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The University of Manchester

NHS
National Institute for Health Research
Collaboration for Leadership in Applied Health Research and Care (CLAHRC) for Greater Manchester

Evaluation Report

Functionality and Feasibility of an Electronic Long-term Conditions Integrated Review Template (GM-ELIRT)

A Pilot Project

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ABBREVIATIONS

ABPM	Ambulatory BP monitoring
AF	Atrial fibrillation
CCGs	Clinical Commissioning Groups
CKD	Chronic Kidney Disease
CIs	Confidence Intervals
COPD	Chronic Obstructive Pulmonary Disease
CVD	Cardiovascular Disease
DAS	Disease Activity Score
FRAT	Fall Risk Assessment Test
FRAX	Fracture Risk Assessment Tool
GM-ELIRT	Electronic LTCs Integrated Review Template
HF	Heart Failure
HTN	Hypertension
INR	International Normalised Ratio
LTC	Long-term Condition
LOS	Length of (hospital) Stay
MD	Mean Difference
NOAC	New Oral Anticoagulant
NHS IQ	NHS Improving Quality
NYHA	New York Heart Association
NP	Nurse Practioner
PAD	Peripheral Arterial Disease
PEI	Patient Enablement Instrument
PN	Practice Nurse
QOF	Outcomes Framework
SD	Standard Deviations
SRFT	Salford Royal NHS Foundation Trust
TIA	Stroke/ Transient Ischaemic Attack
TTR	Time in Therapeutic Range

Executive Summary

Introduction

This pilot project tested the functionality and feasibility of an Electronic Long-term Conditions (LTCs) Integrated Review Template (GM-ELIRT) across 16 primary care practices in Greater Manchester. Currently GP practices use single disease templates to review patients with LTCs. Disease reviews are designed to monitor progression and assess whether a change in clinical management is warranted. A large proportion of the clinical criteria are repeated on each disease template. Patients with multimorbidity may attend for a series of reviews over a short period of time and some aspects of the clinical assessment are likely to be repeated each time. For practices that already combine individual disease reviews into one or two appointments, GPs and nurses have to flick through several single disease templates to complete the review. More importantly, if the review concentrates on one condition at a time, emerging clinical risks associated with comorbidity may be missed. The GM-ELIRT is designed to provide a more holistic, integrated review of patients' LTC needs in primary care and may assist in identifying multimorbidity risks not currently identified by single disease templates. The report focuses on the development and design of three versions of the GM-ELIRT; EMIS PCS, EMIS Web and SystmOne, prior to describing the pilot evaluation project.

Aim

To test the functionality and feasibility of an electronic LTC integrated review template across 16 primary care practices in Central and North Manchester, Ashton, Leigh and Wigan

Objectives

- To ensure that the GM-ELIRT is compatible with existing clinical systems within participating practices.
- To establish whether participating practice nurses feel confident that the GM-ELIRT can improve the LTC review process in their practice in terms of time spent on reviews, efficiency, logicality, reducing repetition and ease of use.
- To ensure that participating practice nurses feel confident that the GM-ELIRT provides a standardised review process for patients with multimorbidity.
- To establish whether participating practice nurses feel confident that the GM-ELIRT assists in guiding practice according to evidence based guidelines.
- To establish whether participating practice nurses feel confident that the GM-ELIRT can fully identify the LTC needs of patients with multimorbidity.

- To establish whether participating practice nurses feel confident that the GM-ELIRT assists in identifying the educational needs (relating to LTC needs of patients with multimorbidity) for less experienced practice nurses.
- To ensure that patients interviewed by a GM-ELIRT team member during the project feel that integrated reviews assist in terms of comprehensiveness, convenience, duration and identifying and addressing LTC needs.
- To ensure that patients interviewed by a GM-ELIRT team member during the pilot project feel more enabled to manage their long-term conditions.

Template Development

The GM-ELIRT was developed in collaboration with Health First ALW, a community interest company who were aiming to develop a similar template to assist the promotion of their Breathlessness Service across ALW. Three template versions of the GM-ELIRT have been built directly into the clinical systems used by participating practices. The first, EMIS PCS was started by Health First's nurse practitioner prior to this role being assigned to GM-CLAHRC's data analysts. The second and third versions; EMIS Web and SystmOne followed once the EMIS PCS version was complete. All versions were built at participating practices.

Template Design

The GM-ELIRT is designed to be used by primary care teams to deliver a more integrated approach to monitoring and managing patients with multimorbidity as a replacement for single long-term condition disease templates. Clinical guidelines are embedded in the template. The template opens with a main screen which guides the review process in a logical order commencing with the generic sections; clinical assessment, symptom review (which provides comorbidity screening and may detect early deterioration of disease or complications associated with multimorbidity) and a review of lifestyle factors including smoking, alcohol, diet, exercise and wellbeing. These generic sections are to be completed for all patients, prior to more specific investigation of the patient's individual conditions. Clinical guidelines assist the user in completing sections and incorporate a comparison of QOF and Nice recommendations for items such as target BP. Where possible, we have tried to embed clinical guidelines although more work is required to ensure they appear appropriately. At the start of development the template included only respiratory and cardiovascular conditions, however, through the process we have been asked to include more of the LTCs that are monitored in primary care, such as hypothyroidism and rheumatoid arthritis. The list will be extended as need arises.

Project Design

This pilot project encompassed the recruitment of practices across NHS partner practices, in Greater Manchester that were using one of the three clinical systems. Within the practices, nursing staff were recruited to test the functionality and feasibility of the GM-ELIRT during clinic sessions. For this they would need to replace the single disease templates currently used with the integrated template. The templates were installed into their system by one of GM CLAHRC's data analysts or sent via the data analyst to the practice manager with downloading instructions. Evaluation methods involved a series of semi-structured questionnaires conducted mainly via face-to-face interview by a GM-ELIRT Team member or completed electronically by the practice nurse and emailed directly to the project lead. Data collection involved baseline and final evaluation to allow for comparison of practice nurses' views of their current templates and the GM-ELIRT. Practice nurses were asked to record any issues, items missing during or after clinic sessions on a post-review evaluation form to avoid missing feedback they may forget to mention at a facilitation session. GM-ELIRT Team members facilitated the process by providing support and collecting feedback on facilitation evaluation forms. At the end of the project, data were collated and analysed by the project lead prior to presenting the results. Analyses was mainly quantitative, however, additional feedback and comments have been collated and presented an a qualitative summary. During the early stages of the pilot, elements of refinement took place as testing was underway. This aided the smooth running of the project and prevented practices withdrawing due to major difficulties with the templates.

Evaluation Results

Recruitment was difficult due to two main factors: The project was conducted at one of the busiest times of the year for primary care, as practices were working their way through flu vaccination appointments. Also a wave of clinical system updates appeared to be in progress across Greater Manchester. Asking practices to test a new template as well was not feasible for many practices. Some of the earlier practices that we recruited did not have time to use it due to other priorities. This resulted in recruiting 16 practices in Ashton, Leigh Wigan, Central and North Manchester. For some, although their start and completion dates may have been two months apart, they may not have had much opportunity to test the template fully, whilst others recruited at the end of the project for the remaining two weeks may have used it more frequently. Thirty-five practice nurses; comprising of nurse practitioners, practice nurses and healthcare assistants attended a project set-up meeting, nine of the thirty-six nurses did not complete any evaluation forms; the results, therefore, encompass the 26 practice nurses who participated in one or more of the evaluation stages.

The three versions of the GM-ELIRT received generally positive responses, particularly for their potential to address multimorbidity, to reduce the repetition that occurs with single disease templates and for their potential to guide practice by embedded evidence based guidelines. Responses were quite varied for improving the review process; some were very enthusiastic, finding the content to be good with more detail than the single disease templates, adding value to the review and speeding the process by reducing the amount of free text required and the number of templates they used. Others liked the way certain pages were logically organised. Some practice nurses, however, found the GM-ELIRT to be too complicated to use at the same time as talking to the patient and reported that it looked too busy which caused them to spent a lot of time looking for items they required, although, they did admit that this may be due to being unfamiliar with the template. We found there to be a positive association between the number of reviews performed and the overall rating score for the GM-ELIRT, which may in part account for the variation in views.

There were only a small number of patients interviewed for this pilot project but those that did participate found integrated reviews to be more convenient, patients didn't mind longer appointments if it meant all their LTCs were reviewed at one appointment. Patients felt they were able to discuss all their symptoms and not just those related to one condition. Patients felt that they received enough information to understand how some of their diseases are related and they felt supported in managing their conditions. Given the small sample sizes for both practice nurses and patients, findings should be viewed as being tentative; test results must be interpreted with caution.

Conclusions

The GM-ELIRT received a favourable response overall. There were extreme views, from particular enthusiasm, rating it as an excellent template, with good content, easy to navigate, easy to use and saving time, to abandoning it on the first attempt. Popular opinion, however, was that it had promising features and with some refinement could provide a more efficient integrated review process for managing patients with multimorbidity. This pilot has given us the opportunity not only to test the feasibility of an integrated LTC template in primary care but has been very useful for piloting and validating the data collection methods used prior to increasing the scope and scale of these methods to take the GM-ELIRT forward for a more extensive evaluation.

1. Introduction

This pilot project tested the functionality and feasibility of an Electronic Long-term Conditions (LTCs) Integrated Review Template (GM-ELIRT) across 16 primary care practices in Greater Manchester. Currently GP practices use single disease templates to review patients with LTCs, in accordance with QOF[1] registers. Disease reviews are designed to monitor patients' individual LTCs to monitor progression and assess whether a change in clinical management is warranted. Information is recorded on the single disease templates which contain all the necessary read codes to record information for QOF activity[1] or for audit purposes. A large proportion of the clinical criteria are repeated on each disease template; such as clinical assessment of BP, pulse, BMI and lifestyle factors. Patients may attend for a series of reviews over a short period of time, if they have more than one LTC some of the clinical criteria is likely to be repeated each time. For practices that already combine individual disease reviews into one or two appointments, GPs and nurses have to flick through several single templates to complete the review. More importantly, if the review concentrates on one condition at a time, emerging clinical risks associated with comorbidity may be missed. The GM-ELIRT is designed to provide a more holistic, integrated review of patients' long-term condition needs in primary care and may assist in identifying multimorbidity risks not currently identified by single disease templates. The report takes the reader through the development and design of three versions of the GM-ELIRT; EMIS PCS, EMIS Web and SystmOne. The recruitment process is then described followed by the project approach and evaluation results. This pilot project has also provided the opportunity to test the evaluation methodology which has assisted in planning future work.

2. Background

LTCs such as cardiovascular disease (CVD), diabetes and respiratory disease are the leading cause of disability and death in the western world.[2] Due to an aging population, it is expected that increased demands on services will result from expanding numbers of older people with LTCs and social care needs.[3] Around 15

million people in England have at least one long-term condition,[2] many have multimorbidity (two or more conditions).[4] Multimorbidity increases the risk of premature death,[5 6] unplanned hospital admissions[7] and extended length of (hospital) stay (LOS).[8] Patients with multimorbidity are generally higher uses of health services,[7 9] are more likely to have poorer quality of life, loss of physical functioning and suffer from depression.[10-15] The consequences of multimorbidity can lead to poor adherence to therapy[16-21] which can result in further morbidity and increased resource utilisation owing to treatment failure.[22]

Individual diseases dominate health-care delivery, yet people with multimorbidity need a much broader approach.[23] The use of many services to manage individual diseases can become duplicative, inefficient and unsafe for patients due to poor communication and integration.[7 24] To identify the risks associated with multiple LTCs, a more effective and better understanding of the epidemiology and impact of multimorbidity is needed to inform the way in which health care is organised and delivered.[9] Recent DoH initiatives are driving changes in healthcare delivery for patients with LTCs. The LTC QIPP[25] workstream focuses on improving the quality and productivity of services for patients and carers, to enable better access to higher quality, local, comprehensive community and primary care. The workstream seeks to reduce unscheduled hospital admissions by 20%, reduce length of stay by 25% and maximise the number of people controlling their own health, through the use of supported care planning.[25] The NHS Outcomes Framework[26] sets out national outcome goals which define indicators for improvement across five domains:

- Preventing people from dying prematurely
- Enhancing quality of life for people with long term conditions
- Ensuring the people have a positive experience of care
- Helping people to recover from episodes of ill health or following injury
- Treating and caring for people in a safe environment and protecting them from avoidable harm

The Commissioning Outcomes Framework[27] will drive local improvements by translating the NHS Outcomes Framework into outcomes and indicators that are meaningful at a local level. Clinical Commissioning Groups (CCGs) will be held accountable for their progress in delivering these outcomes.

Indicators are spread across the five domains and include: reducing the under 75 mortality rate, improving functional ability, ensuring people feel supported to manage their condition(s), reducing unplanned admissions, improving access to primary care services and reducing the incidence of medications errors. NHS Improving Quality (NHS IQ)[28], hosted by NHS England has developed five improvement programmes based on the NHS Outcomes Framework, their role is to build improvement capacity and capability to help develop knowledge and skills across NHS organisations to support improvements in the five domains. An integrated LTCs review template may assist primary care, in delivering NHS Outcomes[26] and the LTC QIPP[25]. By moving away from single disease orientated appointments in primary care, patients with multimorbidity may managed in a more systematic manner using the integrated LTC review template.

This project builds on the work previously carried out by GM CLAHRC in seeking to identify patients with heart failure and CKD and improving their management, improving patients and healthcare professionals' awareness of the risks associated with diseases such as CKD, HF and diabetes, addressing individual needs associated with debilitating diseases such as stroke and improving self-monitoring skills for patients with hypertension and pre-diabetes. Table 1 provides details of the roles and responsibilities of the GM-ELIRT project team.

Table 1: Roles and responsibilities

Name and Role	***Responsibilities***
Trish Gray: Research Fellow	**Template Development and Refinement** Design and development of the GM-ELIRT Monitoring of development progress Refinement planning and monitoring **Evaluation Project** Project design Preparation of project brief Day to day project management Design and development of data collection tools **Recruitment** Initial contact with practices (ALW/North Manchester) Introductory meetings with practice manager and lead nurses Project set-up meetings **Facilitation** Facilitation across practices Team supervision and support **Evaluation Report** Data extraction and preparation Data analysis Preparation of report **Future Planning** Developing and maintaining links with clinical systems companies Developing links with organisations such as GM CSU to take project forward Intellectual Property
Malcolm Young Senior Analyst	**Template Development and Refinement** Development and refinement: GM-ELIRT versions EMIS PCS and EMIS Web
Caroline O'Donnell Analyst	**Template Development and Refinement** Development and refinement: SystmOne GM-ELIRT version Preparation of electronic data collection tools Data extraction
Lorraine Burey Improvement Manager	**Recruitment** Initial contact with practices(Central Manchester/Stockport) **Future Planning** Intellectual Property
Linda Savas KTA	**Facilitation** ALW practices: Chandler House x5, Dr C Khatri, Shevington
Astrid Born Project Support Officer	**Facilitation** City Road, Boundary, Vallance x2, Robert Derbishire, Dr Khatri, Astley **Evaluation Report** Support to project lead

3. Aim

To test the functionality and feasibility of an electronic LTC integrated review template across 16 primary care practices in Ashton, Leigh and Wigan (ALW), Central and North Manchester.

4. Objectives

- To ensure that the GM-ELIRT is compatible with existing clinical systems within participating practices.
- To establish whether participating practice nurses feel confident that the GM-ELIRT can improve the LTC review process in their practice in terms of time spent on reviews, efficiency, logicality, reducing repetition and ease of use.
- To ensure that participating practice nurses feel confident that the GM-ELIRT provides a standardised review process for patients with multimorbidity.
- To establish whether participating practice nurses feel confident that the GM-ELIRT assists in guiding practice according to evidence based guidelines.
- To establish whether participating practice nurses feel confident that the GM-ELIRT can fully identify the LTC needs of patients with multimorbidity.
- To establish whether participating practice nurses feel confident that the GM-ELIRT assists in identifying the educational needs (relating to LTC needs of patients with multimorbidity) for less experienced practice nurses.
- To ensure that patients interviewed by a GM-ELIRT team member during the project feel that integrated reviews assist in terms of comprehensiveness, convenience, duration and identifying and addressing LTC needs.
- To ensure that patients interviewed by a GM-ELIRT team member during the pilot project feel more enabled to manage their long-term conditions.

