Clinical Decision Support (CDS) Roadmap for NHSScotland

SCIMP Conference

23rd September 2015

Overview

1. Outline of CDS Roadmap:

- The need for change
- Definition and scope
- Vision and architecture
- Proposed milestones and deliverables
- Benefits

2. CDS in action – demo of national CDS solution in New Zealand

3. Discussion

The Need for Change

Knowledge-Practice Gap

Knowledge exists but we often fail to apply it correctly.

30-45% of care not based on available evidence (McGlynn 2003, Grol 2003, NHS Atlas of Variation, 2014)

17 years to translate research evidence into routine practice

(Balas and Boren, 2010)

Variation, Harm and Waste in NHSScotland

- Vale of Leven
- Ayrshire and Arran
- Lanarkshire

- No coherent strategic approach to ensure that relevant healthcare knowledge is always available and used for health care decisions.

- **We need to strengthen our systems for ensuring that decisions about patient care are reliably informed by the best available knowledg**e.

Impact of CDS – the Evidence

Clinicians with CDS available to them are:

- 1.6 times more likely to prescribe the correct medicines or other therapies;
- 1.7 times more likely to order the required diagnostic tests
- 1.6 times more likely to monitor drug effects in line with evidence
- 1.4 times more likely to take appropriate preventative measures.

CDS impact on patient outcomes:

- Trend towards reducing, patient mortality.
- Trend toward, higher quality-of-life scores.
- Reduces or prevents adverse events.
- Can improve efficiency and can reduce costs.
- Can improve patient satisfaction.

  – *8 systematic reviews – Implementation Science, AHRQ, Annals of Internal Medicine.*

Policy commitment

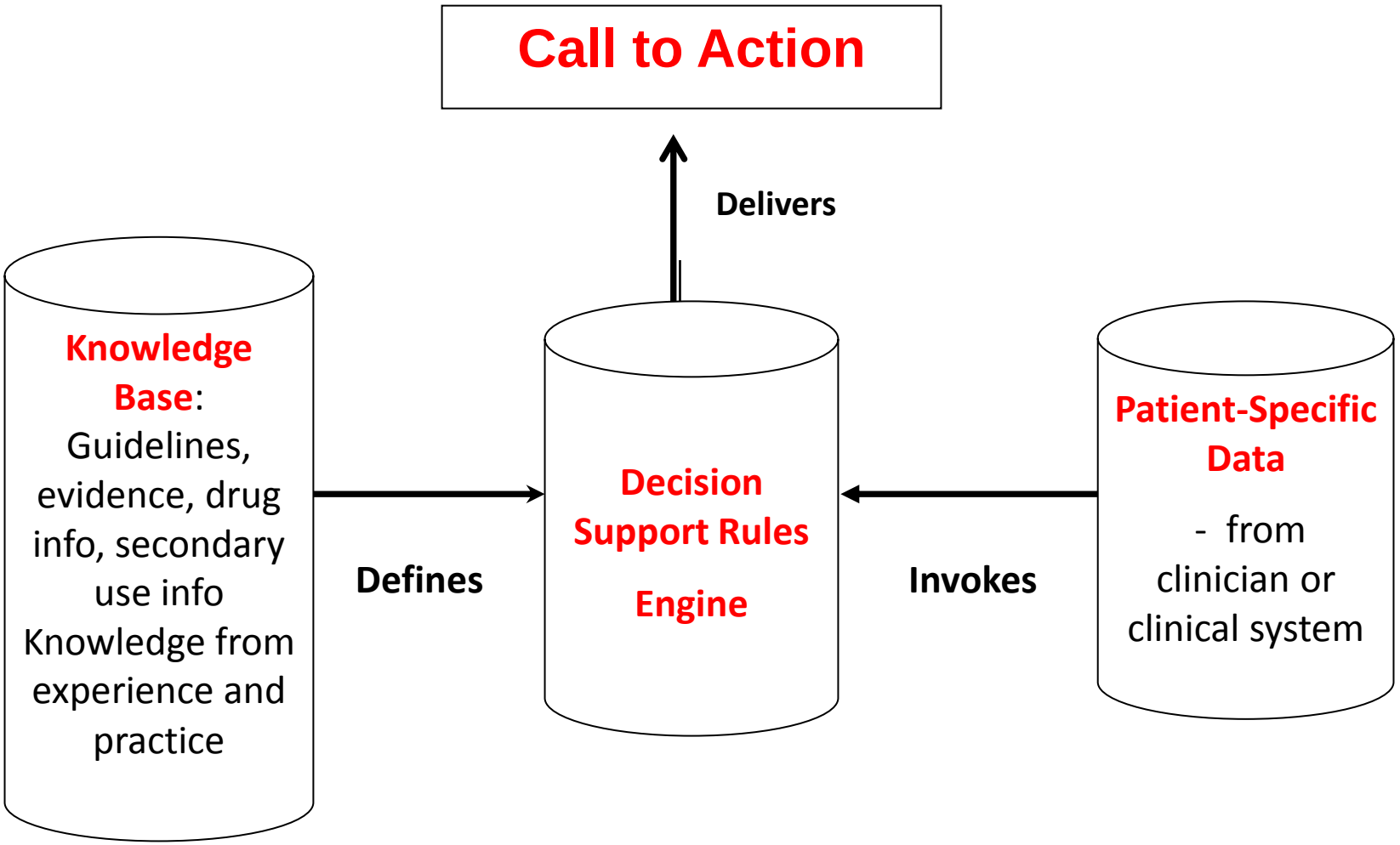
- **Clinical Decision Support an objective within new eHealth Strategy.**

"By 2016 we will have a plan to provide clinicians with quick and easy access to decision support tools that highlight variation from best practice, generate appropriate prompts and alerts, and enable generalists and less experienced clinicians to connect to specialist clinical knowledge and experience at point of care. "

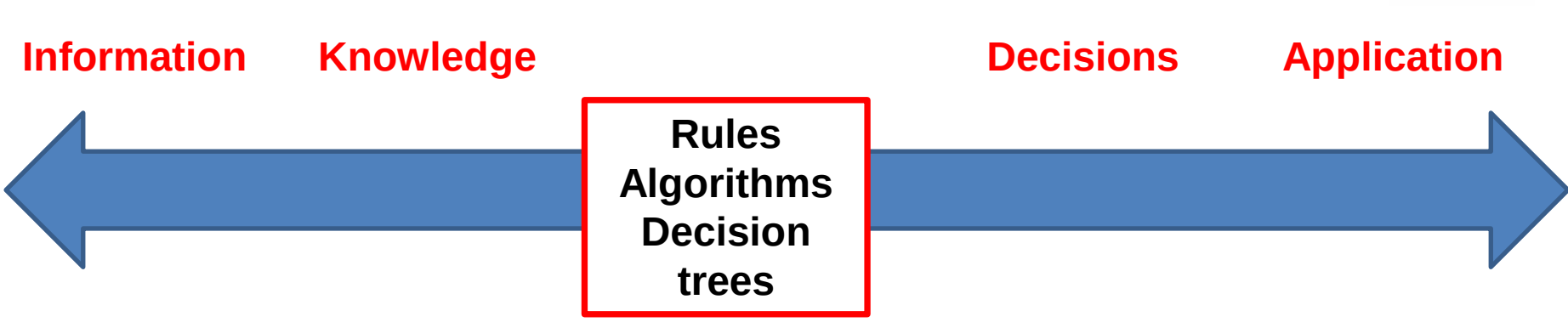
Defining Clinical Decision Support

A computer-based system providing "passive and active **referential information as well as reminders, alerts, and guidelines**." (Bates et al)

Components of Decision Support



No “one size fits all” CDS system



Formularies
E-Books
Guidelines
Evidence summaries
Datasets – e.g. public health.

Calculators for screening, dosage, etc
Diagnostic tools
Treatment options
Lab reference guides – interpretation.
Monitoring tools.

“Pull”
“Passive” reference resources

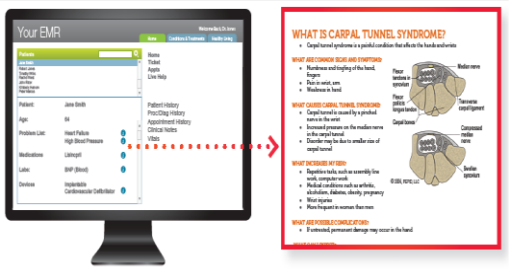
“Push”
Intelligent systems that anticipate clinician need

4 Types of CDS

1. **Standalone:**
- Web
- Mobile

2. Linked with clinical systems

- Clinician searches or follows links to evidence/guidance.



3. Context-sensitive support

- Business rules “push” patient-specific prompts and alerts to clinician.

4. **Clinician to clinician knowledge-sharing** via technology

Standalone Clinical Decision Support - Examples

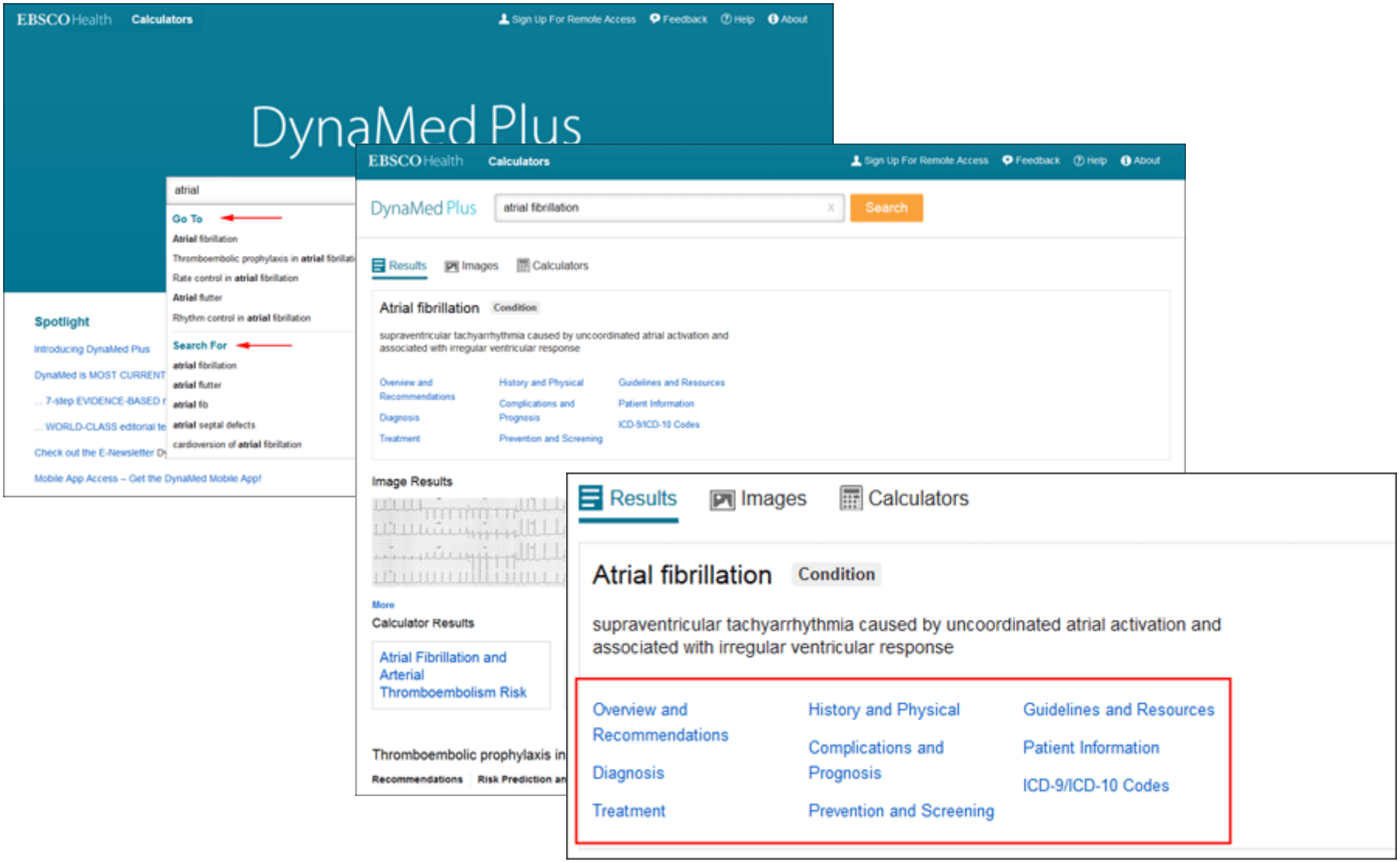
Website-Based:

