

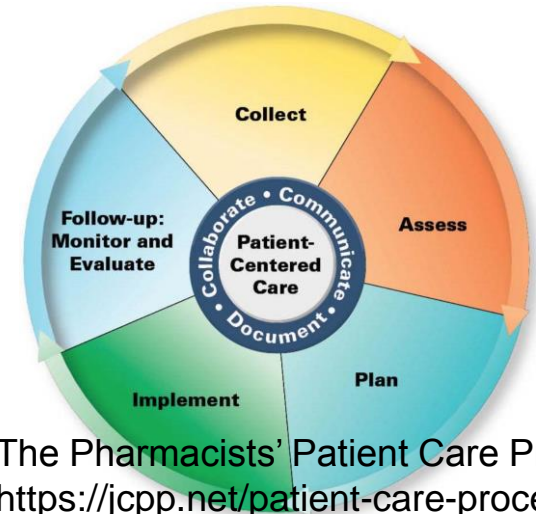
# WS3: Data-Responsive Care Planning

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# Care Process

A **Care Process** is *systematic approach* to the detection, treatment, and management of disease in a population by a given care team



- Often implicit or not very systematic
- **Goals:** transparent, patient oriented, evidence based
  - Regularisation of *known, high quality* care

# Care Process Models

Showing 1 to 10 of 184

| ◆ Title   | ◆ Reference number | ▼ Published   | ▼ Last updated |
|---|--------------------|---------------|----------------|
| Head injury: assessment and early management                      | CG176              | January 2014  | June 2017      |
| Spondyloarthritis in over 16s: diagnosis and management           | NG65               | February 2017 | June 2017      |
| Eating disorders: recognition and treatment                       | NG69               | May 2017      | May 2017       |
| Idiopathic pulmonary fibrosis in adults: diagnosis and management | CG163              | June 2013     | May 2017       |
| Hip fracture: management  | CG124              | June 2011     | May 2017       |

The nice thing about standards  
is that there are so many of them  
to choose from.

— *Andrew S. Tanenbaum*

# Challenges

- CPMs constantly evolve
  - Much faster than embodied care processes
- CPMs are high level
- CPMs are incomplete
- CPMs are hard to implement or adapt
  - Esp. across **time**, space, **condition**, organisation
  - Esp. in concert with complex IT
    - Or devolved sensing
  - Exacerbated for Long Term Conditions

# Consider Diabetes

**NHS Digital 2015-2016 diabetes audit**

**All people with diabetes aged 12 years and over should receive all of the nine NICE recommended care processes<sup>1,2</sup> and attend a structured education programme when diagnosed.**

## **Nine Annual Care Processes for all people with diabetes aged 12 and over**

**Responsibility of Diabetes Care providers (included in the NDA 8 Care Processes)**

|   |  |
|---|--|
| <b>1. HbA1c</b><br>(blood test for glucose control)                 | <b>5. Urine Albumin/Creatinine Ratio</b><br>(urine test for kidney function) |
| <b>2. Blood Pressure</b><br>(measurement for cardiovascular risk)   | <b>6. Foot Risk Surveillance</b><br>(foot examination for foot ulcer risk)   |
| <b>3. Serum Cholesterol</b><br>(blood test for cardiovascular risk) | <b>7. Body Mass Index</b><br>(measurement for cardiovascular risk)           |
| <b>4. Serum Creatinine</b><br>(blood test for kidney function)      | <b>8. Smoking History</b><br>(question for cardiovascular risk)              |