5. Template Development

Following a systematic review of evidence relating to LTCs and integrated care and a series of discussions with practice nurses and GP's to establish what an integrated LTC template should look like, what should be included and which systems the template should be developed in, a decision was made to begin the development of an integrated cardiovascular and respiratory template that included the LTCs currently reviewed by practice nursing staff. Discussions also took place with Health First ALW, a community interest company who were aiming to develop a similar LTC template to assist the promotion of their Breathlessness service across ALW. Talks resulted in development of a partnership agreement between GM CLAHRC and Health First ALW for a joint venture to take the project forward across participating ALW practices. The agreement involved, input in the design and development of the first template by one of Health First's Nurse Practitioners, agreement that the five practices within Chandler House (which houses the main Health First practice) will test the SystmOne version and Health First will support the spread of the GM-ELIRT across ALW practices once testing and refinement is complete.

Discussions also took place with clinical system software companies to investigate whether collaborative agreements could be established between GM CLAHRC and the software companies to work in partnership to develop and spread the templates. After much deliberation from companies, no firm commitments were made to either develop the templates or to provide dummy versions of the software to allow the templates to be developed in the GM CLAHRC office at Salford Royal NHS Foundation Trust (SRFT). A decision was made, therefore, for GM CLAHRC's data analysts to develop the templates as and when access was granted at participating practices.

There are a range of clinical systems used across Greater Manchester practices with no standardisation of systems in use, however, it appears that certain systems dominate in practices across CCGs, for example, EMIS dominates across North, Central and South Manchester. Practices previously using EMIS LV or PCS have moved or are moving to EMIS Web whilst Vision is widespread across Salford and Bury. ALW have more or a combination of systems. The first template was built in EMIS PCS, with EMIS web and SystmOne

versions following almost immediately after. The reasons for choosing EMIS PCS for the first version are as follows:

- GM CLAHRC's data analysts had no prior knowledge of clinical template design whilst Health First's Nurse Practitioner had some experience of template design using EMIS PCS
- Through Health First's involvement, GM CLAHRC had access to EMIS PCS systems in GP practices in ALW
- At commencement of the pilot, a high proportion of EMIS practices were using PCS with no immediate plans to move to EMIS Web.

The EMIS PCS version took far longer than originally envisaged due to the system design and availability of computer time at the practices we had been able negotiate access to. Feedback was sought from a clinical lead, five practices nurses and three GPs prior to minor refinement of the first template for testing. As soon this version was ready for testing, a roll-out of EMIS Web occurred at short notice across Greater Manchester, this included a number of practices provisionally recruited for testing the PCS version. Work on the EMIS Web version, therefore, commenced instantaneously. The switch from Synergy to SystmOne also occurred as planned at the Chandler House which allowed access to a SystmOne practice for the development of the SystmOne version. Throughout the process, views were sought from a small number of practice nurses to maintain focus, ensuring that the templates would be fit for purpose. Appendix 1 provides details and dates of the most important development features and refinement.

6. Template Design

The GM-ELIRT encompasses existing single disease templates used in primary care but improves the process by including:

- A symptom review that may help to identify developing comorbidity.
- Clinical measures based on national and international guidelines
- Clinical targets based on national and international guidelines.

- Clinical guidelines based on national and international guidelines.
- Risk assessments that may identify comorbid risks.

The individual templates are now described in more detail. To avoid lengthy repetition, the term 'user' has been employed to describe the person conducting a LTC review in whole or part; this may be a healthcare assistant, practice nurse, nurse practitioner, nurse clinician or GP (trainee, locum salaried or partner) or one of the practice administrative team, such as the practice manager or clerk.

6.1. EMIS PCS

The EMIS PCS template has a main screen as shown in Figure 1, which guides the user in completing the review in a logical order, commencing with the generic sections: clinical assessment, symptom review, bloods and urine screening and lifestyle factors. Vaccinations that are indicated for patients diagnosed with a LTC are also on this opening page, including the shingles vaccine which has recently been added to the Quality Outcomes Framework (QOF) register for patients aged 70 and 79. From the front page, the template leads the user onto a more specific assessment of individual diseases depending on the patient's diagnoses, by clicking on the appropriate buttons. The following diseases are included:

- Asthma.
- Atrial Fibrillation (AF).
- Coronary Artery Disease (often referred to Chronic Heart Disease (CHD)).
- Chronic Kidney Disease (CKD).
- Chronic Obstructive Pulmonary Disease (COPD).
- Diabetes.
- Hypertension (HTN).
- Heart Failure (HF).
- Peripheral Arterial Disease (PAD).
- Stroke/Transient Ischaemic Attack (TIA).

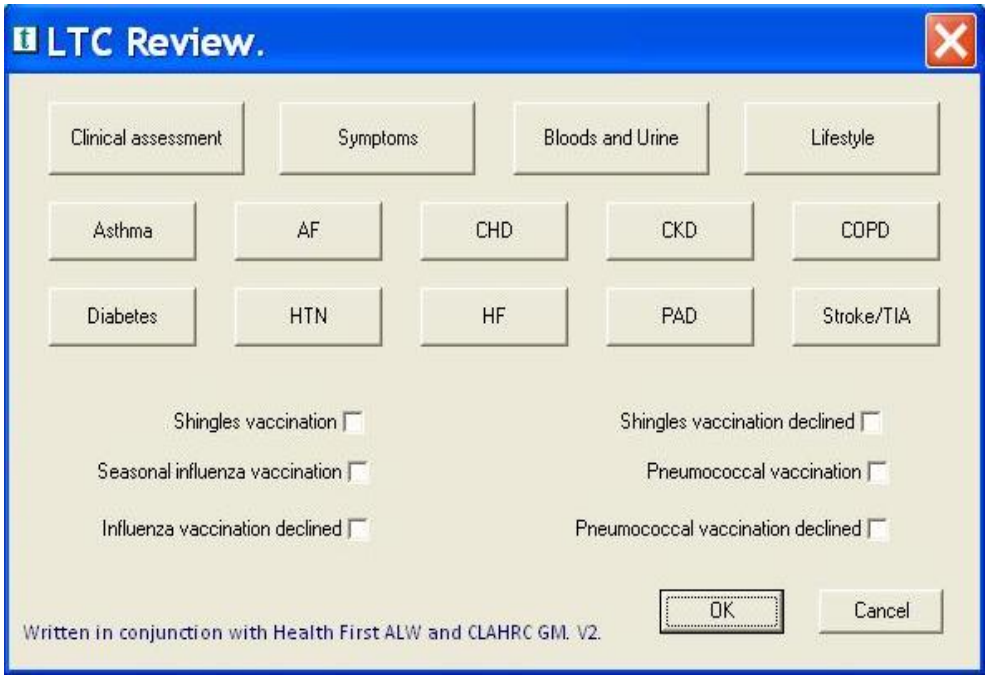

Figure 1: EMIS PCS Front screen

6.1.1. Generic sections

The clinical assessment screen (Figure 2) contains assessments that would have been on every single disease template, such as BP, pulse rate, height, weight and BMI therefore; performing these once for an integrated review reduces repetition. This page also houses items that may previously have been missed in single disease reviews; such as pulse rhythm which may only have been recorded on an Atrial Fibrillation template, thereby, providing an opportunity for early identification of developing comorbidity. Target systolic and target diastolic BP has also been added to the template, these have not previously featured on a LTC review template. Clinical guidelines assist the user in completing these boxes; and incorporate a comparison of QOF and Nice BP targets for individual diseases or a combination of diseases which increase cardiovascular risk. In other areas of the template we have tried to embed clinical guidance to appear when text is hovered over, but for target BP, the system did not allow the length of text required, therefore, we provided a separate clinical guidelines sheet (Appendix 2) that includes target BP as well as all the embedded guidelines.

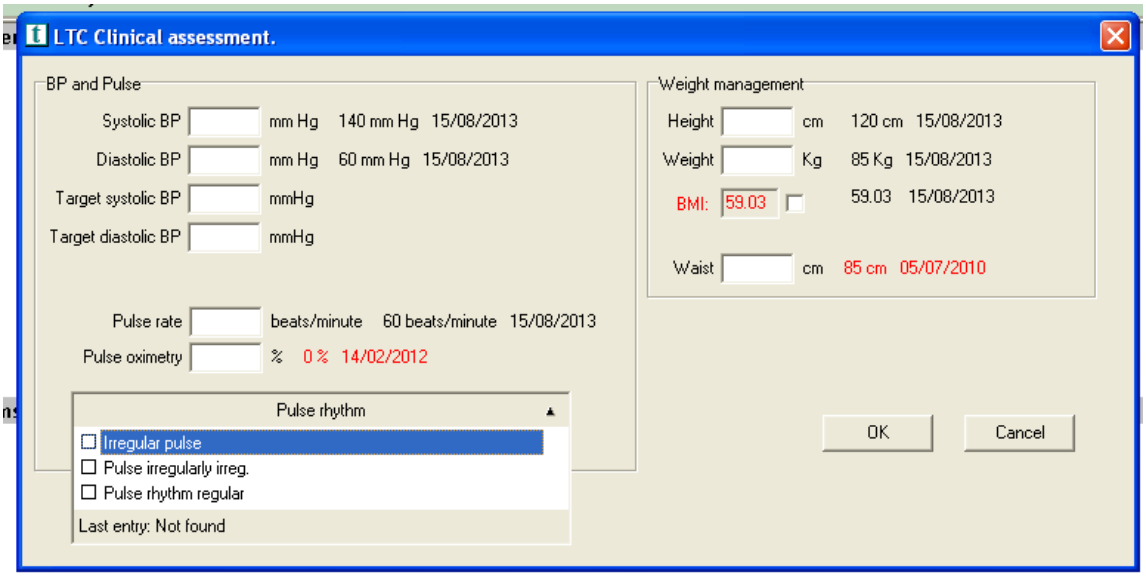

Figure 2: EMIS PCS Clinical assessment screen

A symptom review screen acts as a comorbidity screening tool. Single disease templates don't allow for general symptoms, therefore, this screen adds a new dimension to the review process. General symptoms appear on the right hand side of the screen and allow a tick only to report that a symptom is present. On the left, slightly more detailed enquiry is allowed by the use of drop down boxes, as shown in Figure 3. Only symptoms relating to the diseases within the template are included.

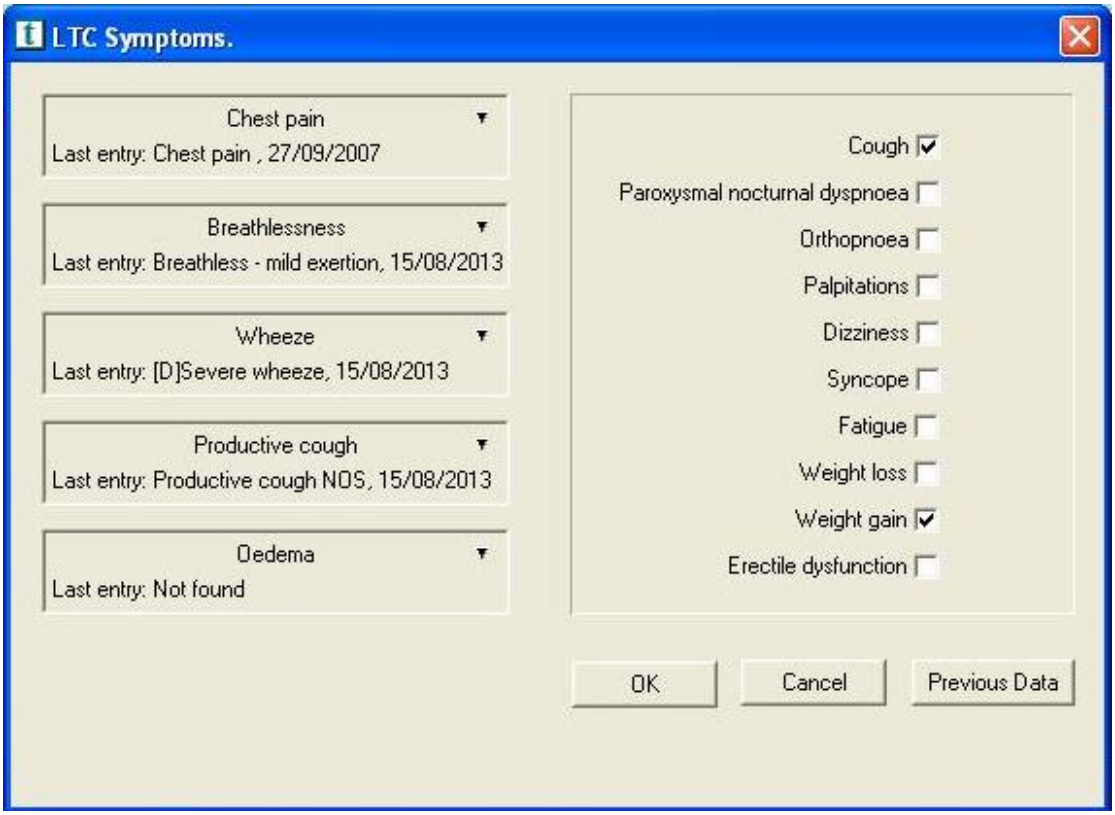

Figure 3: EMIS PCS Clinical assessment screen

A bloods and urine screen allows pathology results to be viewed easily rather than the user leaving the template to find results in another part of the system; only tests that would have been conducted prior to the review are featured.

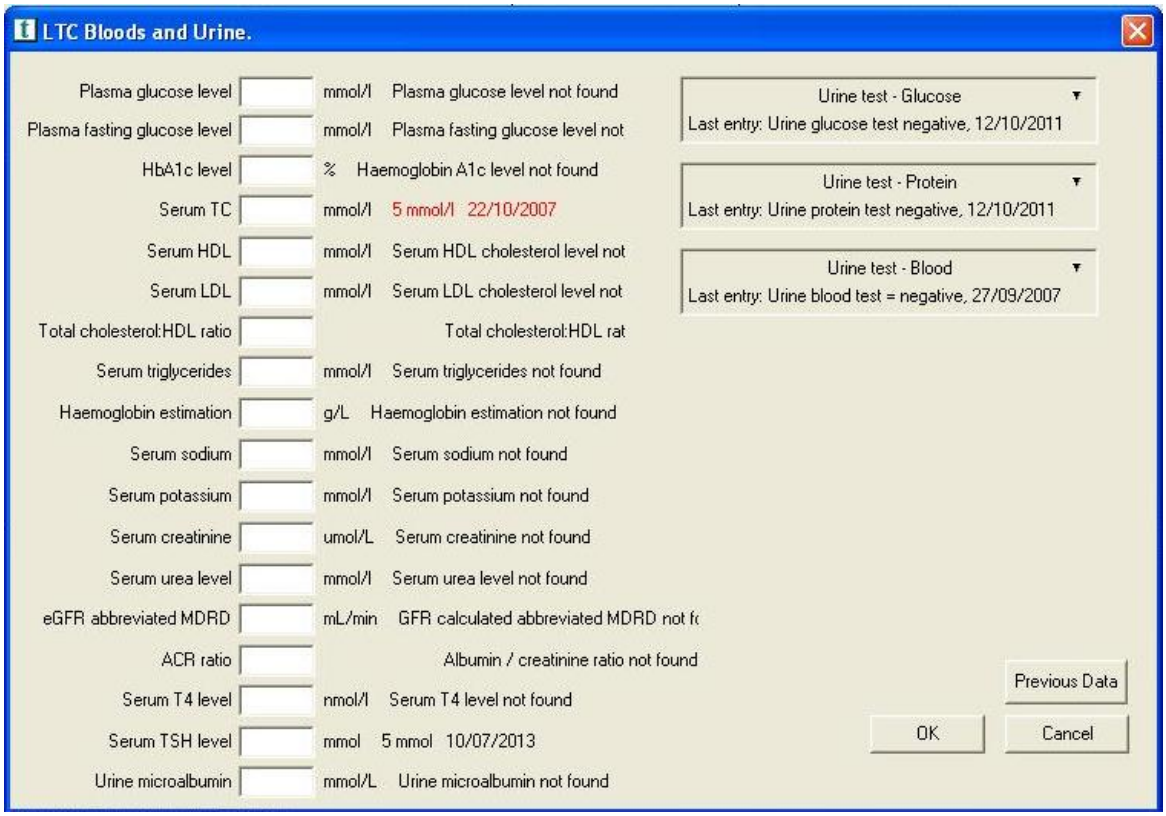

Figure 4: EMIS PCS Bloods and Urine screen

As for the clinical assessment screen, the Lifestyle screen provides information that would have been on every single disease template such as smoking, alcohol, exercise and diet but extends the review to cover items that would only be covered by certain reviews; for example, the GP Physical Activity Questionnaire (GPPAQ) is indicated for QOF for hypertension only, yet is useful to identify a need for advice about exercise for patients with other LTCs or to identity barriers to exercise due to comorbid diseases. There are also additional features to speed the process of the review such as a web link to the Pack Years Calculator as shown in Figure 5.