- Dynamed Plus
- Clinical Pathway Publisher tool

Mobile:

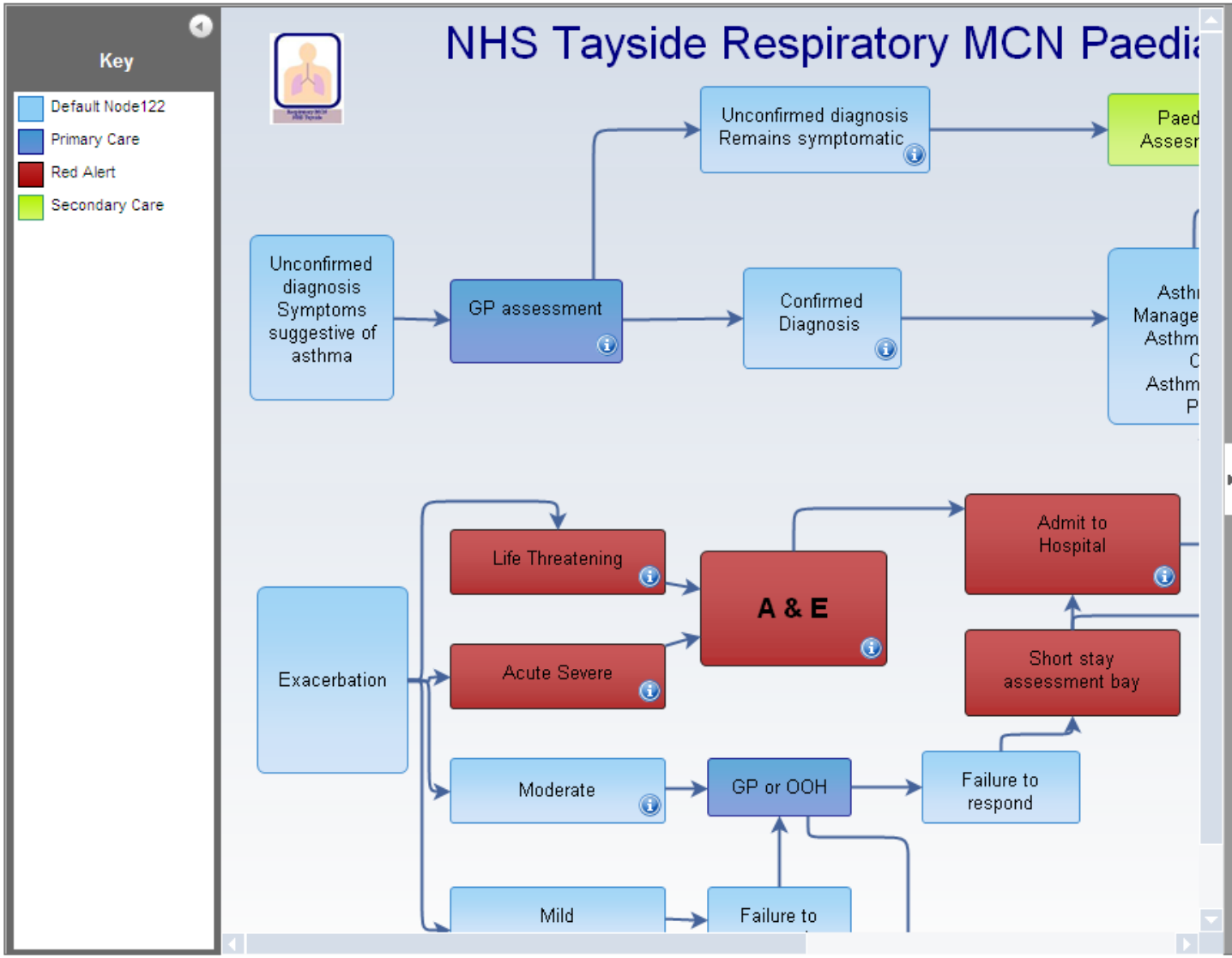
- BNF and SIGN apps
- Sepsis App (MHRA-approval)

Example – Dynamed Plus



NHS Tayside Respiratory MCN Paediatric Pathway

Author : Dawn Grogan
Email : dawngrogan@nhs.net
Created : 17/10/2012 15:56:05
NHS Board : NHS Tayside
Modified : 22/04/2013 13:16:22
Modified By : Dawn Grogan
Review Date : N/A



Information

NHS Tayside Childhood Guideline

External Links

NHS Tayside Respiratory MCN Staffnet

Website

Asthma UK

Knowledge Network

British guideline on the management of asthma: a national clinical guideline

Publisher: Scottish Intercollegiate Guidelines Network (SIGN)