**Responsibility of NHS Diabetes Eye Screening (screening register drawn from practices)**

**9. Digital Retinal Screening**  
(photographic eye test for eye risk)

# Focus on Compliance

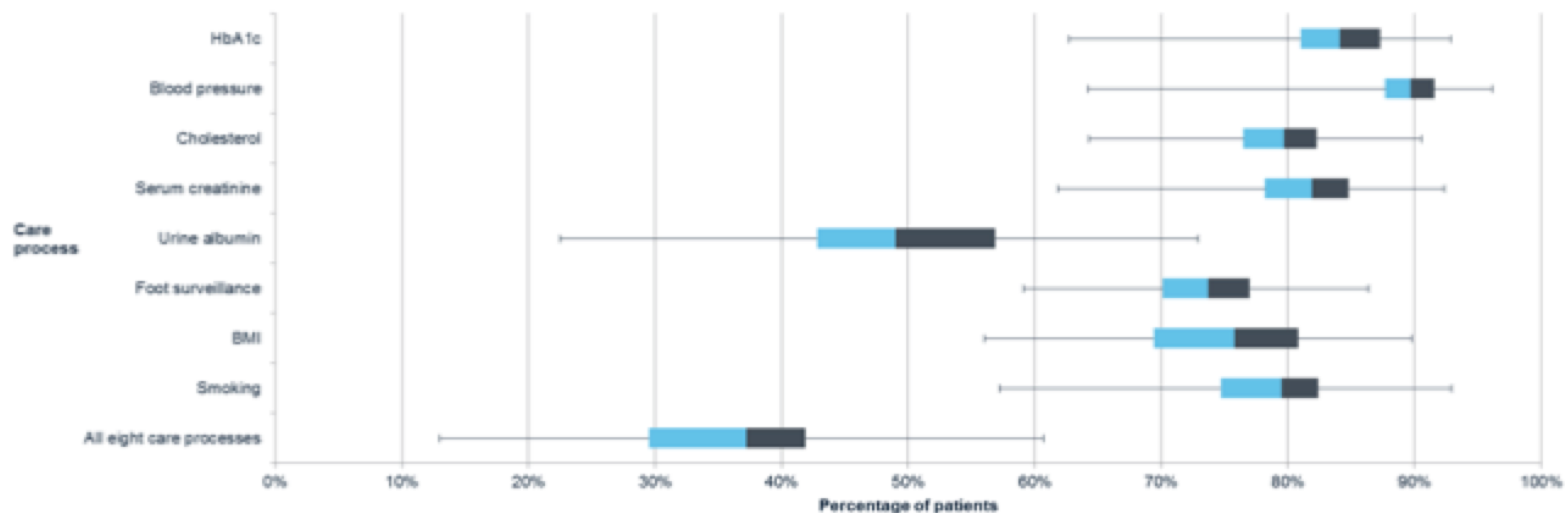
## Care Processes - Locality Variation, Type 1

### Key Finding

The striking variation at locality level is evident and can also be seen between similar specialist services.

**Figure 5: The range of CCG/LHB care process completion for people with Type 1 diabetes, 2015-2016**

England and Wales



# What's missing?

- These aren't full fledged processes
  - More like “checkpoints”
  - The gap between goal and enactment is large
- Hard to adapt and customize
  - Tracking preferences or deviations
  - Challenging to deal with
    - large data streams
    - evolving prediction and other data driven models
- Co-morbidities typically not well integrated
  - CPMs tend to have “light links” across conditions



# Integrating Wearables

- CPMs aim for compliance by *simplification*
  - Focus on few, high value, broad based moves
  - Aim for 100% compliance on key bits
- Wearable world
  - Powerful sensors and devices near the patient
  - High level of interconnection
    - From watches to powerful servers
  - Lots of data
  - Possibility for *effective* patient control
    - Compliant with richer Care Process Models

People with diabetes rarely spend more than two to three hours per year with a healthcare professional, and for the remaining 8,757 hours they must manage their diabetes themselves. They need the knowledge and skills [and tools] to do this.

*National Diabetes Audit, 2015-2016*

# Data-responsive care planning

- Goals:
  - Sophisticated electronic representation of CPMs
    - At a granular, deployable level
  - Planning as well as execution or monitoring
    - Determine patient specific pathways
    - Adapt to new circumstances or changes in patients
    - Mindful of the totality of the patient situation
  - Incorporate sensing (in the broad sense)
    - *React* to data from sensors (mediated by pred. models)
    - *Direct* sensors (hardware or people)

# WS3

- WS3.1. Acquisition of detailed care plans for long term care
  - Formalism design
  - Modular, multi-level, extensible
  - Use all members of the care team, esp. patients
- WS3.2. Planning for sensing
  - Tracking multiple sources of information
  - Adapt to failures (or success) of info gathering

# Key Collaborators

- Cerner Corporation
  - US centered
  - Top 2 supplier of electronic health record systems
  - Big push toward Knowledge Driven Systems
- NICE
  - Structured development of guidance
    - Including “deployable” guidance
- Elsevier
  - Exploiting their extensive knowledge assets