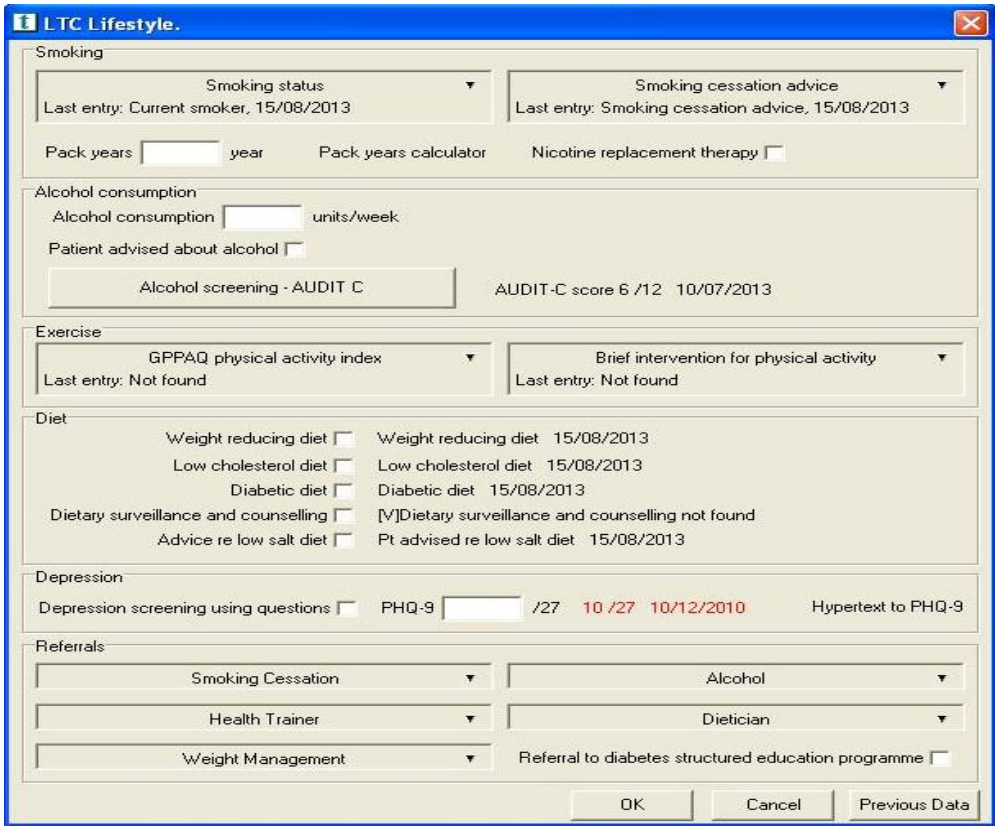

Figure 5: EMIS PCS Lifestyle screen

Once the generic sections are complete the disease specific screens can be accessed from the front screen for more detailed assessment of criteria relating specifically to individual diseases. The Asthma screen (Figure 6), for example, includes the RCP 3 Questions which assess the degree of morbidity and provides a measure for prescribing decisions to promote optimum asthma control, according to the step up/down management plan.

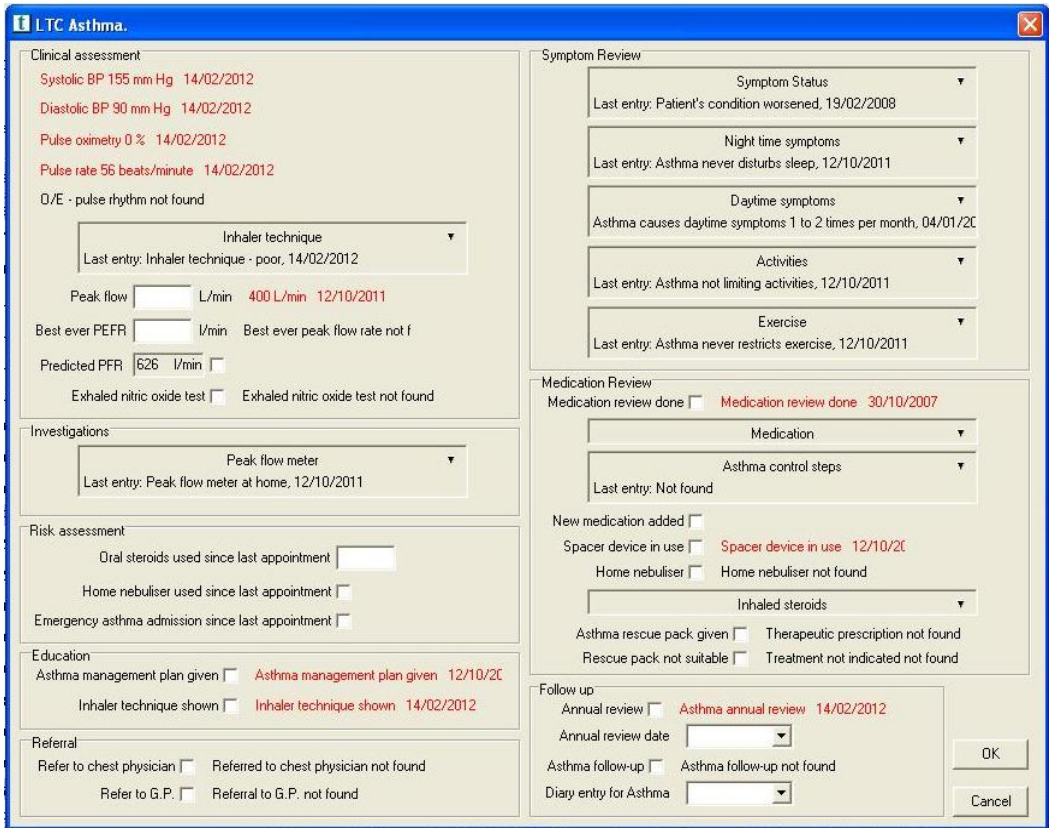

Figure 6: EMIS PCS Asthma screen

For clarity and ease of use, each disease specific template is separated into sections using a standard format; the section headings are as follows:

- Clinical Assessment
- Investigations
- Risk Assessment
- Symptom review
- Medication
- Education
- Referral
- Follow-up

The majority of screens follow in the same order. Asthma and COPD, however, contain more items than the other screens which created difficultly maintaining the order; the headings are the same but the order is slightly different. Information gathered during the generic review that is clinically important for individual LTCs, populates onto the relevant disease specific screen as shown in Figure 7; the BP and BMI readings appear from the clinical assessment screen to the diabetes screen. This feature avoids time being wasted by closing the screen, clicking back to the front screen to access the clinical assessment screen to check a result, before returning to the diabetes page. As for the generic screens, there is a combination of tick and drop down boxes on each specific disease screen

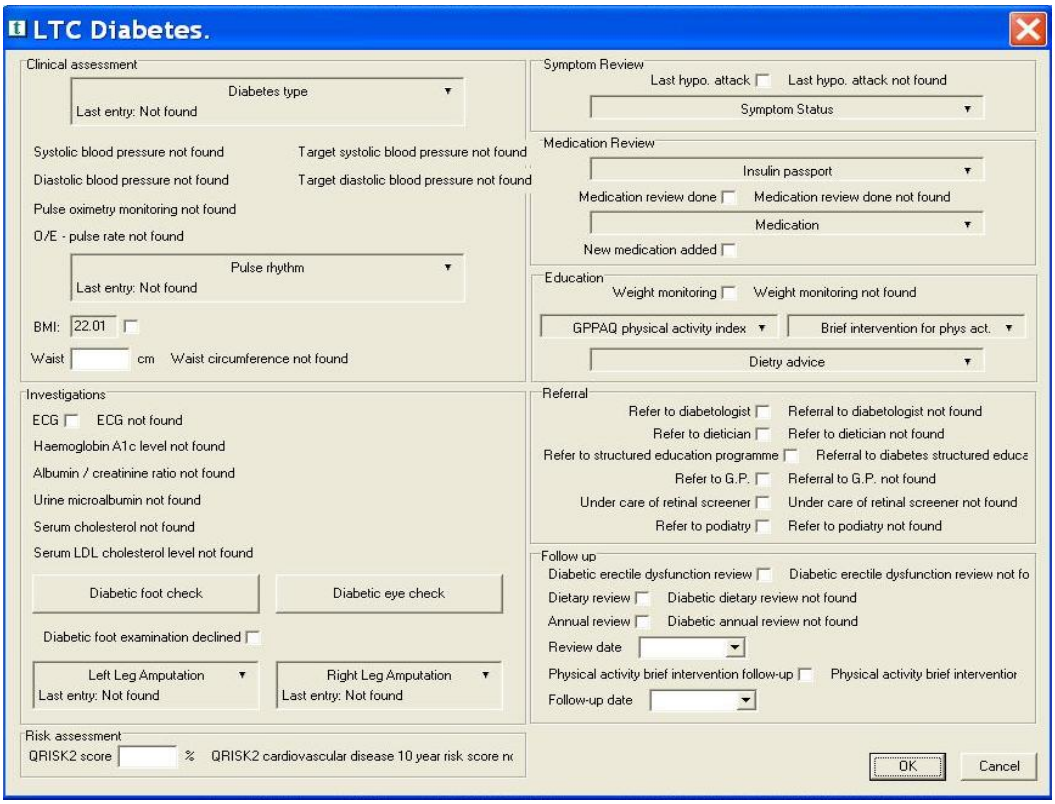

Figure 7: EMIS PCS Diabetes screen

Where a more detailed assessment is warranted, items can be accessed via a link to additional documents found in the EMIS PCS system. A diabetes review requires a detailed foot and eye check, clicking on the appropriate buttons opens separate screens as shown in Figure 8.

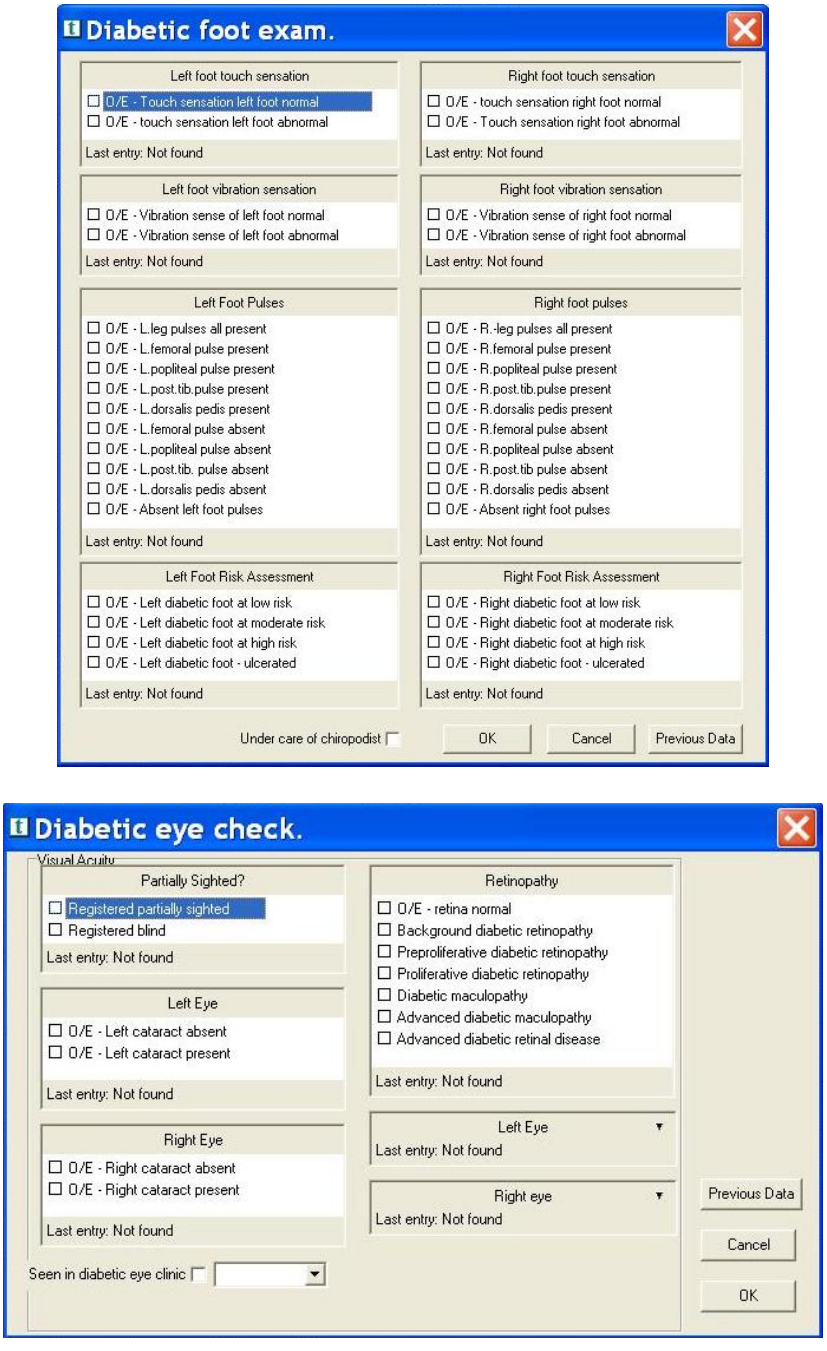

Figure 8: EMIS PCS Diabetes foot and eye check screens

To improve the quality of patient records, items have been added that may previously not have been recorded but are valuable for prescribing decisions. For AF (Figure 9), for example, the Time in Therapeutic Range (TTR) for INR (international normalised ratio) can be recorded as recommended by the European Society of Cardiology[29] as a measure to assess the need for switching from warfarin therapy to a new oral anticoagulant (NOAC).