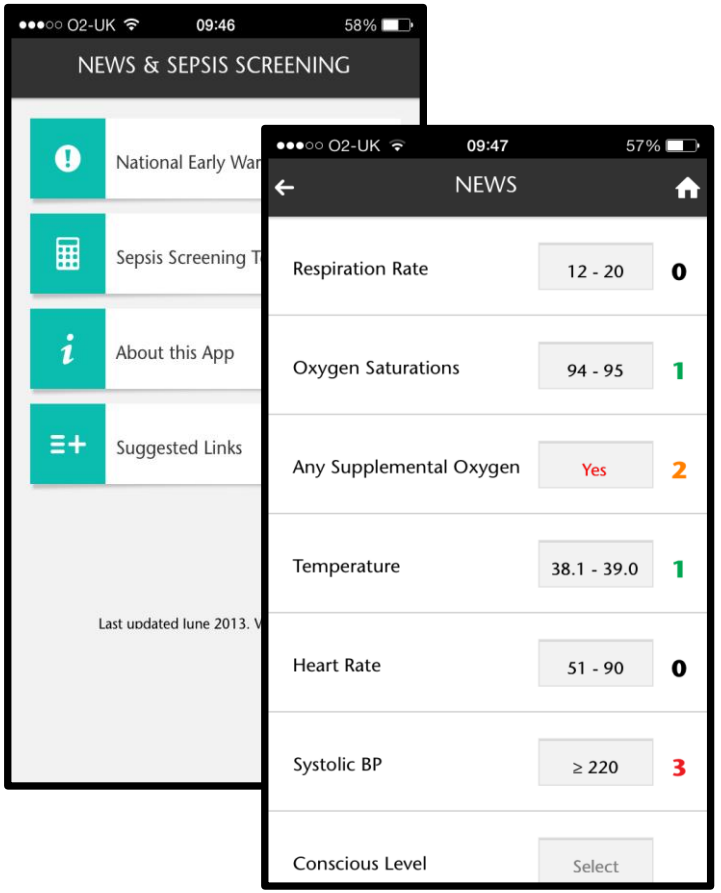
Date Published: 2008

Recent Documents

NHS

Information Knowledge Decisions Application

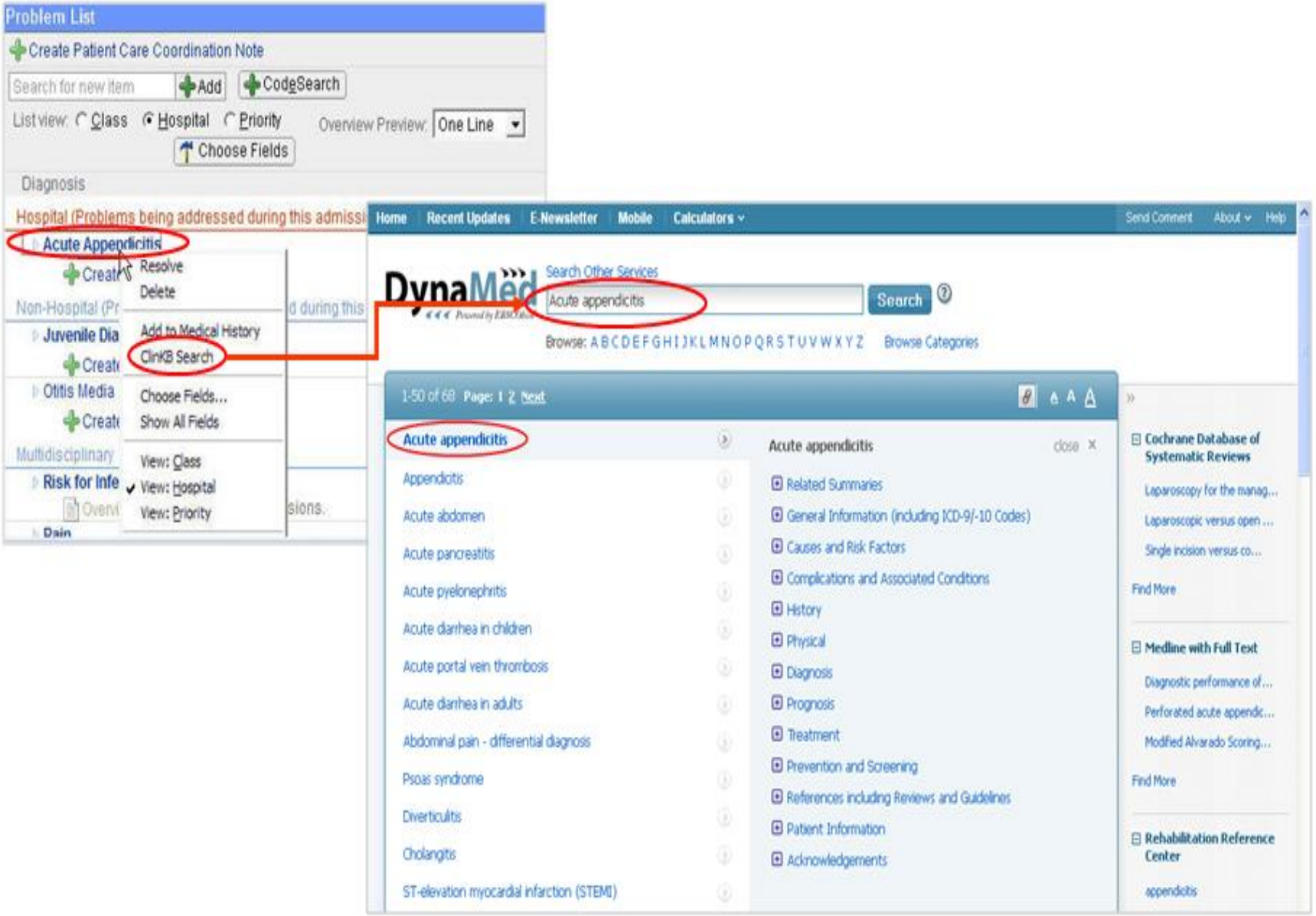
Rules
Algorithms
Decision trees



Linked Clinical Decision Support - Example

Search and links to “Dynamed Plus” embedded in Clinical System

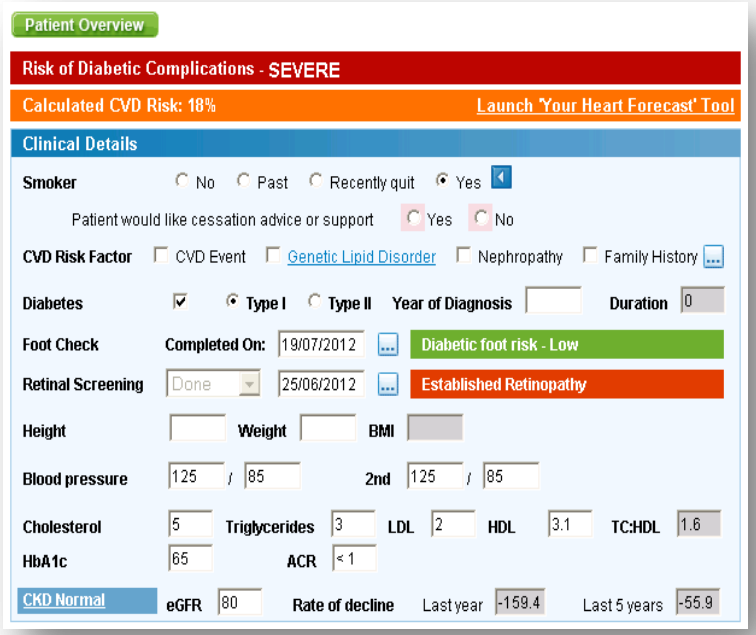
Passive Links to Evidence Summaries from EHR



Context-Sensitive Clinical Decision Support

Evidence and guidelines converted into decision support rules that are invoked by specific data in patient record; issue prompts and reminders to clinician in context of EHR.

Example: Care-IS used in primary care throughout New Zealand



CVD risk calculator embedded in clinical system

Clinical Advice

Progressive renal decline, predicted to enter stage 4 soon: consider referral if patient may be affected during their lifetime

Referral may be less useful if patient unlikely to be affected by their renal decline

Offer influenza and pneumococcal vaccinations

Minimise nephrotoxic drugs and consider renal doses of medication

Review every six months with FBC, creatinine, electrolyes, lipids, HbA_{1c}, and urine albumin-creatinine ratio

Urinary protein-creatinine ratio is less sensitive but sometimes used to monitor significant levels of proteinuria

No recent serum potassium found: do not implement any advice about starting or increasing ACE inhibitors or ARBs until normokalaemia verified

Target BP is systolic 120 - 139 and diastolic less than 90

Blood pressure above target; consider reviewing antihypertensive therapy with priority to ACE inhibitors or ARBs

Please use the Common Form for more detailed advice on management of hypertension

Urine ACR indicated due to previous proteinuria (no recent ACR or PCR found)

Arrange imaging of renal tract due to persistent invisible haematuria unless benign transient cause of haematuria identified. Recall to monitor haematuria within a year

http://www.bpac.org.nz/BT/2013/June/urine-tests.aspx contains advice on investigating haematuria. Risk factors for urological malignancy include smoking, recurrent UTI or other urological disorders, occupational exposure to chemicals or dyes, pelvic irradiation, history of excessive analgesic use, and others

Refer to nephrology due to invisible haematuria with proteinuria in CKD stage 3

Nephrology Referral

Refer patient to Nephrology

Patient specific advice based on SIGN Guidance – note that this combines guidance for diabetes, CKD, and Stroke management.

Screenshots from the BP CARE-IS system embedded in clinical systems

Limitations of Technology-Driven Evidence-Based Practice

- **Inflexible rules and technology driven prompts** may produce care that is management driven rather than patient centred.
- Statistically significant benefits indicated in the research evidence due to may be marginal in real-life practice where the environment – e.g. remote and rural **context - and patients are very different from controlled research studies**.
- **Pathways and guidelines based on single conditions and non-complex patients can encourage over-referral** and over-investigation not tailored to patient needs.

(Greenhalgh 2014)

A fourth form of decision support

Clinician to clinician knowledge-sharing

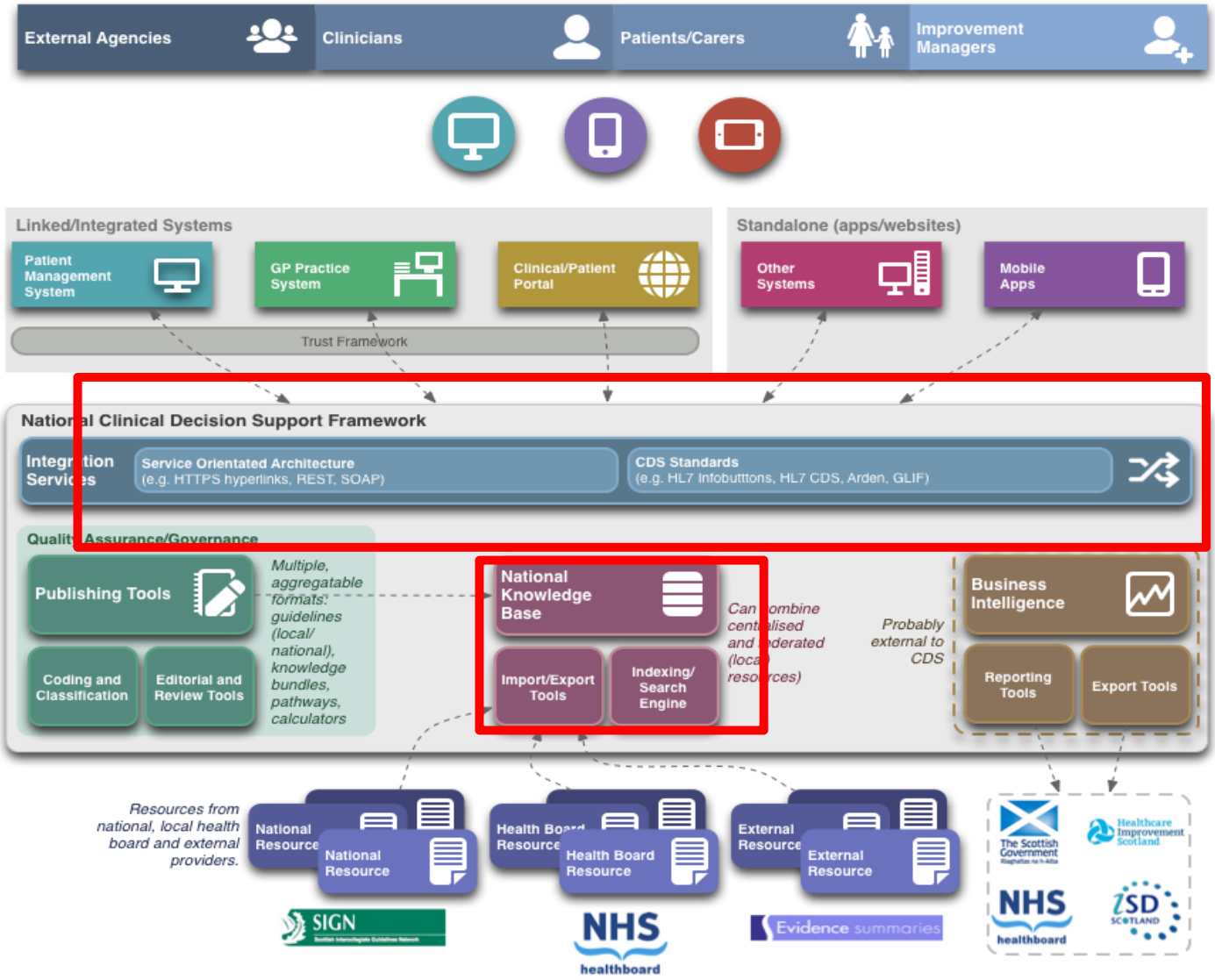
- Messaging, phone and video communication to underpin guideline-driven technology prompts.
- Combines clinician expertise and experience with evidence from research and guidelines.

Example

Airedale Hospital – "Immedicare".

- 200 nursing and residential homes in Cumbria linked to linked to the Communications Hub based at Airedale NHS Foundation Trust.
- Run by specialist nurses, 24/7
- Residents and care home staff can get medical help from hospital consultants or specialist nurses via a secure video link, if and when they need it, without having to leave the home.

Architecture:
Common Knowledge Base, Multiple Channels



Clinician, Patient and 3rd party agency accessible

Cross-device access

Accessible as independent, linked and/ or integrated formats.

CDS services re-using existing systems and resources - both national (e.g. Imprivata, Ensemble, NICE guidelines, Knowledge Network/Publisher) and local (e.g. health board guidelines).

Data can be gathered for audit, reporting and feedback into CDS review/revision.

Vision for Roadmap

- **“By 2020, optimal, usable and effective clinical decision support will be widely available to clinicians when and where they need it, and whatever device they are using, as an integral part of their working practice.**

- **This will enable practitioners to translate knowledge routinely and reliably into practice to improve quality of healthcare in Scotland, helping to make NHSScotland a learning system based on continuous generation and use of knowledge.”**

Milestones and Deliverables

Current Fixtures within an Evolving Roadmap

Phase 1: By March 2017

1. **Specify, procure and pilot a context-sensitive CDS platform for primary care.** Build the business case for national roll-out in phase 2.
2. **Deliver high-impact Quick Wins - including:**
   - Mobile CDS platform for antibiotic prescribing
   - Decision Support Web Gateway for Paediatric and Child Health.
   - Proof of concept of point of care mobile app for SIGN guideline and generic junior doctors' handbook.
   - Pilot of evidence-based prompts and clinician-clinician communication to reduce over-referral and over-investigation from care home to secondary care settings
3. **Build clinician and policy level engagement** and consult further on priorities for phase 2

Challenges

- Reluctance to change
- Clinician leadership
- Competencies – data science, evidence-based practice.
- Integration with Safety and Quality agendas.
- Risk management and evidence based practice.

