDM:**

| Problem in PPDM | ACDC Component |
|---|---|
| Unreliable/unavailable blood glucose data | 1) Telemonitoring |
| Suboptimal medication adherence | 2) Self-management support |
| Complex medication regimens | 3) Medication management |
| Comorbid depression | 4) Depression management |

  - **Effectiveness: Primary outcome = HbA1c, linear mixed models with constrained intercept**
  - **Formative: Semi-structured interviews with intervention group**

# Intervention procedures

- Intervention patients submitted blood glucose data using standard VA HT equipment (Cardiocom IVR) on a daily basis
  - Daily automated calls as a prompt to self-report blood glucose data (using IVR or phone number keys)
- ACDC intervention delivered by VA HT nurses via 30-min telephone calls every 2 weeks x 6 months (12 total calls max):

# Outcomes

| BASELINE CHARACTERISTICS[a] | ACDC (*N*=25) | USUAL CARE (*N*=25) |
|---|---|---|
| Demographics | | |
| Age (years) [mean (SD)] | 60 (8.4) | 60 (9.2) |
| Male | 25 | 23 |
| Race | | |
| White | 13 | 8 |
| African American | 12 | 15 |
| Other | 0 | 2 |
| Latino/Hispanic ethnicity | 1 | 2 |
| Married/living together | 18 | 13 |
| Completed ≤12 years of school | 9 | 10 |
| Low health literacy (REALM ≤60) | 11 | 9 |
| Employed, full-time/part-time/self | 10 | 8 |
| Inadequate income[b] | 5 | 8 |
| Lives alone | 6 | 5 |

•Crowley MJ, et al. Telemed J E-Health. 2015 Nov 5. [Epub ahead of print]

- **On our primary analysis, ACDC patients appeared to have a greater HbA1c improvement than usual care patients**

| OUTCOME | PREDICTED MEAN (SE) | | PREDICTED MEAN DIFFERENCE ACDC VERSUS UC (95% CI) | *P* VALUE |
|---|---|---|---|---|
| | ACDC INTERVENTION | UC | | |
| HbA1c (%)[a] | | | | |
| Baseline | 10.5 (0.2) | 10.5 (0.2) | | |
| 3 months | 9.2 (0.3) | 10.2 (0.3) | −1.0 (−1.7, −0.2) | 0.012 |
| 6 months | 9.2 (0.4) | 10.2 (0.4) | −1.0 (−2.0, −0.0) | 0.050 |
| SBP (mm Hg)[b] | | | | |
| Baseline | 126.7 (2.3) | 126.7 (2.3) | | |
| 3 months | 126.4 (3.1) | 128.7 (3.1) | −2.3 (−10.4, 5.9) | 0.575 |
| 6 months | 122.1 (3.0) | 129.8 (2.7) | −7.7 (−14.8, −0.6) | 0.035 |
| DBP (mm Hg)[b] | | | | |
| Baseline | 72.3 (1.5) | 72.3 (1.5) | | |
| 3 months | 70.7 (1.9) | 72.4 (1.9) | −1.7 (−6.6, 3.2) | 0.498 |
| 6 months | 67.8 (1.9) | 73.4 (1.8) | −5.6 (−9.9, −1.2) | 0.013 |
| SCI-R[c] | | | | |
| Baseline | 49.3 (1.7) | 49.3 (1.7) | | |
| 3 months | 54.7 (2.4) | 52.4 (2.3) | 2.3 (−3.4, 8.0) | 0.421 |
| 6 months | 58.0 (2.7) | 50.9 (2.6) | 7.0 (0.1, 14.0) | 0.047 |

•Crowley MJ, et al. Telemed J E-Health. 2015 Nov 5. [Epub ahead of print]

# The NC Medicaid Study

# NC Medicaid Study

- 558 Medicaid patients
- Self management program focused on improving lifestyle and medication adherence
- Improvement of medication possession from:
  - 55% 12 months prior to program enrollment to 77% 12 months post initiation of the program

# Challenges

- Scalability
- ROI/cost
- IT
- Sustainability
- Evaluation
  - Integrating into regular work of clinic
  - Measuring success

# Where is the future?

- Chronic disease growing in prevalence
- Evaluations and considering various stakeholders (e.g., patients, family, providers)
- Self management programs require intersection of behavior/social contextual environment
- Need for increasing sophistication of analyses and methodologies (e.g., predictive analytics)
- Ability to work in an inter/multidisciplinary environment
- Investing in our future

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