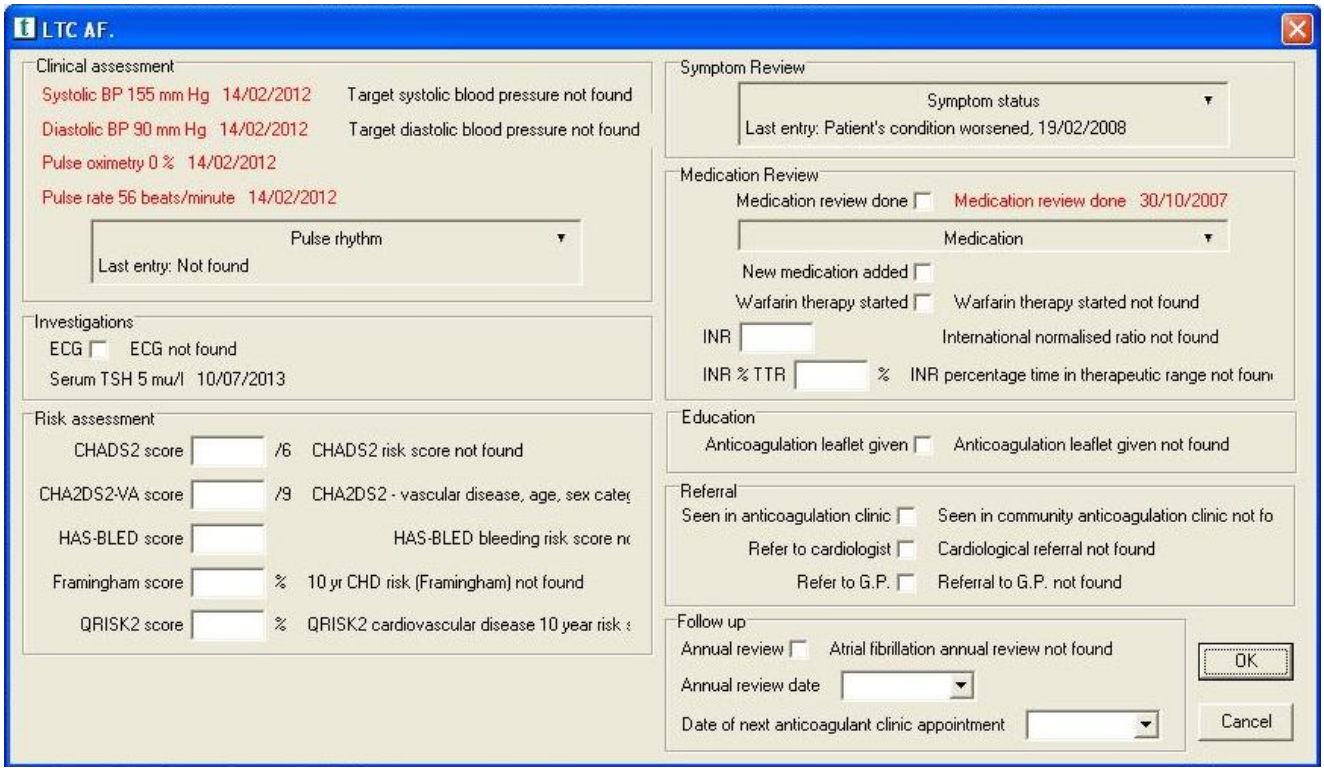

Figure 9: EMIS PCS AF screen

On the CKD screen (Figure 10), CKD stage, eGFR and ACR are included to allow accurate registration of CKD and provide detailed monitoring of progression. This builds on the work carried out by GM CLAHRC's CKD project team.

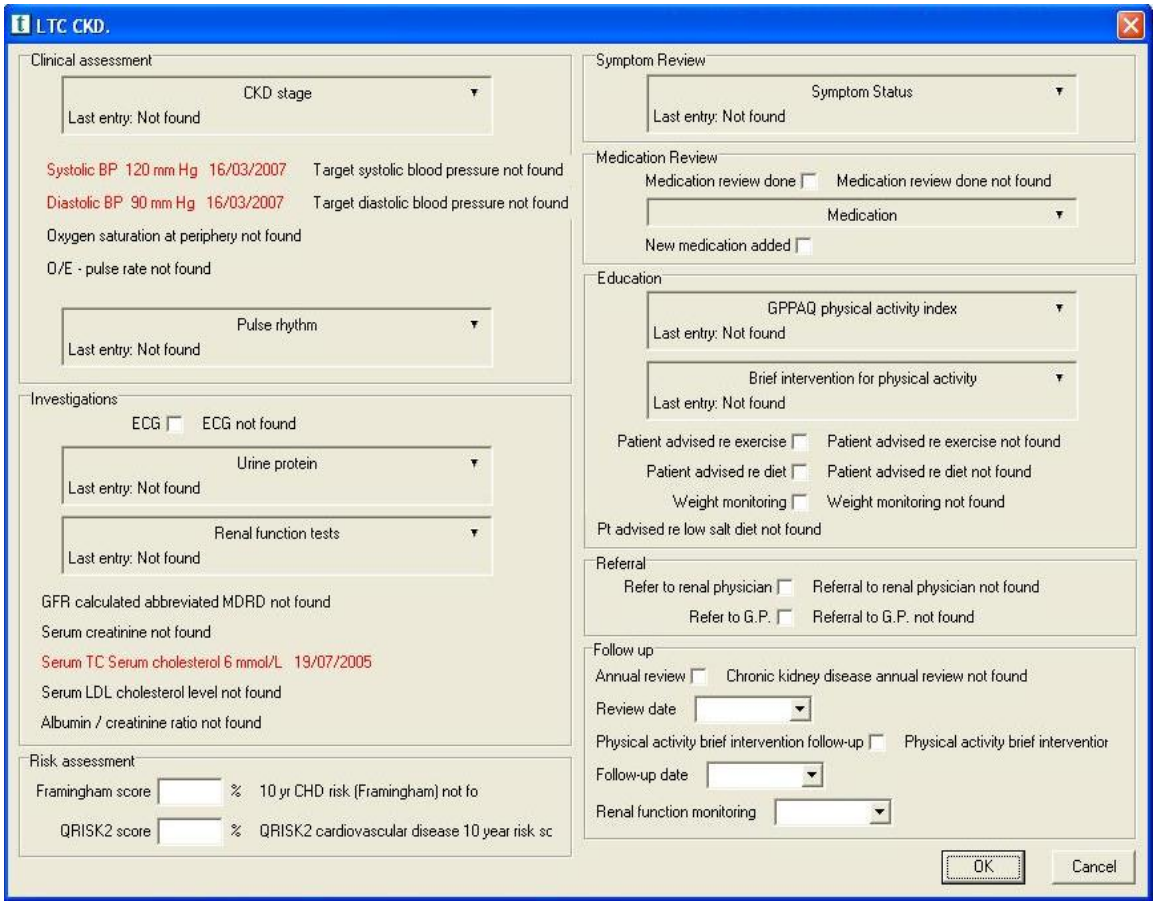

Figure 10: EMIS PCS CKD screen

Ambulatory BP monitoring (ABPM) readings can be recorded on the hypertension screen (Figure 11). ABPM is recommended by NICE for use in primary care to provide an accurate assessment of blood pressure over a 24-hour period in the patient's normal environment. Many studies have confirmed that this is superior to clinic blood pressure in predicting future cardiovascular events and target organ damage.[30-33] Home monitoring BP recordings are also featured; this complements work carried out by GM CLAHRC's BP self-monitoring project team in encouraging GP practices to assist hypertensive patients to self-monitor and implement strategies to maintain good BP control.

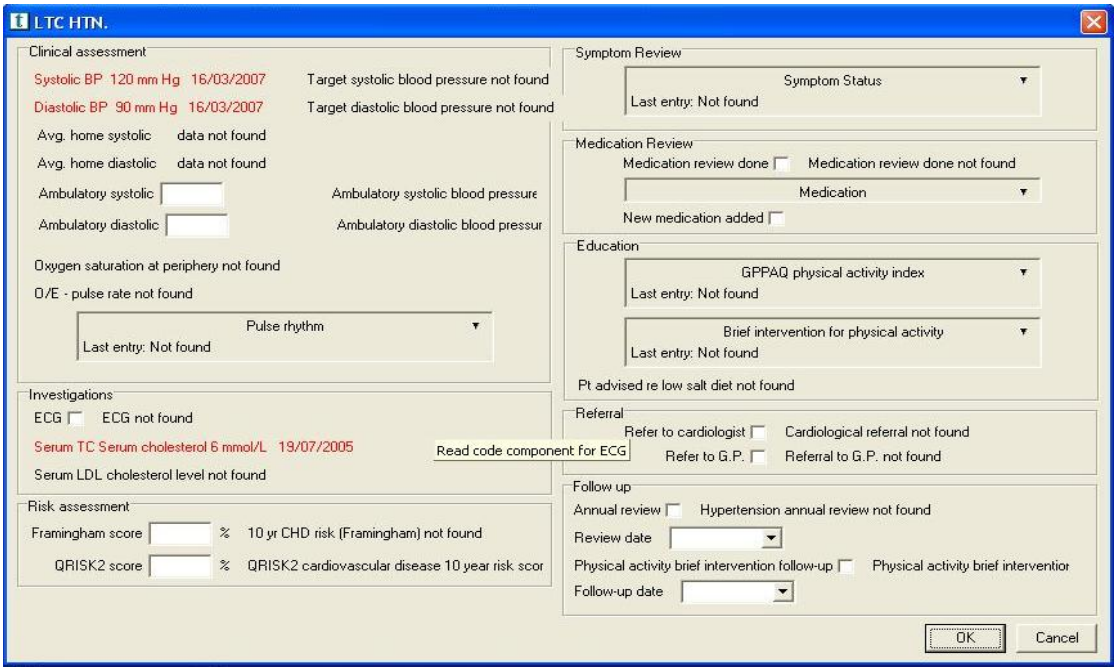

Figure 11: EMIS PCS Hypertension screen

6.2. EMIS Web

EMIS Web is an updated system to the previous PCS and LV versions which allowed more scope in template development and design. Rather than comprising of a series of amalgamated templates as for EMIS PCS, there is one template comprising of a number of pages that can be clicked in and out of easily and quickly without having to close pages down before moving onto the next. It has a similar feel to Microsoft Outlook.

The pages are more clearly presented than EMIS PCS, the sections are organised on rows, and each section heading is clearly defined. The front page (Figure 12) allows the user to specify the consultation reason. Each drop down box allows multiple options, so if the patient has a diagnosis of diabetes, hypertension, CKD and COPD, all can be selected. In EMIS PCS, the user had to go into each disease specific screen to view or update review information. EMIS Web helps the user update the patient's review status and see clearly the date previous reviews were carried out. It also assists practices to satisfy QOF requirements for the recording of annual and six monthly reviews.

New LTCs have been added to the EMIS Web template. As mentioned earlier, the first version covered only respiratory and cardiovascular related diseases but during the development process we received a number of requests to extend the template to include other LTCs, some of which have been recently added to the QOF register for review. Due to the limited time from development to project completion we only had time to add rheumatoid arthritis and hypothyroidism. Further LTCs will be added as part of the refinement work. A quick link bar runs down the left hand side of the screen to allow the user to move quickly through pages and flick back and forward as necessary.

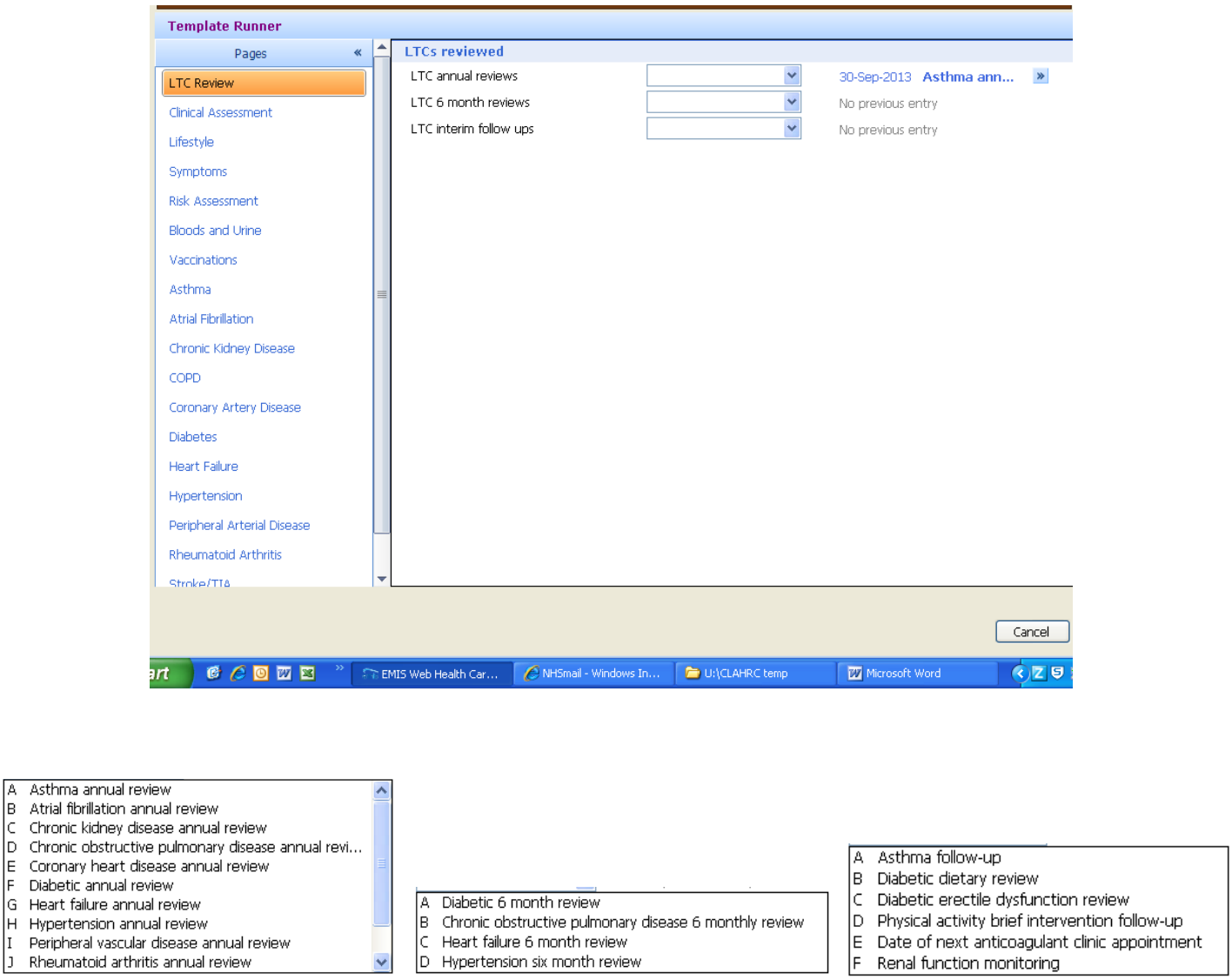

Figure 12: EMIS Web Front page

The symptoms page (Figure 13) has been extended to provide a more holistic review of symptoms rather than focusing only on cardiovascular and respiratory symptoms. Drop down boxes reveal a list within each section. The new sections are mental health, neurological and musculoskeletal. General symptoms have been expanded, but it is likely that future versions will contain more system boxes e.g. urological and gastrointestinal and some of the general symptoms can be transferred. For mental health, depression and anxiety have been added.

Depression screening at LTC review has been removed from QOF, yet many studies have confirmed the risk of depression for patients with LTCs.[10 34 35] The presence of these symptoms may prompt further investigation for patients at risk. Short-term memory loss and confusion has also been added to prompt further cognitive dysfunction screening for suspected dementia. Neurological symptoms have also been added. The EMIS PCS template lacked a more inclusive assessment of stoke patients' needs concerning mobility, balance, risk of falls and cognitive function. There are still a number of symptoms that still should be added, but limited time did not allow further detail. This will be addressed as part of future refinement.