Making it Real

Demo of Care-IS Decision Support Platform

National solution for primary care in New Zealand

Integrated Clinical Quality Solutions

NSS will deliver its mission through 4 strategic objectives:

Customers at the heart of everything we do

Increasing our service value

Improving the way we do things; and

Become a great place to work.

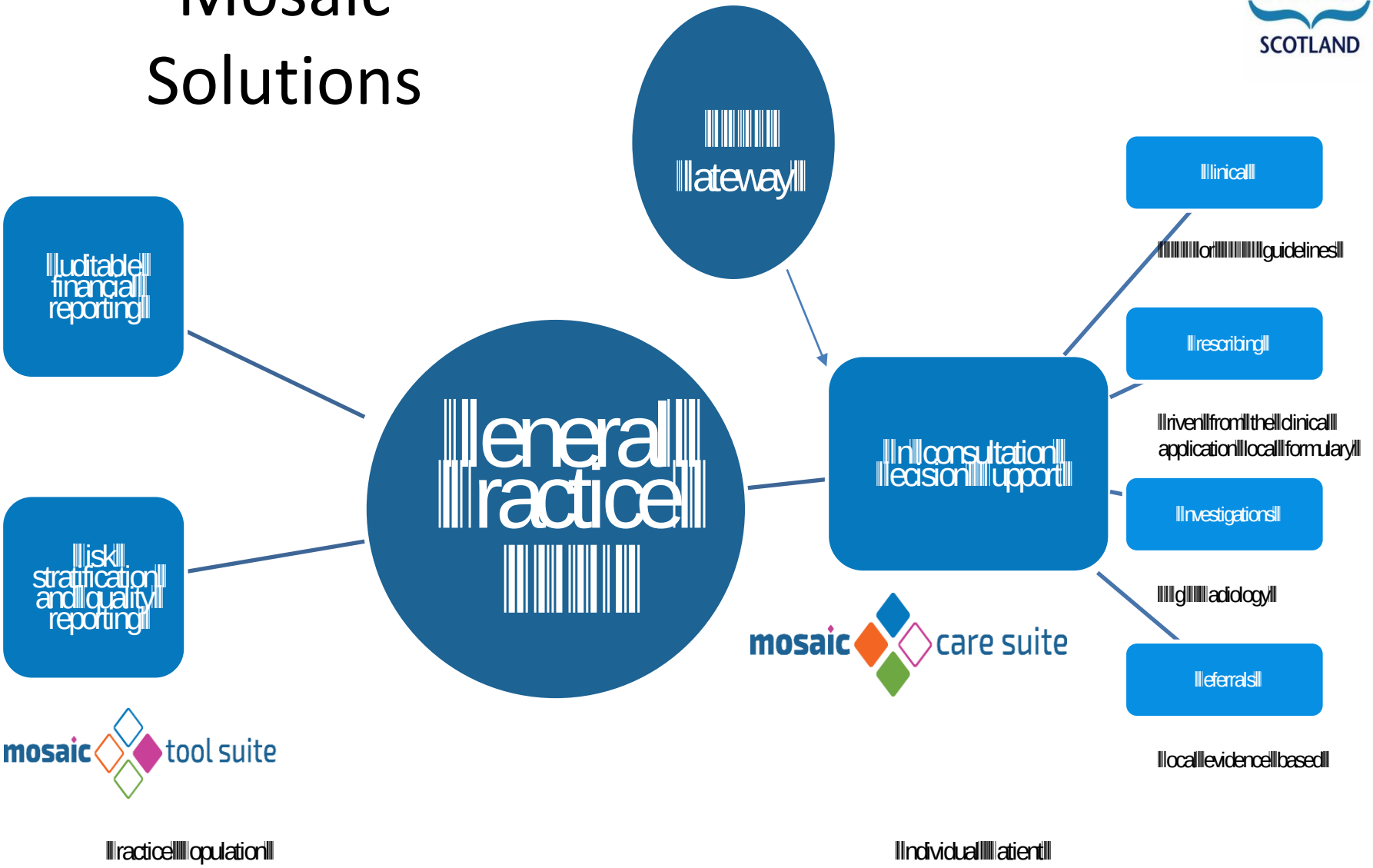
Areas to Cover

- CARE IS and clinical solutions
- The platform
- PRS Integrations:
  - EMIS
  - Vision
- Opportunities
  - Improve adherence to best practice clinical guidance
  - By doing so raise standards of care and outcomes
  - Reduce costs & efficiencies
  - Referral management and integration with SCI Gateway
  - Facilitate involvement of allied professional HCP's in particular nurse and pharmacy

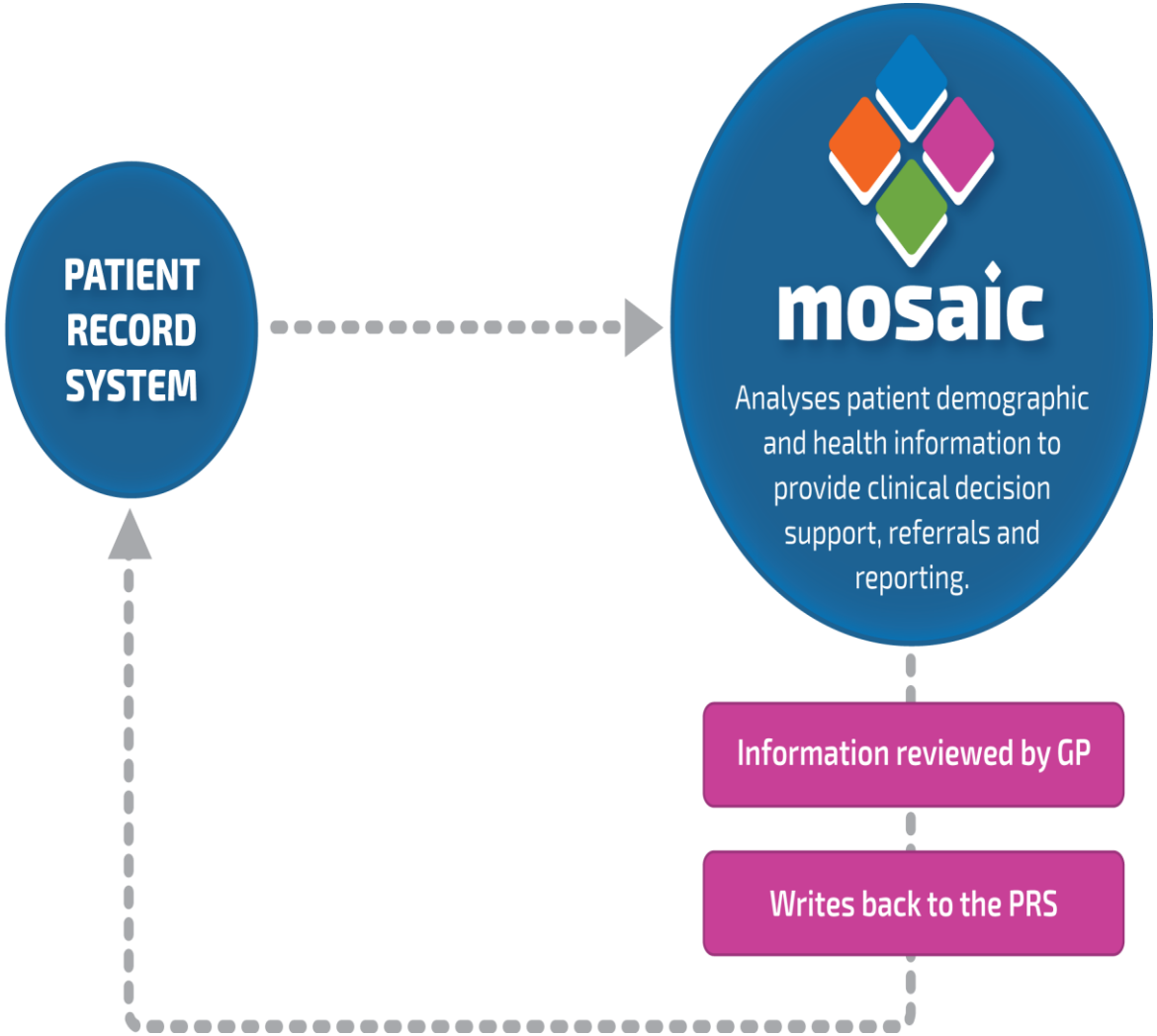
Mosaic – Integrated Clinical Solutions

- Launched in New Zealand (population 4.5m) in 2005
- Integrated into the standard workflow
- Most trusted source of medical information by HCPs in primary care
- Average of 118,000 hits per working day or 29.5 million per year
- Used in 98% of practices

Mosaic Solutions



In Practice


PATIENT RECORD SYSTEM
mosaic
Analyses patient demographic and health information to provide clinical decision support, referrals and reporting.
Information reviewed by GP
Writes back to the PRS

CARE Suite: How it works

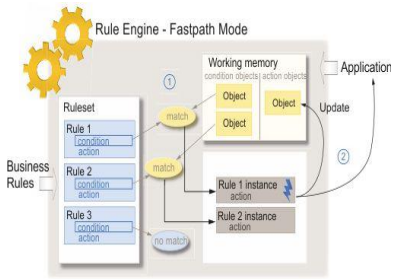
NHS SCOTLAND

NICE accredited
www.nice.org.uk/accreditation

SIGN

[illegible]uidelines[illegible]or[illegible]
[illegible]athways[illegible]

[illegible]usiness[illegible]ules[illegible]ngine[illegible]



[illegible]uidelines[illegible]igitised[illegible]on[illegible]//
[illegible]servers[illegible]

Efficacy and safety of a electronic decision support tool (FASTEST): a cluster randomized controlled trial

Dr Anna Ranta, MD, FRA

MidCentral Health and University of Otago

New Zealand

ANZAN – Adelaide - May 2014

MidCentral District Health Board
Te Pae Hauora o Ruahine o Tararua

University of Otago
Te Whare Wānanga o Otāgo

Efficacy Endpoints

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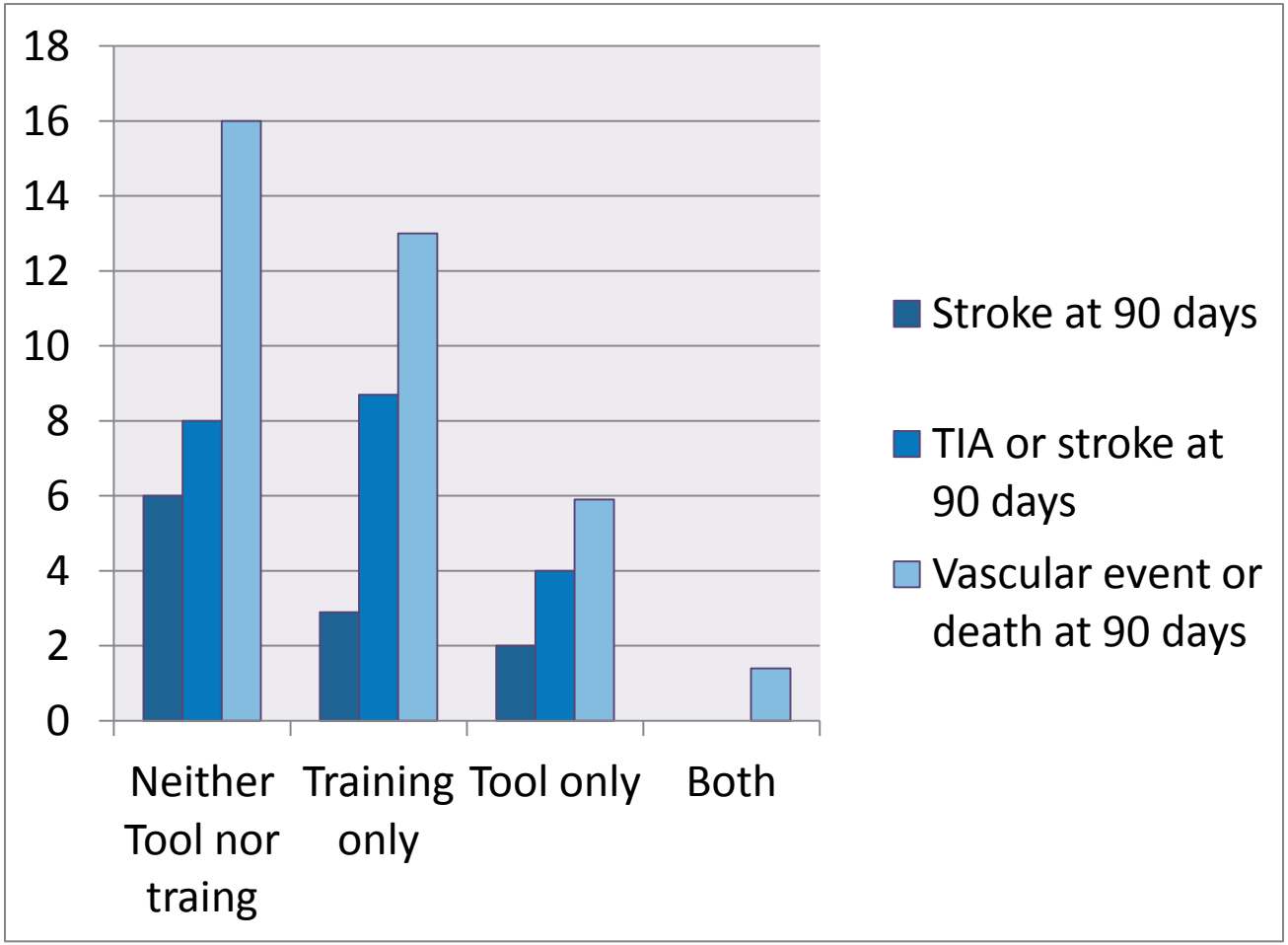
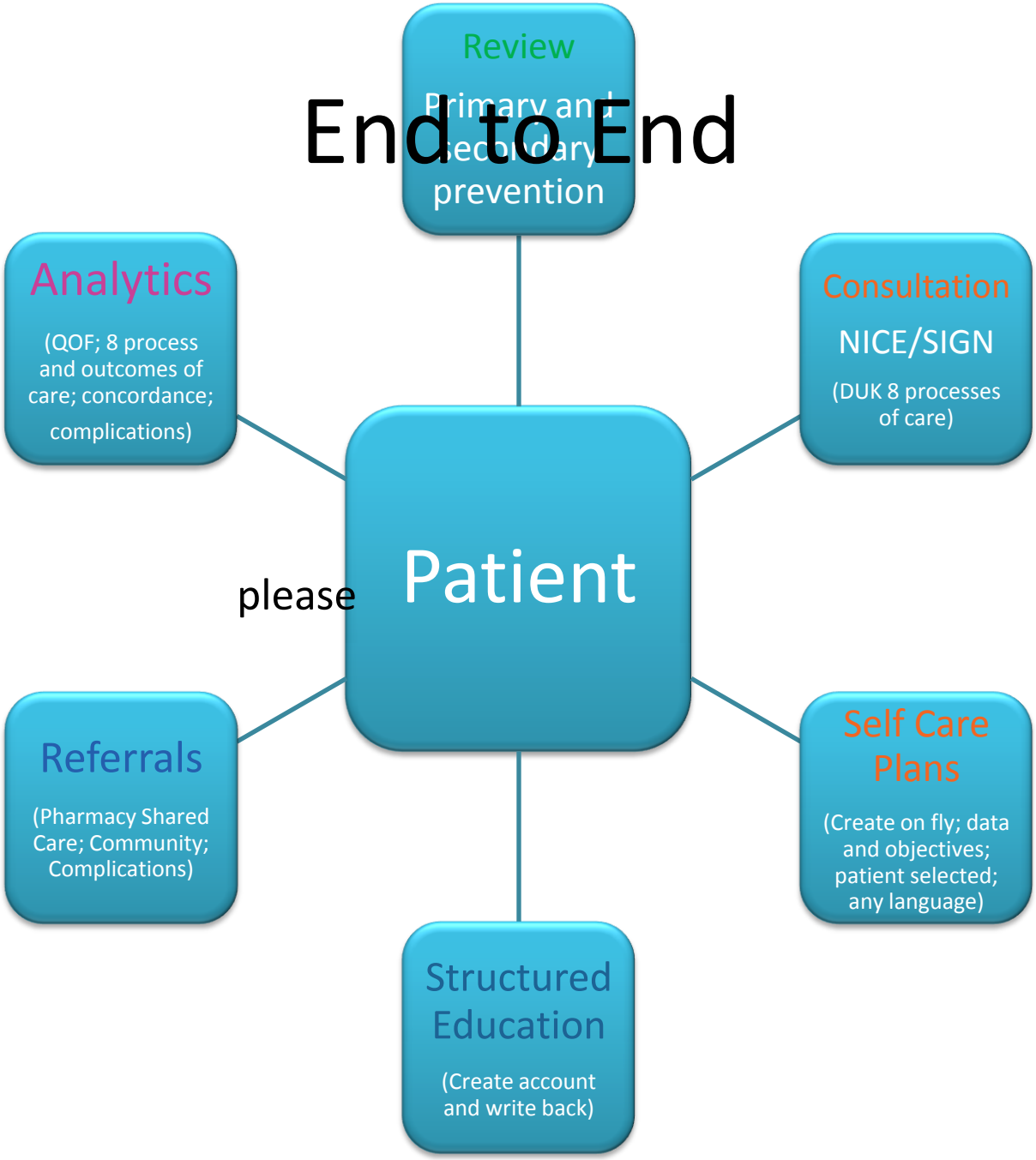
Ranta A[1], Dovey S[2], Weatherall M[2], O'Dea D[2], Gommans J[2], Tilyard M[2]. **Cluster randomized controlled trial of TIA electronic decision support in primary care.** Neurology. 2015 Apr 14;84(15):1545-51

Outcomes


18
16
14
12
10
8
6
4
2
0
Neither Tool nor traing
Training only
Tool only
Both
Stroke at 90 days
TIA or stroke at 90 days
Vascular event or death at 90 days

End to End


Review
Primary and secondary prevention
Analytics
(QOF; 8 process and outcomes of care; concordance; complications)
Consultation
NICE/SIGN
(DUK 8 processes of care)
please
Patient
Referrals
(Pharmacy Shared Care; Community; Complications)
Self Care Plans
(Create on fly; data and objectives; patient selected; any language)
Structured Education
(Create account and write back)

Mosaic Patient Review

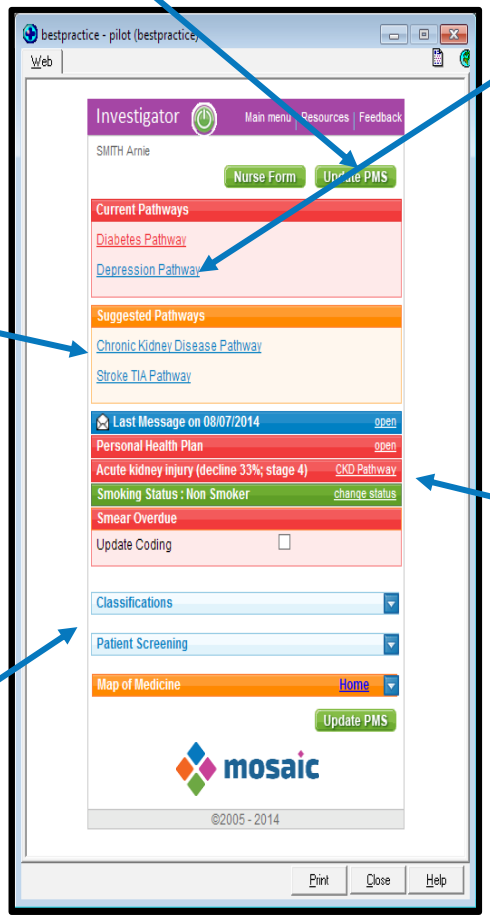
Clicking this button saves all the data back into the patient record

This patient is currently being treated on the diabetes and depression applications. Clicking the link opens the application.