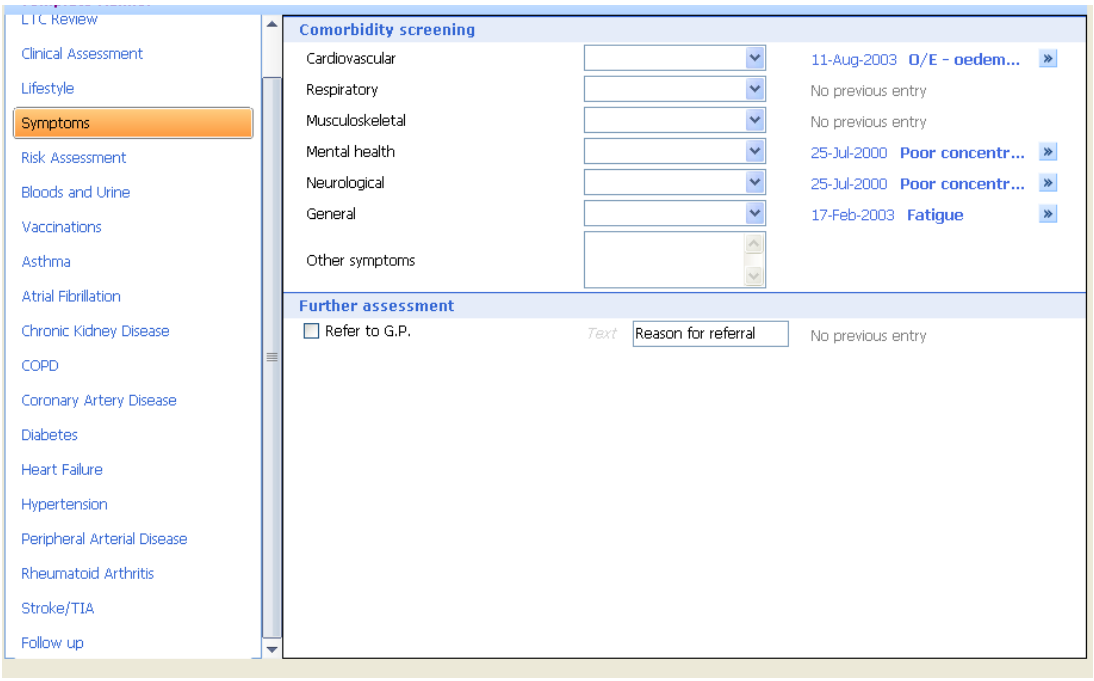

Figure 13: EMIS Web Symptoms: comorbidity screening page

The bloods and urine page (Figure 14) is much clearly defined in EMIS Web and is divided into sections to describe the type of pathology results so that specific results can be easily found.

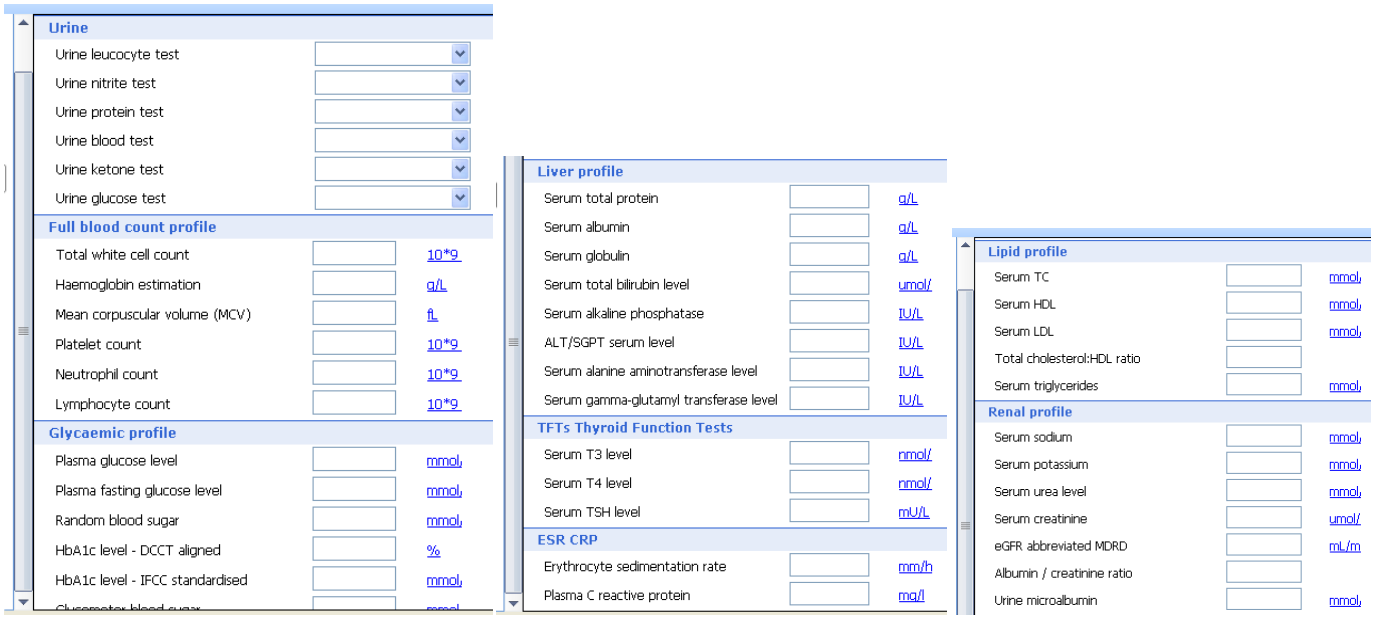

Figure 14: EMIS Web Bloods and Urine results page

In EMIS PCS, risks assessment tools were presented within the appropriate disease screens which meant that some were repeated on a number of pages. In EMIS Web, we have created a separate page for risk assessment tools (Figure 15) and have included all risk tools previously presented in the PCS version but added more, such as a diabetes risk score[36] which provides a 10 year risk calculation of developing type 2 diabetes. This may assist practices in identifying pre-diabetes and implement early strategies to prevent or slow the progression to diabetes for at risk patients. This adds to the work carried out by the GM CLAHRC's IGT teams in proactive management of pre-diabetes. Since adding rheumatoid arthritis to the template we have also included the Falls Risk Assessment Tool (FRAT) and the Disease activity score (DAS). The Fracture Risk Assessment Tool (FRAX) has also been added in preparation for further osteoporosis criteria being added in the next wave of refinement. Cognitive function screening tools have been added for further investigation of patients deemed to be at risk of developing dementia. As the incidence of multimorbidity and dementia rise with age,[32] [33] early identification may assist in developing strategies to manage the disease effectively for patients and their families, particularly for people already living with multiple LTCs. The

consequences of multimorbidity can lead to poor adherence to therapy,[16 18 21 37] which can increase resource utilization owing to treatment failure.[22] Treatment failure due to poor adherence can lead to a vicious cycle of unwarranted changes of medications, escalating healthcare expenditure and the risk of increased morbidity. Interventions to improve adherence are frequently reported in academic literature,[38] however, in clinical practice there is little evidence of implementing such findings. Adding adherence risk questions may highlight the need to monitor poor adherence more effectively.

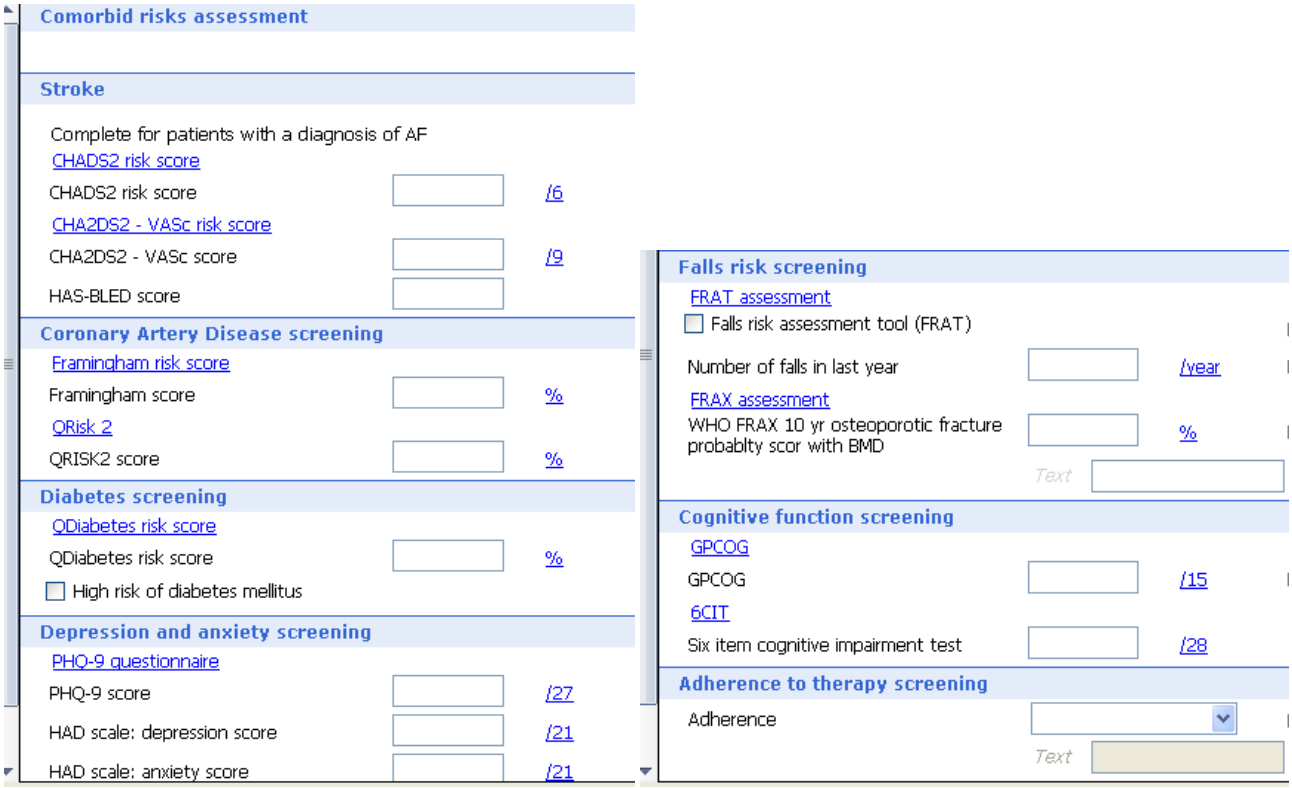

Figure 15: EMIS Web Risk Assessment

The EMIS Web template has allowed more detail about the medication patients are prescribed for each disease group as shown on the Coronary Artery Disease page in Figure 16. The clinical guidelines enhance this information by providing an overview of the prescribing recommendations to assist the user when checking medication combinations for patients with multimorbidity.

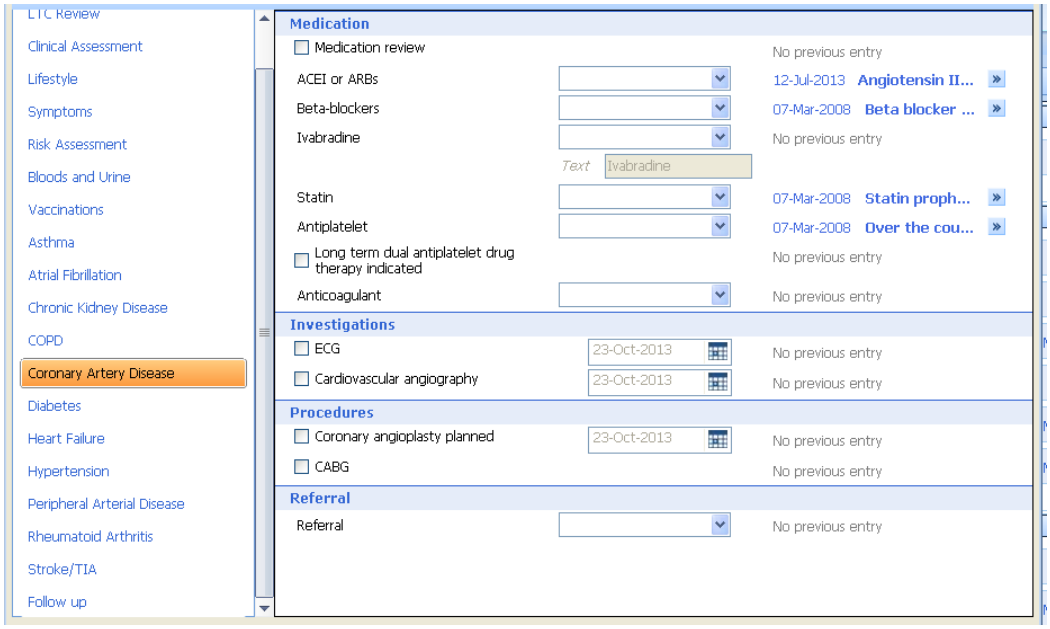

Figure 16: EMIS Web Coronary Artery Disease page

The heart failure page (Figure 17) includes sections that may previously have been poorly recorded such as specifying the type of heart failure, ejection fraction and New York Heart Association (NYHA) classification. This will hopefully enhance practice records and assist in monitoring, managing and decelerating progression. The GM-ELIRT encompasses all items contained on the heart failure template currently being spread across in Bury by the GM CLAHRC Heart Failure Team, and therefore, complements this work.

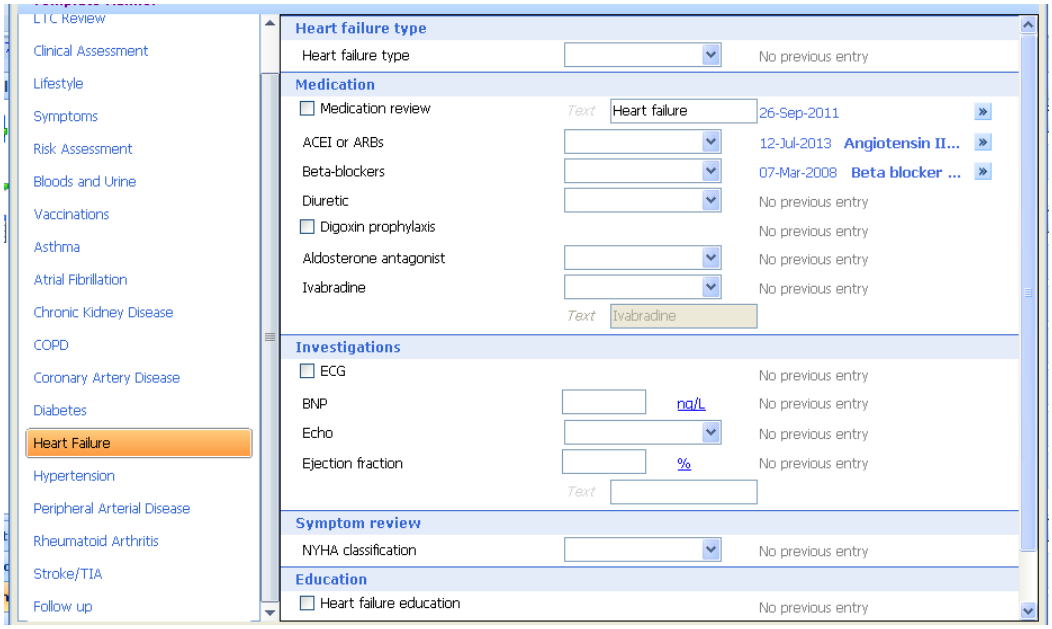

Figure 17: EMIS Web Heart Failure page

6.3. SystmOne

We have been able to mirror the EMIS Web development in SystmOne, even though the systems are completely different. The screens also have a different formatting but we have been able to display the same information on each. In SystmOne, the quick link row lays horizontality at the top of the screen as shown on the front page (Figure 18). SystmOne displays more information on the screen than EMIS Web about past events as shown at the bottom of the screen, with dates of presentation or diagnoses. A yellow box on the right, lists dates that previous reviews were performed. In EMIS Web the previous event or result appears directly next to the item.