Based on the patient's record, Mosaic is suggesting the patient is considered for the CKD and TIA applications

Based on alerts in the patient record and NICE based classifications, coded messages and reminders are included here

Diagnoses (classifications) and basic examination data (eg BP or Weight) can be added here

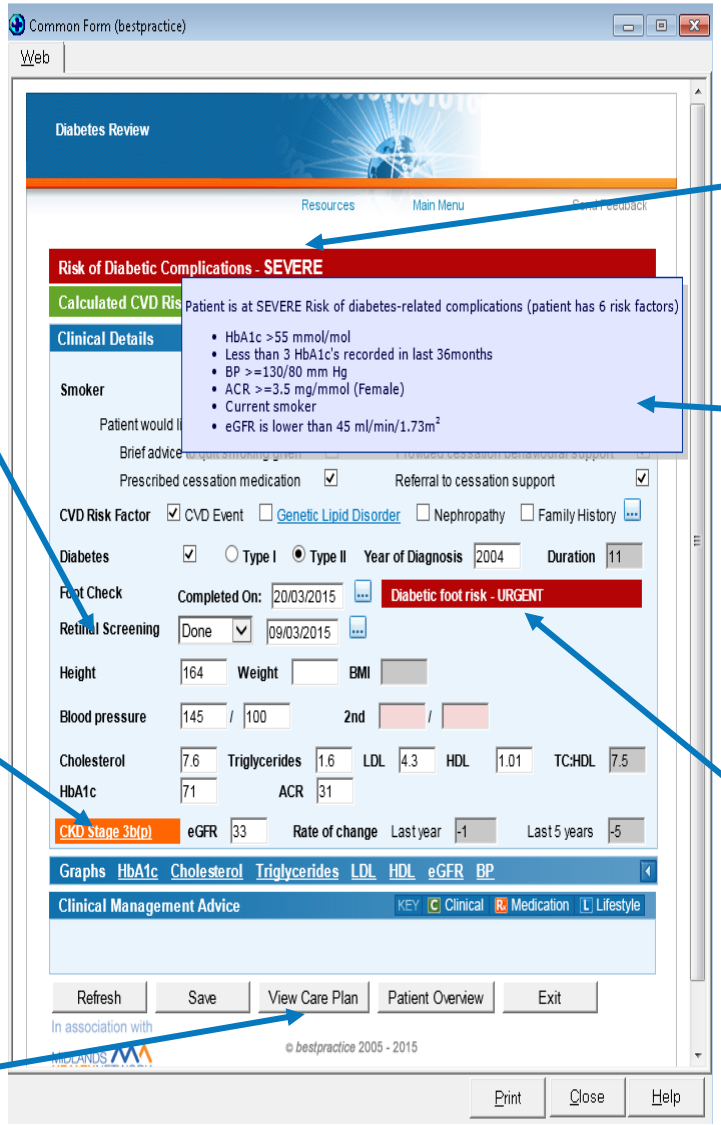


Mosaic Consultation: Diabetes Module

Retinal screening results (images) can be uploaded and displayed. Improves patient understanding.

Patient is identified as having CKD stage 3b. Direct link to CKD application.

Click through to generate a personal care plan with patient specific



Risk of diabetic complications calculated and presented

Hover over any alert and the underlying parameters for the risk calculation are displayed.

Diabetic foot risk assessed. Click in to do assessment. Another click to initiate referral and one further click to complete and send.

Mosaic Consultation: CKD Pathway

SIGN
Scottish Intercollegiate Guidelines Network

NHS Quality Improvement Scotland

Stage	Description	GFR (ml/min/1.73 m²)
1*	Kidney damage with normal or raised GFR	≥90
2*	Kidney damage with mild decrease in GFR	60-89
3A	Moderately lowered GFR	45-59
3B		30-44
4	Severely lowered GFR	15-29
5	Kidney failure (end-stage renal disease)	<15

103 Diagnosis and management of chronic kidney disease
A national clinical guideline

NICE National Institute for Health and Care Excellence

Chronic kidney disease

early identification and management of chronic kidney disease in adults in primary and secondary care

Issued: July 2014 last modified: March 2015

NICE clinical guideline 182
guidance.nice.org.uk/cg182

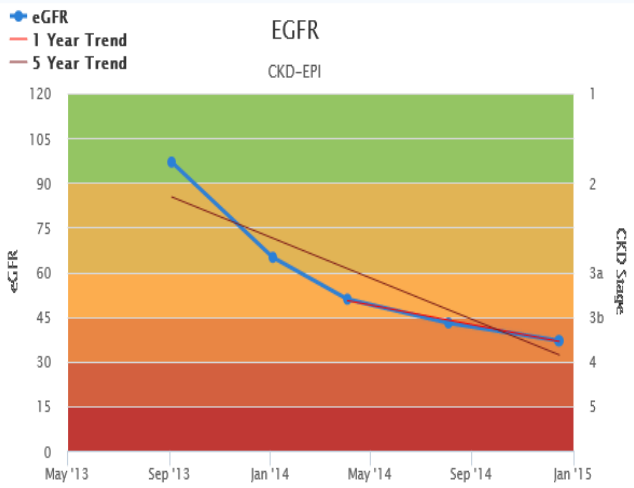
2008

Extracts EGFR results from PRS (calculates EGFR from creatinine)

- Determines stage
- Does regression
- Determines estimated time to stage 4

Progressive CKD stage 3b

Charts



Current/Existing Data

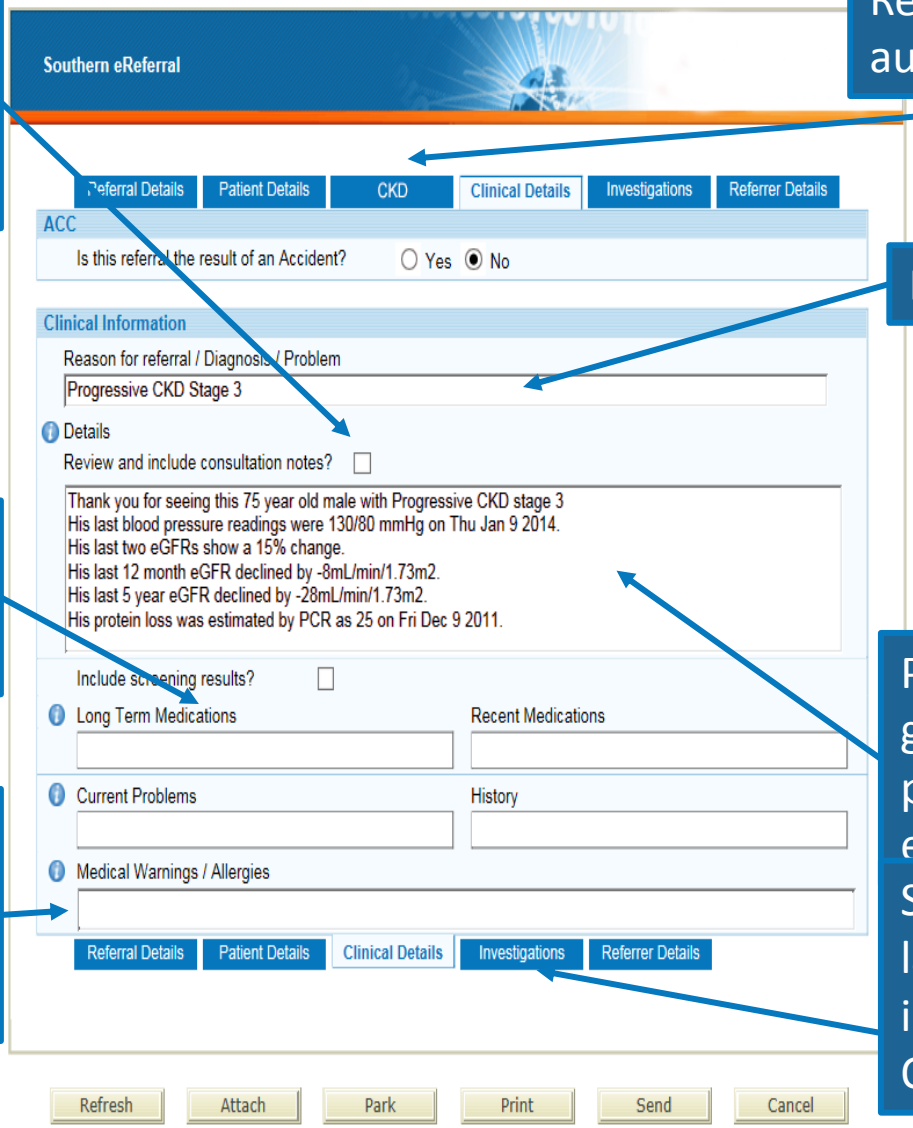
Laboratory Results

Serum Creatinine (most recent)	175	µmol/ℓ	(15/12/2014)
eGFR	37	mℓ/min/1.73m²	0% change from previous (15/12/2014)
Annual Rate of Change	-27	mℓ/min/1.73m²/year	(03/04/2014 - 15/12/2014)
Five Year Rate of Change	-208	mℓ/min/1.73m²/5 years	(03/09/2013 - 15/12/2014)
ACR (most recent)	45	mg/mmol	(01/09/2014)

Mosaic Referrals

Consultation notes can be added from the PRS.

Referral generation fully automated



Diagnosis pre-populated

Medications taken from the PRS

Patient specific letter generated and prepopulated. Can be edited.

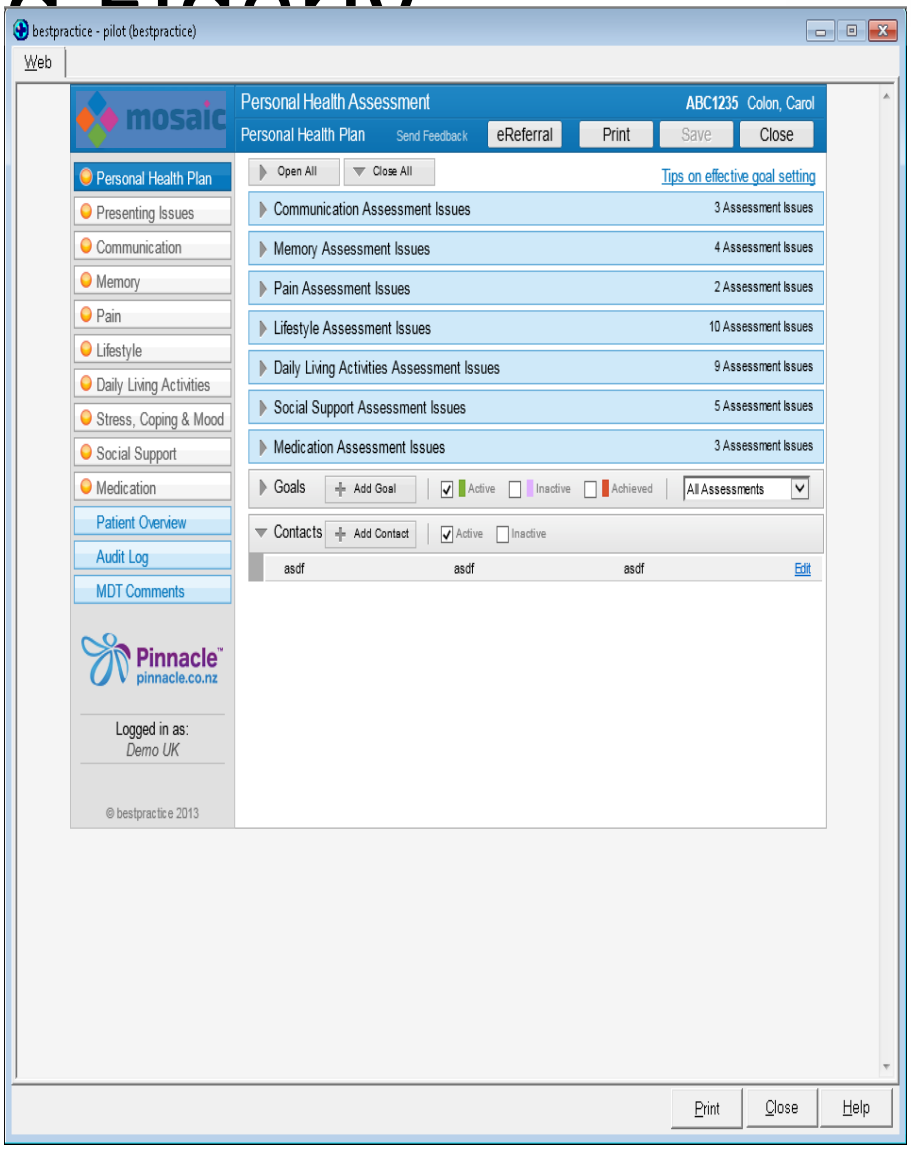
Medical warning and allergies added from PRS automatically.

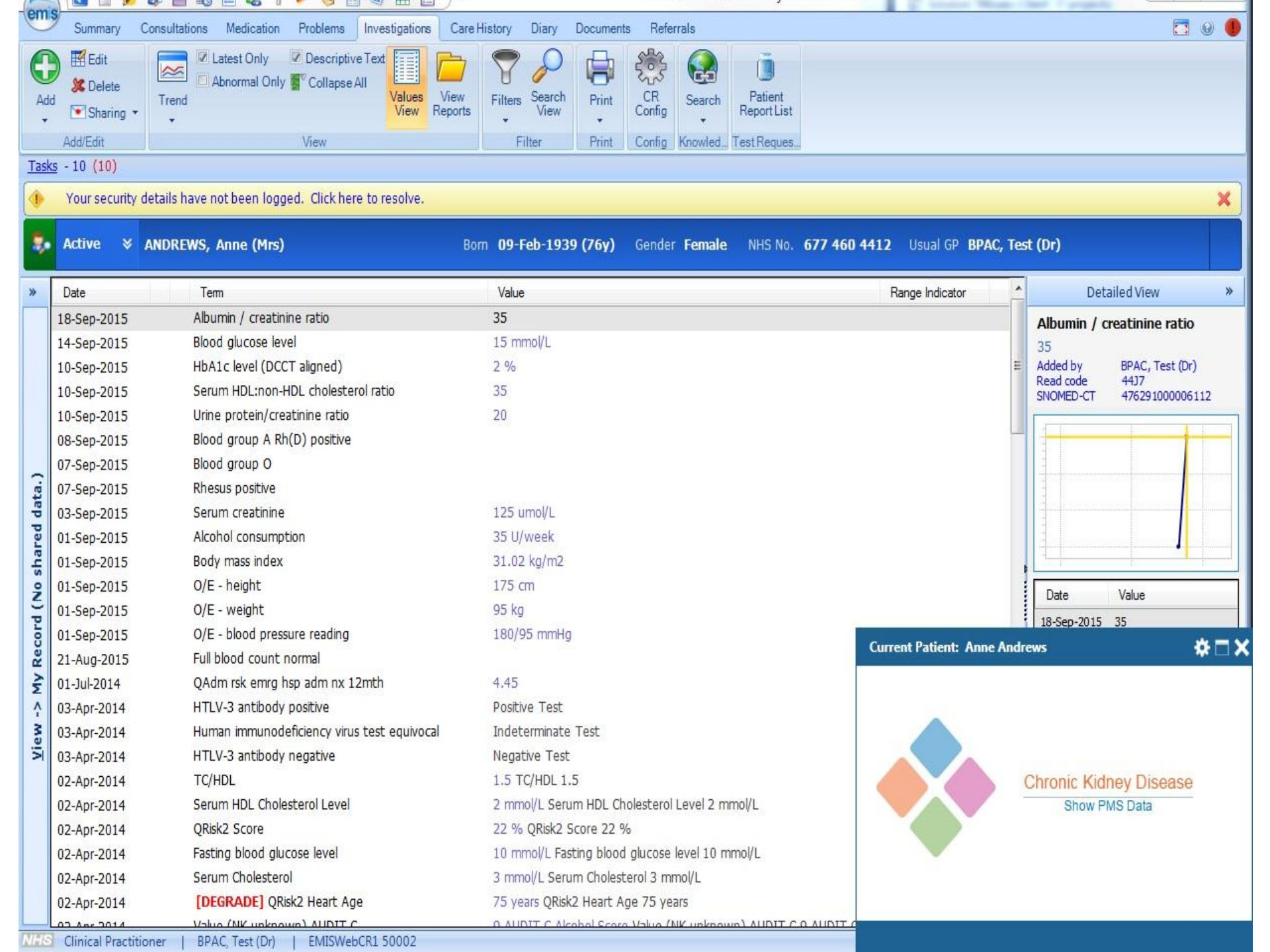
Standard set of laboratory investigations added. Others can be selected.

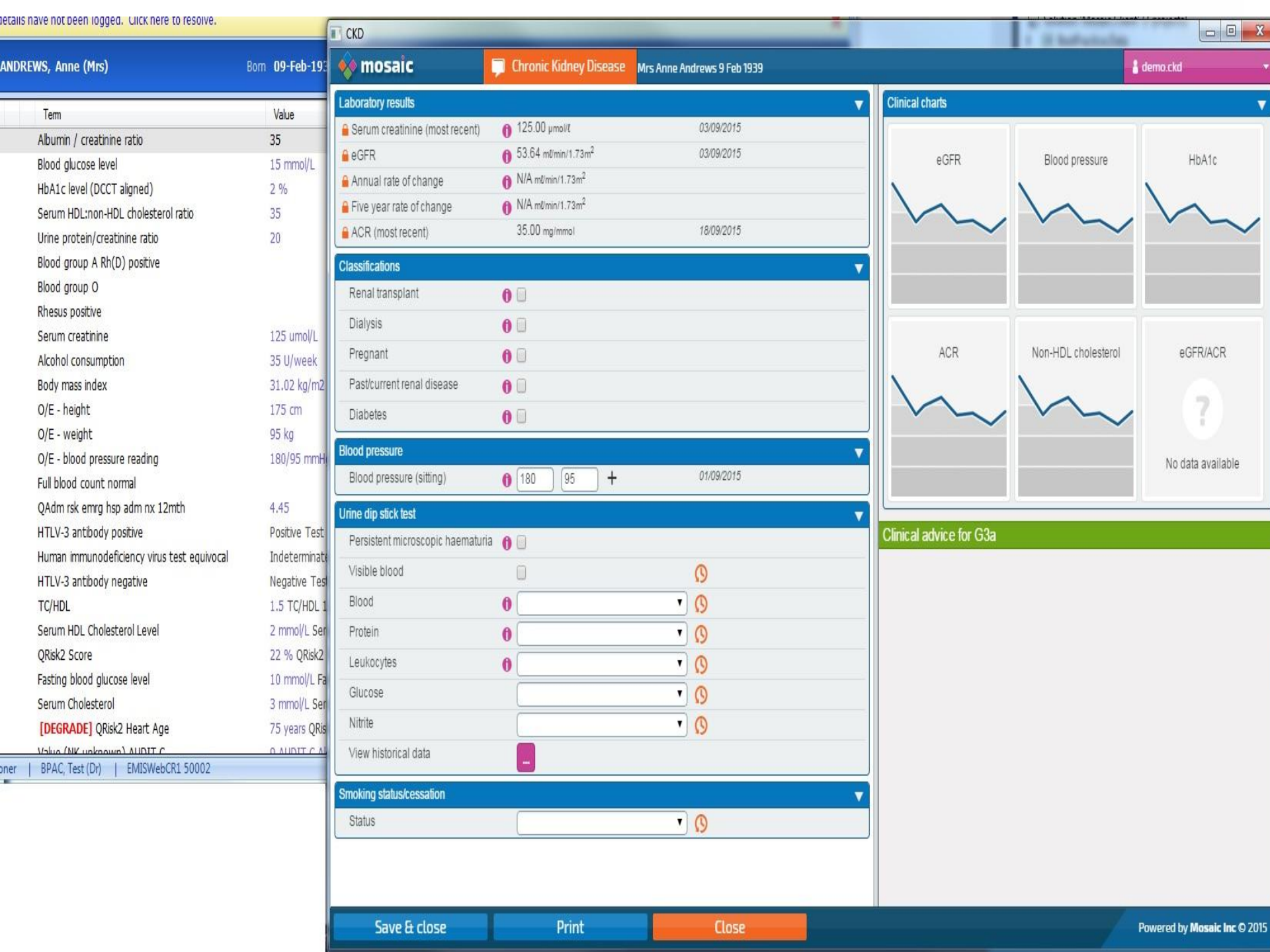
Frail and Elderly

- Healthcare
- Social care
- Medication Use Review
- MDT review notes
- Full audit log

- Key outcomes
  - Reduced unplanned admissions
  - Survival at home




Summary
Consultations
Medication
Problems
Investigations
Care History
Diary
Documents
Referrals
Add
Edit
Delete
Sharing
Add/Edit
Trend
Latest Only
Abnormal Only
Descriptive Text
Collapse All
Values View
View Reports
View
Filters
Search View
Filter
Print
Print
CR Config
Config
Search
Knowled...
Patient Report List
Test Reques...
Tasks - 10 (10)
Your security details have not been logged. Click here to resolve.
Active
ANDREWS, Anne (Mrs)
Born 09-Feb-1939 (76y)
Gender Female
NHS No. 677 460 4412
Usual GP BPAC, Test (Dr)
View -> My Record (No shared data.)
Date
Term
Value
Range Indicator
18-Sep-2015 Albumin / creatinine ratio 35
14-Sep-2015 Blood glucose level 15 mmol/L
10-Sep-2015 HbA1c level (DCCT aligned) 2 %
10-Sep-2015 Serum HDL:non-HDL cholesterol ratio 35
10-Sep-2015 Urine protein/creatinine ratio 20
08-Sep-2015 Blood group A Rh(D) positive
07-Sep-2015 Blood group O
07-Sep-2015 Rhesus positive
03-Sep-2015 Serum creatinine 125 umol/L
01-Sep-2015 Alcohol consumption 35 U/week
01-Sep-2015 Body mass index 31.02 kg/m2
01-Sep-2015 O/E - height 175 cm
01-Sep-2015 O/E - weight 95 kg
01-Sep-2015 O/E - blood pressure reading 180/95 mmHg
21-Aug-2015 Full blood count normal
01-Jul-2014 QAdm rsk emrg hsp adm nx 12mth 4.45
03-Apr-2014 HTLV-3 antibody positive Positive Test
03-Apr-2014 Human immunodeficiency virus test equivocal Indeterminate Test
03-Apr-2014 HTLV-3 antibody negative Negative Test
02-Apr-2014 TC/HDL 1.5 TC/HDL 1.5
02-Apr-2014 Serum HDL Cholesterol Level 2 mmol/L Serum HDL Cholesterol Level 2 mmol/L
02-Apr-2014 QRisk2 Score 22 % QRisk2 Score 22 %
02-Apr-2014 Fasting blood glucose level 10 mmol/L Fasting blood glucose level 10 mmol/L
02-Apr-2014 Serum Cholesterol 3 mmol/L Serum Cholesterol 3 mmol/L
02-Apr-2014 [DEGRADE] QRisk2 Heart Age 75 years QRisk2 Heart Age 75 years
Detailed View
Albumin / creatinine ratio
35
Added by BPAC, Test (Dr)
Read code 44J7
SNOMED-CT 476291000006112
Date
Value
18-Sep-2015 35
Current Patient: Anne Andrews
Chronic Kidney Disease
Show PMS Data
NHS Clinical Practitioner | BPAC, Test (Dr) | EMISWebCR1 50002