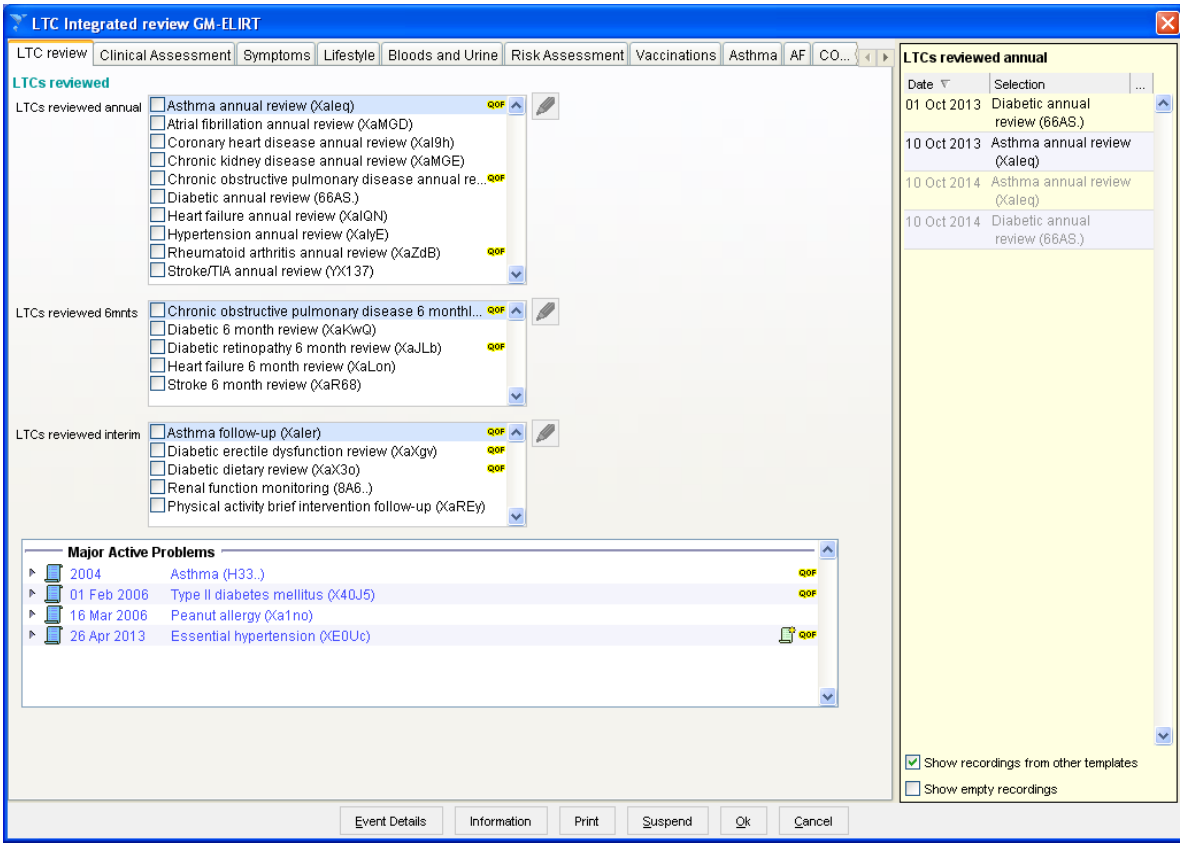

Figure 18: SystmOne Front page

Due to the screen format, the clinical guidelines prepared for this project are shown on the screen, which make them more visible to the user than appearing when text is hovered over. In Figure 19, BP and pulse targets are displayed on the Clinical Assessment page to assist the user when setting targets for the patient such as target systolic and diastole BP.

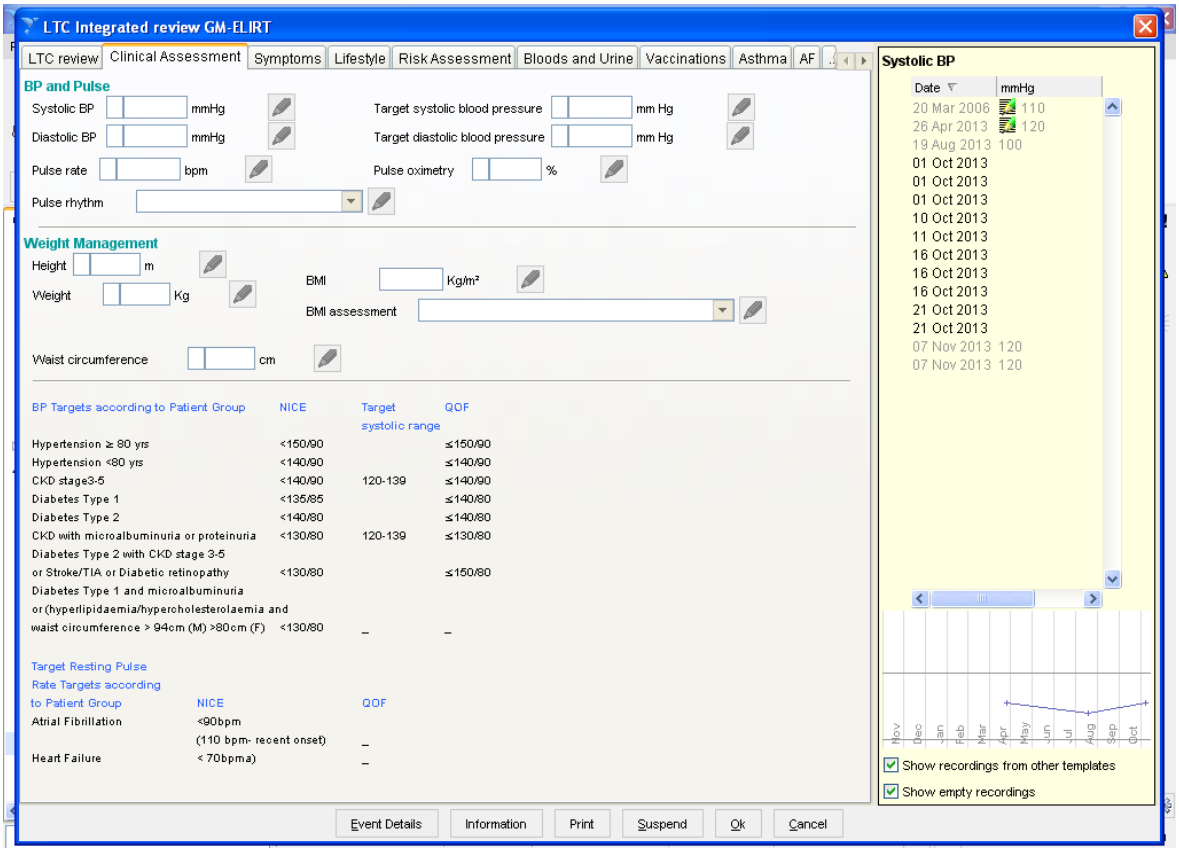

Figure 19: SystmOne Clinical Assessment page

The symptoms added are shown clearly in SystmOne as shown in Figure 20 under the headings: cardiovascular, respiratory, musculoskeletal, neurological, mental health and general. Text boxes are available for each section to provide more detail and additional systems not listed can be added as text.

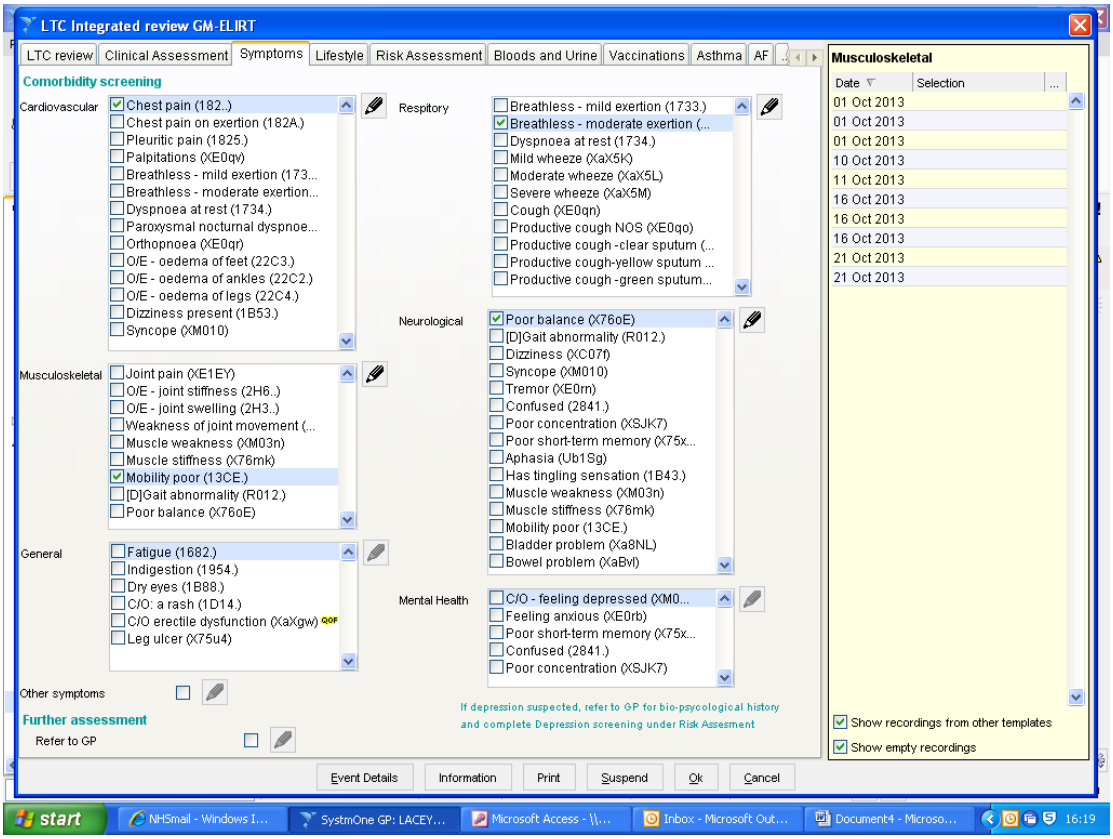

Figure 20: SystmOne Symptoms shown on comorbidity screening page

Prescribed medication is also visible on the screen in SysmOne which allows the user to check medication easily without clicking to another section of the system. As for EMIS Web, recommended medications are listed (Figure 21) as per the clinical guidelines.

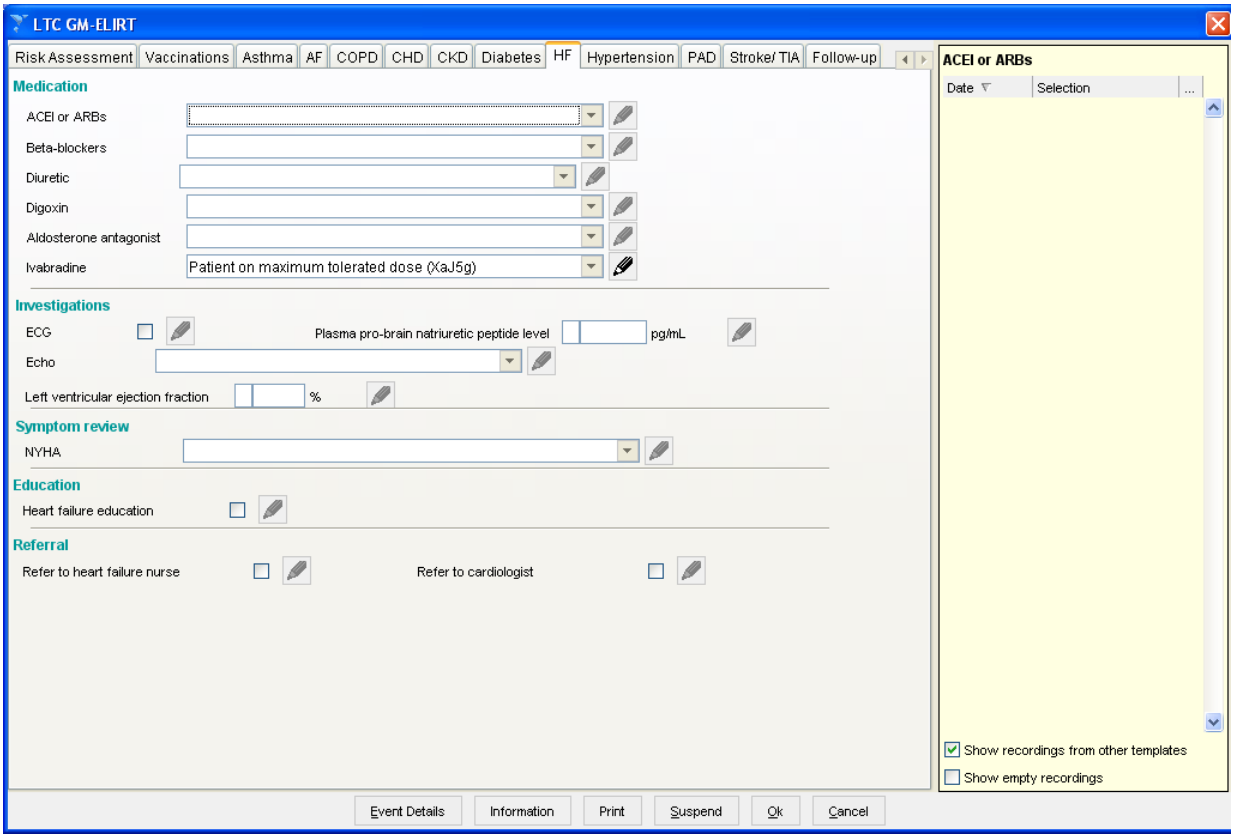

Figure 21: SystmOne showing prescribing choices for heart failure.

A number of previous readings can be displayed in SystmOne as shown for previous BP recordings in Figure 22. There is also an option for displaying a graph. This may be valuable to show patients previous results to incentivise them to modify behaviour such as displaying the HbA1c results for patients with type 2 diabetes or to congratulate patients with good BP control following a period of home monitoring.

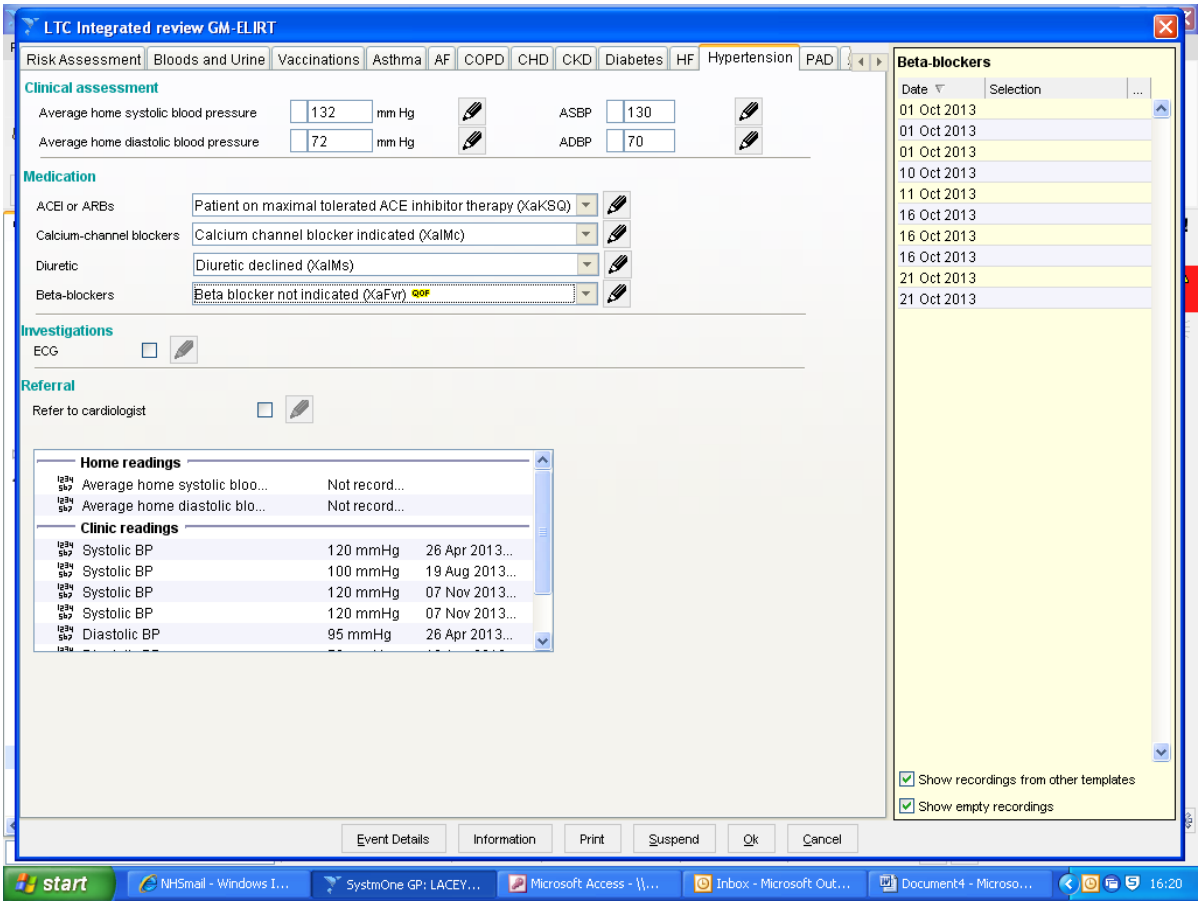

Figure 22: SystmOne Hypertension page showing previous BP recordings.