details have not been logged. Click here to resolve.
ANDREWS, Anne (Mrs)
Born 09-Feb-193
Term
Value
Albumin / creatinine ratio 35
Blood glucose level 15 mmol/L
HbA1c level (DCCT aligned) 2 %
Serum HDL:non-HDL cholesterol ratio 35
Urine protein/creatinine ratio 20
Blood group A Rh(D) positive
Blood group O
Rhesus positive
Serum creatinine 125 umol/L
Alcohol consumption 35 U/week
Body mass index 31.02 kg/m2
O/E - height 175 cm
O/E - weight 95 kg
O/E - blood pressure reading 180/95 mmH
Full blood count normal
QAdm rsk emrg hsp adm nx 12mth 4.45
HTLV-3 antibody positive Positive Test
Human immunodeficiency virus test equivocal Indeterminate
HTLV-3 antibody negative Negative Test
TC/HDL 1.5 TC/HDL 1
Serum HDL Cholesterol Level 2 mmol/L Ser
QRisk2 Score 22 % QRisk2
Fasting blood glucose level 10 mmol/L Fa
Serum Cholesterol 3 mmol/L Ser
[DEGRADE] QRisk2 Heart Age 75 years QRis
BPAC, Test (Dr)
EMISWebCR1 50002
CKD
mosaic
Chronic Kidney Disease
Mrs Anne Andrews 9 Feb 1939
demo.ckd
Laboratory results
Serum creatinine (most recent) 125.00 µmol/l 03/09/2015
eGFR 53.64 ml/min/1.73m² 03/09/2015
Annual rate of change N/A ml/min/1.73m²
Five year rate of change N/A ml/min/1.73m²
ACR (most recent) 35.00 mg/mmol 18/09/2015
Classifications
Renal transplant
Dialysis
Pregnant
Past/current renal disease
Diabetes
Blood pressure
Blood pressure (sitting) 180 95 01/09/2015
Urine dip stick test
Persistent microscopic haematuria
Visible blood
Blood
Protein
Leukocytes
Glucose
Nitrite
View historical data
Smoking status/cessation
Status
Clinical charts
eGFR
Blood pressure
HbA1c
ACR
Non-HDL cholesterol
eGFR/ACR
No data available
Clinical advice for G3a
Save & close
Print
Close
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CKD

mosaic | Chronic Kidney Disease | Mrs Anne Andrews 9 Feb 1939 | demo.ckd

Laboratory results

Classifications

Blood pressure

Urine dip stick test

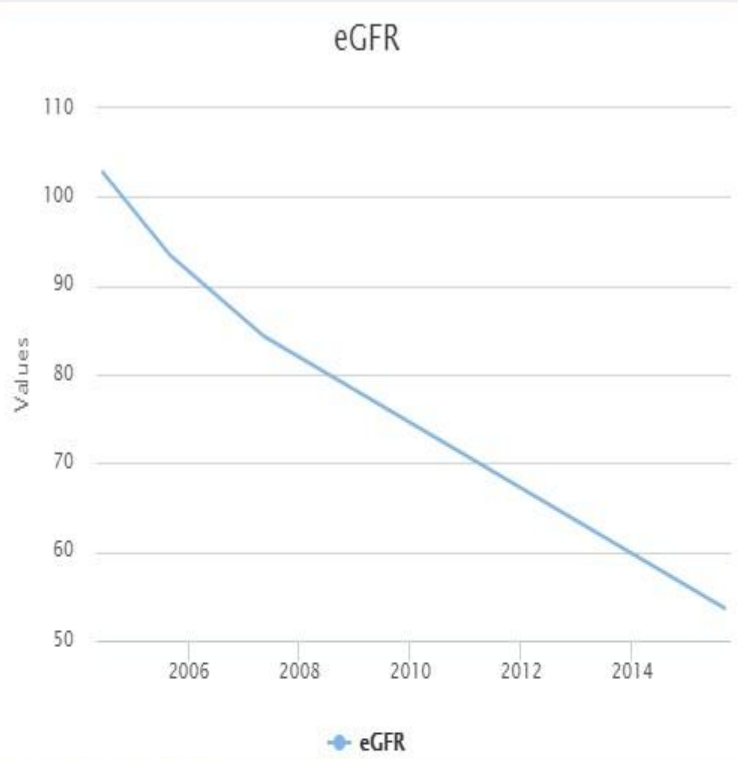
Two out of three positive reagent strip tests, on separate occasions, over a two week period confirms persistent invisible haematuria.

Persistent microscopic haematuria	
Visible blood	
Blood	Non-haemolysed Trace
Protein	++++
Leukocytes	Trace
Glucose	
Nitrite	
View historical data	...

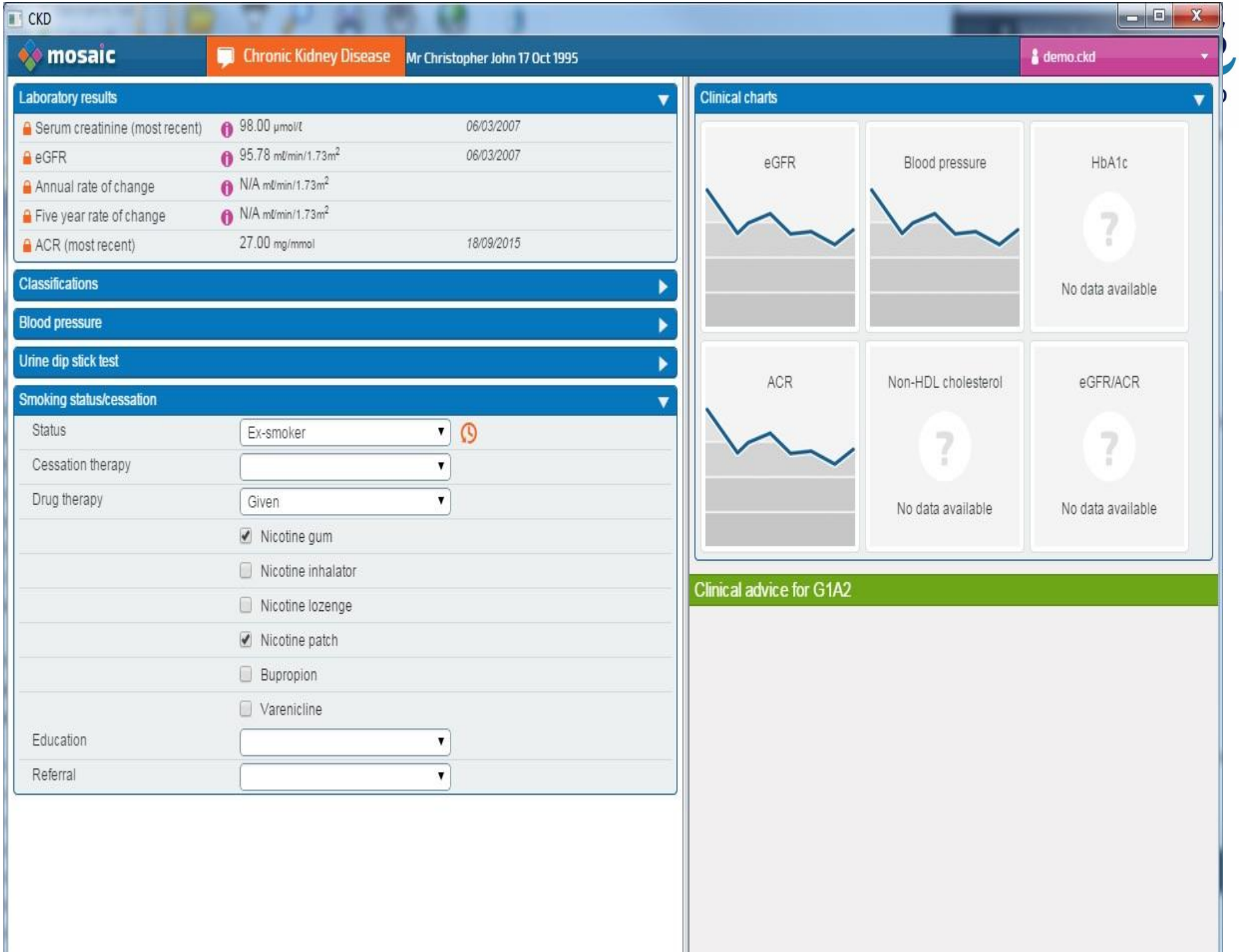
Smoking status/cessation

Status	Smoker
Cessation therapy	Given
Drug therapy	Not given
Education	
Referral	Not referred

Clinical chart



Clinical advice for G3a


CKD
mosaic
Chronic Kidney Disease
Mr Christopher John 17 Oct 1995
demo.ckd
Laboratory results
Serum creatinine (most recent) 98.00 µmol/l 06/03/2007
eGFR 95.78 ml/min/1.73m2 06/03/2007
Annual rate of change N/A ml/min/1.73m2
Five year rate of change N/A ml/min/1.73m2
ACR (most recent) 27.00 mg/mmol 18/09/2015
Classifications
Blood pressure
Urine dip stick test
Smoking status/cessation
Status Ex-smoker
Cessation therapy
Drug therapy Given
Nicotine gum
Nicotine inhalator
Nicotine lozenge
Nicotine patch
Bupropion
Varenicline
Education
Referral
Clinical charts
eGFR
Blood pressure
HbA1c
No data available
ACR
Non-HDL cholesterol
No data available
eGFR/ACR
No data available
Clinical advice for G1A2

Demonstration

Please find Neil or I at the CARE IS stand

Discussion

1. From what you have heard in this session, what seems most interesting or important to you about national implementation of clinical decision support in NHSScotland?

2. Where is there evidence of waste, variation and harm that a CDS solution could help to address? What would it enable that can't be done currently?

3. Would your organisation be interested in the piloting of context-sensitive CDS in primary care?

Clinical Decision Support (CDS) Roadmap for NHSScotland

SCIMP Conference

23rd September 2015