SystmOne also has a visible display of QOF indicators as shown of the diabetic foot check page (Figure 23). It will be reassuring to practices that the correct read codes have been used to satisfy QOF[1] requirements.

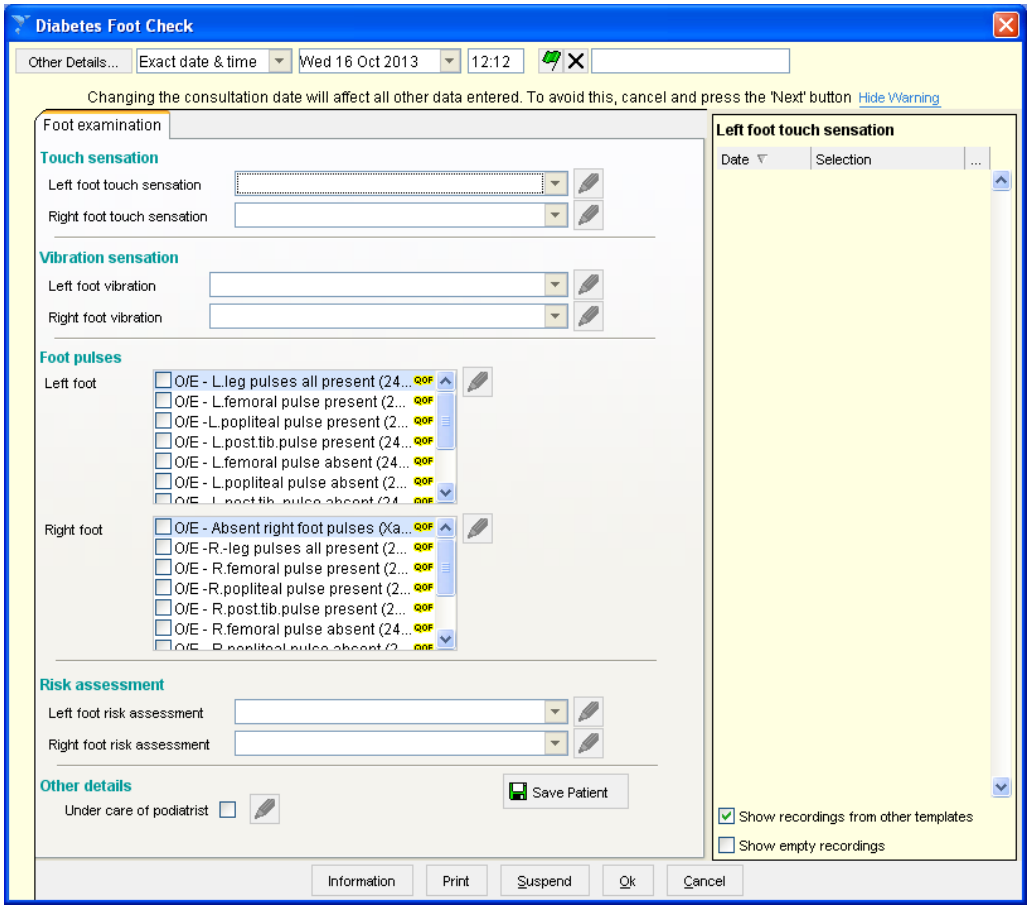

Figure 23: SystmOne Diabetes foot check showing highlighted QOF indicators.

The evaluation pilot project will now be described.

7. Project Design

The main stages of the project design were Recruitment, Facilitation, Evaluation and Refinement. The Model for Improvement was used to guide the evaluation process. The flow chart in Figure 24 presents the project design for this pilot with anticipated timelines; Section 7 will then describe the process in more detail.

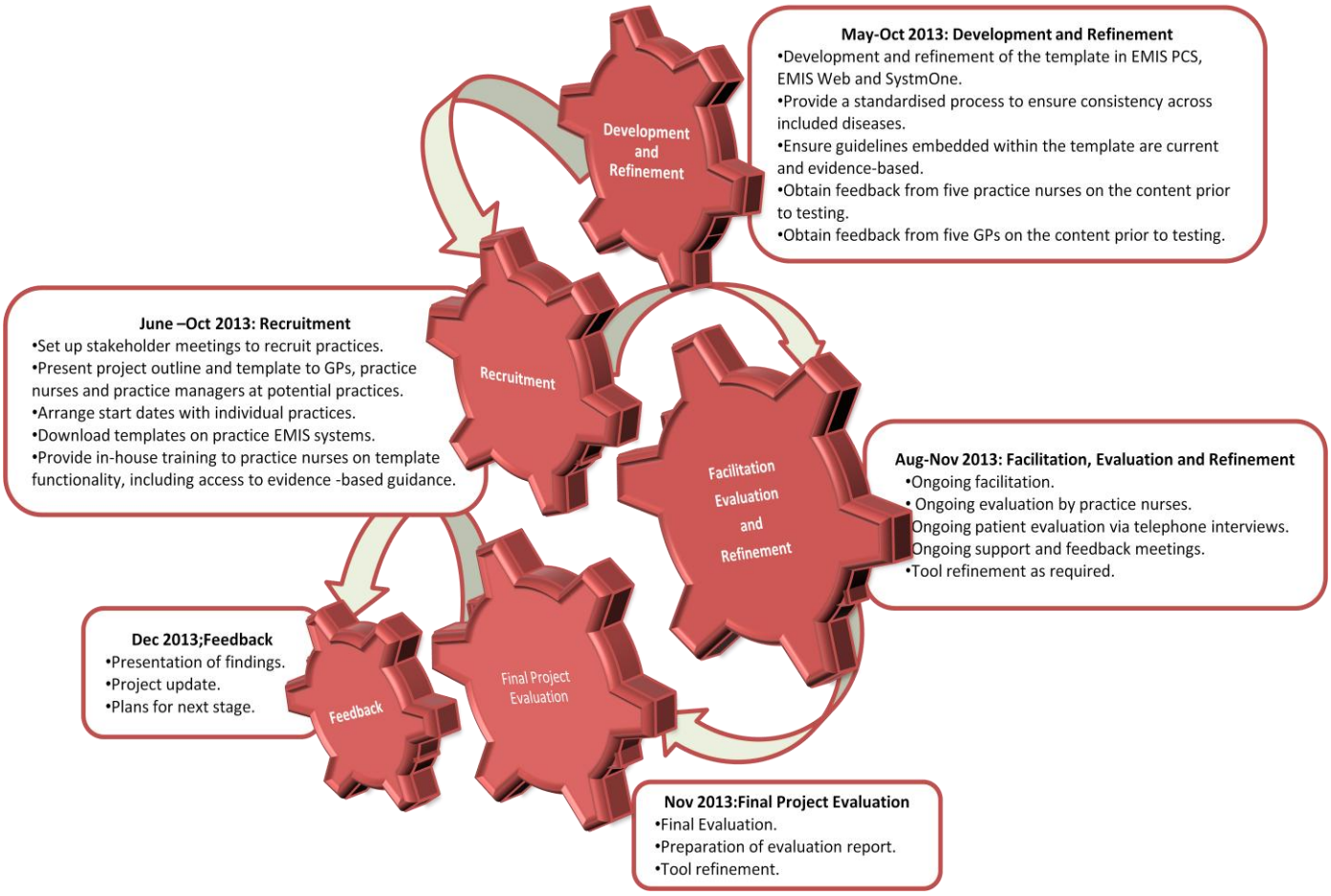

Figure 24: Flow chart presenting the structure and anticipated timelines for the GM-ELIAT pilot project.

7.1. Recruitment

As time was limited, practices were recruited on an opportunistic basis. Practices providing access for template development were the first practices to be invited to take part in testing the template. Contact was also made with practices that have been involved in previous GM CLAHRC projects. Practice team members who had co-ordinated projects at practice level or who had had a key role, were the first point of contact. The

Project Lead also contacted practice managers, GPs or lead practice nurses whom she had been in contact with during the development stage of the project, to assess their interest for recruitment.

7.1.1. Introductory Meetings

As soon as responses were received, the project lead set-up an introductory meeting this usually involved the lead nurse and/or the practice manager. Screenshots of the template to be tested were presented and the project was discussed prior to obtaining confirmation that the practice was willing to take part in the project. Where possible, a project set-up meeting with the remaining practice nursing team was arranged. If feasible, a project set-up meeting involved the whole nursing team but where this was not possible due to different work schedules, separate project set-up meetings were arranged. The practice nursing team may involve nurse practitioners (NPs), practice nurses (PNs) or healthcare assistants (HCAs). To avoid repetition of the list of nurse roles, practice nursing team members will be referred to as nurses or practice nurses (i.e. GP practices' nurses).

7.2. Facilitation and Support

Support was on-going throughout the project, facilitated by members of the GM-ELIRT Team. Facilitation support began with a project set-up meeting and ended with a final facilitation meeting to complete a final evaluation questionnaire. Prior to the project set-up meeting, a zipped version of the template was sent to the practice manager with downloading instructions. Where the practice manager required assistance in downloading the template or refinement of the template was needed prior to continuing, a data analyst attended the project set-up meeting.

7.2.1. Project Set-up meeting

Project set-up meetings lasted approximately an hour depending on practice nurses' clinic schedules. Meetings were attended by practice nurses, the project lead and a member of the GM-ELIRT project facilitation team. In cases where the practice team had had involvement in template design and had been previously briefed by the project lead, a member of the facilitation team conducted the meeting in conjunction

with the data analyst, to assist with any technical questions. Each practice nurse received a project file containing the following resources:

- A Project Plan.
- A User Guide.
- A Clinical Guidelines Sheet
- Post-review Evaluation Sheets.
- Patient Information Sheets for patients to take home.
- Patient Consent Forms for patients to take home.
- A patient contact details sheet

The contents of the file were specifically designed to contain everything practice nurses would need to allow minimal involvement (due to busy clinic schedules), yet a useful evaluation. The project set-up meeting involved:

- A description of the project, including background, testing and the evaluation process.
- Checking that the tool functions correctly within the practice's clinical system.
- Familiarisation of the template by practice nurses via a detailed presentation of its contents with an explanation of the format using a dummy patient.
- Addressing any initial issues arising during familiarisation with the template.
- Discussion about when to start using the template.
- A baseline evaluation questionnaire, conducted via a face-to face interview. Where time was limited an electronic version was emailed to the practice nurse for completion and return via email to the project lead for analysis. Further details of evaluation methods are provided below.

7.2.2. Facilitation Meetings

Regular facilitation was provided by face-to-face contact on a weekly to fortnightly basis throughout the project. Facilitation sessions consisted of short meetings lasting between 20 and 30 minutes for practice

nurses to feedback any particular comments or issues with the template or the process, that had not been highlighted in the evaluation forms. Feedback was captured on a facilitation questionnaire. Post-review evaluation forms were collected and more supplied along with patient information sheets, patient consent forms and patient contact sheets, as required. Meetings were arranged on an individual basis to suit practice nurses' time schedules. Practice nurses were given contact details for all members of the GM-ELIRT team including the data analyst, for issues arising between facilitation sessions.

7.3. Evaluation

The evaluation involved a number of evaluation questionnaires completed via face-to-face interview, telephone interview or electronically and returned by email. Questionnaires included baseline, post-review, facilitation, final and patient evaluation. The evaluation methods were conducted in parallel to testing the templates and will now be described in more detail.

7.3.1. Baseline evaluation questionnaire

A baseline evaluation questionnaire (Appendix 3) was completed following the Project Set-up meeting via a number of different methods:

- Face-to-face interview. The electronic or paper form was completed by a GM-ELIRT team member
- Self-completion at the project-set up meeting (where a large nursing team attended the project set-up meeting and there was limited time to complete the questionnaire with all nurses individually)
- Self-completion electronically and emailed to project lead (where time was limited at the project set-up meeting).
- Telephone interview (where time was limited at the project set-up meeting and this was preferred by the practice nurses).

The questionnaire took approximately 5-10 minutes to complete. Questions were related to the existing LTC review process and single disease templates. Practice nurses were asked how long a review takes, whether

there is repetition between single disease templates for patients with multimorbidity and their opinion on the quality of single disease templates for a number of factors including: usability, efficiency, identifying and managing multiple LTC needs, guiding clinical practice and their educational content for assisting less experienced nurses when conducting LTC reviews.

7.3.2. Post-review evaluation questionnaire

Practice nurses were asked to leave a post-review evaluation sheet (Appendix 4) on their desk for the duration of each clinic session to capture any issues they have with the template as it happens so that it is fresh in their mind. This was a very short six question evaluation but important to allow major problems with the template to be refined immediately if this issue would deter practices from continuing with the template. It was also useful to capture more minor issues in case these were forgotten at the time of the facilitation meeting. As each review performed may involve different sections of the template, nurses' evaluations may differ according to each patient's needs; waiting for each facilitation session may have resulted in lost data. Practice nurses were asked to store completed post-review evaluation sheets in a plastic wallet provided in the GM-ELIRT project folder. Completed sheets were collected by a GM-ELIRT team member at facilitation meetings.

7.3.3. Facilitation evaluation questionnaire

A facilitation evaluation questionnaire (Appendix 5) was completed at each facilitation session by a GM-ELIRT team member. Questions focused on the time taken to complete reviews, which template pages had been completed to date, whether the GM-ELIRT template was used for all reviews, or practice nurses had felt the need to switch back to a single disease template, whether items were easy to find, whether they noticed anything was missing, whether the GM-ELIRT screening tools had helped to identify co-morbidity and whether the clinical guidelines had been utilised to guide practice.

7.3.4. Final evaluation questionnaire

At the end of the testing period practice nurses were asked to complete a final evaluation (Appendix 6). The form was usually completed by a GM-ELIRT team member during a short face-to-face interview, lasting approximately 15 minutes. Where this was not possible, final evaluation forms were emailed to practice nurses to complete electronically and return via email. Questions were related to the review process during the testing period. Practice nurses were asked the average time it takes to complete a review with the GM-ELIRT, whether multiple LTCs were assessed at the same time, whether the template assisted the flow of the review, and their opinion on the quality of the GM-ELIRT for a number of factors including: usability, efficiency, identifying and managing multiple LTC needs, guiding clinical practice and addressing nurses' educational needs to allow comparison with the single disease templates.

7.3.5. Patient evaluation questionnaire

To establish patients' views on integrated reviews, practice nurses were asked if they would be happy to recruit patients to take part in a short telephone interview lasting approximately 15 minutes. Questions were related to their last review appointment (involving the GM-ELIRT template) and covered general questions such as; did they know which LTCs they had, which conditions were reviewed at the appointment, how many review appointments did they have per year. To ascertain their views on integrated reviews they were given a series of statements and asked whether they agreed or disagreed on a scale of 1-5 (strongly disagree = 1, disagree = 2, neither agree nor disagree =3, agree =4 and strongly disagree = 5). The following information was sought.

- Whether patients feel that having all LTCs reviewed at the same time more thoroughly addresses their LTC needs?
- Whether having longer but fewer appointments is more convenient?
- Whether they feel that concerns relating to any of the LTCs are addressed more effectively?
- Whether they feel that all their LTCs needs are more fully addressed during an integrated review?
- Whether they felt they were provided with enough information to see how some of their LTCs are related?

- Whether they felt more supported in managing their LTCs as a whole and not individually?

The Patient Enablement Instrument (PEI) was also used to assess whether patients feel enabled to manage their LTCs. The PEI has previously been used to measure the effectiveness of consultations in a number of primary care settings.[39-42] Enablement describes a consultation outcome that reflects the extent to which patients understand their health problems, and feel able to cope with them as a result of the consultation. Greater enablement is achieved when the patient's needs are identified, acknowledged and dealt with in an appropriate context [39]. The PEI has six questions. Patients were asked, "As a result of your last review appointment do you feel you are:

- Able to cope with life?
- Able to understand your LTCs?
- Able to cope with your LTCs
- Able to keep yourself healthy?
- Confident about your health?
- Able to manage your LTCs?

Each question has four response options: much better/better/same or less and not applicable (for questions 1 to 4), much more/more/same or less and not applicable (for questions 5 to 6). Scoring ranged from 0 to 2: 2 = much better/much more, 1 = better/more and 0 = same or less or not applicable.

If patients were happy to take part, the practice nurse was asked to record their telephone number and give them an information sheet and a consent form to take home and advised that they would receive a call from a GM-ELIRT Project Team member. By providing their telephone number, the patient was only agreeing to being contacted. They were not consenting to take part. When the patient was contacted they would be provided with further information as required, prior to consenting to take part. Patients were asked to complete a written consent form and were sent a pre-paid envelope to return it. If they no longer wished to proceed, they did not need to give a reason. For safe storage of patients' telephone numbers, a password protected 'Patient Contact Details' sheet was emailed to practice nurses via a secure NHS.net account. Once names

were collected this was emailed back to the project lead again using nhs.net accounts or a hard copy was kept secure according to the GP practices data protection policy, until it was collected by a GM-ELIRT team member. Patients were contacted shortly after receiving their contact details.

7.4. Data Analysis

Analysis involved data from the evaluation forms and practice nurses' facilitation feedback. Comments were summarised and reported qualitatively whilst statistical data have been analysed quantitatively. Demographic variables and individual scores for the current system and the GM-ELIRT are expressed in frequencies, means and standard deviations (SD). The mean difference (MD) was calculated for interval data and expressed with 95% confidence intervals (CIs) to compare differences in scores between the current process and the GM-ELIRT. Individual scores were grouped into themes; the review process, addressing multimorbidity and educational content, and reanalysed to obtain theme scores. Scores were then combined to obtain an overall score and MDs recalculated. Score differences were analysed by the Paired t test. Associations between interval variables were tested using Pearson's correlation. Tests were two-tailed with $\alpha = 0.05$. Given the small sample size, findings should be viewed as being tentative; test results must be interpreted with caution, and MDs and their CIs should be assessed carefully in terms of the size and direction of the of the MD and the width of the CI. Analysis was conducted in IBM SPSS 20

7.5. Refinement

A number of revisions were made to earlier drafts of the template during the development phase as shown in Appendix 1. Following initial feedback from the pre-test group of practice nurses and GPs, minor modifications were made prior to commencing the pilot. Further changes were then made to the format when EMIS Web and SystmOne versions were created. Due to their more advanced technology we were able to modify the format to improve usability. To allow the pilot to run as smoothly as possible, necessary refinement continued throughout. In testing the GM-ELIRT, we were asking practices to change the process they use for LTC reviews whilst continuing with their normal clinical routine which relies on accurate documentation. For this we were asking them to test a prototype rather than a ratified model. In order to encourage practices to continue

using the GM-ELIRT throughout the project, rather than revert back to single disease templates as issues arose, it was important to amend the templates to address issues that would prevent practice nurses continuing with the template. For minor issues refinement will take place prior to the main evaluation project.

7.6. Feedback

The findings will be presented to each GP practice involved. Discussions will continue with practices regarding refinement of the templates and an update provided regarding the future direction of the project.

8. Evaluation Results

The following results are collated from the self-report, semi-structured evaluation questionnaires; baseline, post-review, facilitation, final and patient evaluation. Data analysis is mainly quantitative, however, nurses were encouraged to expand on answers during facilitation meetings and these responses have been collated and reported as a qualitative summary.

8.1. Practice recruitment

We had difficulty recruiting practices for this pilot project as initial introductory emails were sent out during the summer period when staffing levels were low across practices. Also we were expecting practices to commence testing at their busiest time of the year; the 'flu vaccine season'. Due to these difficulties, we attempted to recruit more practices than originally intended in Stockport, Central and North Manchester; and although some of the initial discussions were promising, wider recruitment did not come to fruition.

At the start of the project the intention was to develop and test the EMIS PCS version only. At the time, although many practices were changing to EMIS Web at some point, none of the practices we originally contacted had a switch date. The EMIS PCS version took far longer than expected to develop due to the rudimentary nature PCS, the unfamiliarity with the system by our analyst and the reliance on adequate system

access time at GP practices. Towards the end of the development period, many of the practices had switched or were switching to EMIS Web. This resulted in a further delay of the project start date as practices waited for the EMIS Web version to be developed. At the same time, the Health First ALW practice and neighbouring practices switched from Synergy to SystmOne and were eager for the development of the SystmOne version to test. This again meant we had very little time from development to completion of the pilot for these practices. Figure 25 presents a modified project structure with actual timelines in view of the difficulties in recruiting practices.

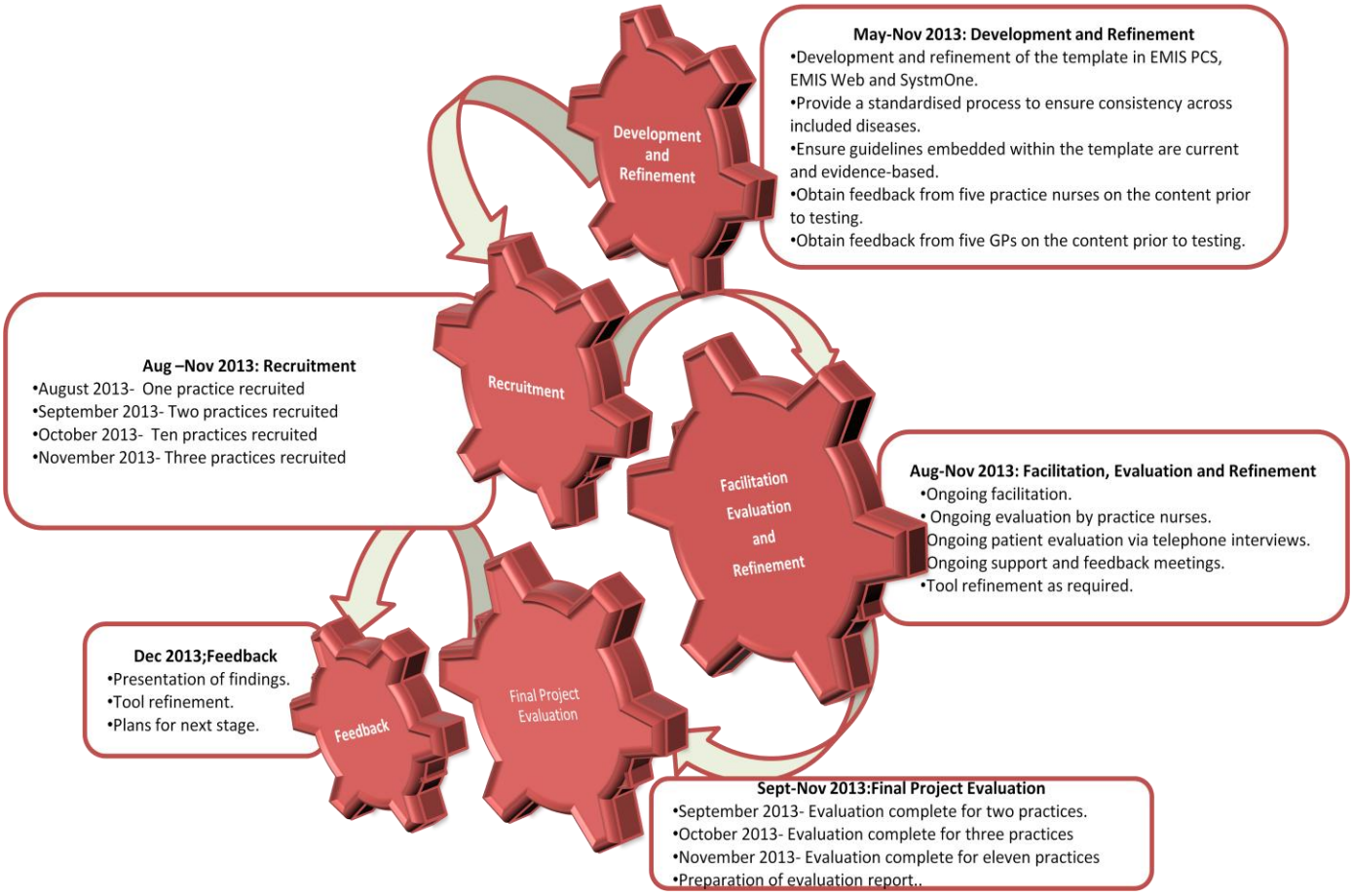

Figure 25: Flow chart presenting the structure and anticipated timelines for the GM-ELIAT pilot project.

8.2. Practice demographics

Thirty-five nurses across 16 practices in ALW, Central and North Manchester were recruited to the pilot. Table 2 provides demographic details of the practices involved.

Table 2. **Practice Demographics**

	Practice	Patient Population	Number Patients with LTC*/ (%)	Number of GPs	Nurses involved in Testing		
					Nurse Practitioner	Practice Nurse	HCA
Central Mcr	Cornbrook City Road Practice:	9,675	1, 723 (17.8)	3		1	
	Cornbrook Boundary Surgery			5		2	
	The Vallance Group	5,788	1,441 (24.9)	3		1	
	The Vallance Group	7,037	1,442 (20.5)	2		1	
	The Robert Darbishire	19,000	2,500 (13.2)	14		4	3
North Mcr	Simpson Medical Practice	3,752	182 (4.9)	3		1	
AWL	The Medicentre	5,684	846 (14.9)	3		2	
	Shevington Surgery	12,775	812 (6.4)	9	1	3	1
	Dr Khatri's Surgery (Astley)	3,215	1400 (43.5)	1		2	
	Marus Bridge Surgery	4,871	2505 (51.4)	4	2	1	1
	The Grange	3,918	1913 (59.5)	3	1	1	1
	Drs Russell & Mohan Kumar	4,185	500 (11.9)	3	1		
	Hawkley Medical Practice	3,365	775 (23)	2	1	1	
	Shakespeare Surgery	2,712	691 (25.5)	3		1	
	Dr Khatri's Surgery (Tyldesley)	4,656	1913(59.5)	2		1	
	Astley General Practice	2,761	1082 (39.2)	3		1	
					6	**23**	**6**
Total	**16**	**93,394**	**21,127**	**63**		**35**	

There were six nurse practitioners, 23 practice nurses and six healthcare assistants. Nine of the 35 nurses did not participate in the evaluation; the results, therefore, encompass the 26 practice nurses who participated in one or more of the evaluation stages. Table 3 provides details of the length of their participation and the number of facilitation sessions they had. A longer participation period, however, does not necessarily mean that the template was used more frequently than practice nurses with a shorter duration participation period.

Table 3: Practice Nurses' Participation period

Practice nurse ID	Start date:	Completion date	Number of weeks of participation	No facilitation sessions
1	02/08/13	20/09/13	7	1
2	02/08/13	20/09/13	7	1
3	05/09/13	25/09/13	3	1
4	24/09/13	07/11/13	5	2
5	24/09/13	25/10/13	4	2
6	24/09/13	21/10/13	4	1
7	14/10/13	18/11/13	5	1
8	14/10/13	19/11/13	5	1
9	14/10/13	19/11/13	5	2
10	14/10/13	11/11/13	4	2
11	14/10/13	19/11/13	5	0
12	14/10/13	11/11/13	4	0
13	21/10/13	18/11/13	4	1
14	15/10/13	19/11/13	5	1
15	15/10/13	15/11/13	4	0
16	21/10/13	22/11/13	5	2
17	25/10/13	19/11/13	1	2
18	22/10/13	18/11/13	4	3
19	05/11/13	21/11/13	2	2
20	15/11/13	22/11/13	1	1
21	23/10/13	07/11/13	2	2
25	08/10/13	07/11/13	4	1
26	08/10/13	21/11/13	8	1
27	08/10/13	21/11/13	8	2
31	19/11/13	27/11/13	1	1
35	07/11/13	25/11/13	2	1

As previously described, the GM-ELIRT has been developed in three clinical systems so far; EMIS PCS, EMIS Web and SystmOne. Figure 26 presents the versions tested by practice.

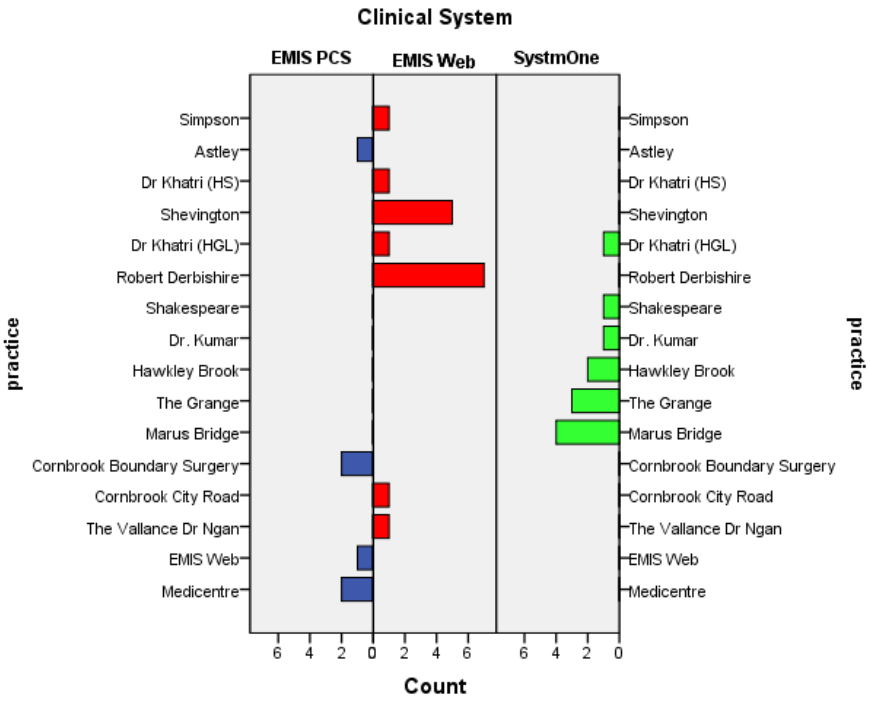

Figure 26: Pyramid chart defining the clinical systems used across recruited practices

8.3. Single Disease Templates

GP practices conduct a series of LTC reviews in accordance with QOF[1] registers. These reviews are designed to monitor patients' individual LTCs to assess whether a change in clinical management is warranted. Reviews are conducted annually, however, there are a number conducted nine or six monthly, such as heart failure and diabetes. Practice nurses conduct the majority of LTC reviews but this varies from practice to practice depending on the level of expertise of the nursing staff employed and the role structure within the GP practice. In practices where nurses have not undergone specialist training, GPs conduct a number of reviews such as HF and PAD. Practice nurses that completed a baseline evaluation, conducted the following reviews: 18 (69%) conducted AF reviews, 26 (100%) Asthma, 25 (96%) diabetes, 23 (89 %) COPD, 22 (85%) hypertension, 21 (80 %) Coronary Artery Disease and CKD, 20 (77%) HF and stroke and/or TIA, 12

(46 %) PAD, 10 (39%) and rheumatoid arthritis reviews. Practice nurses' experience conducting LTC reviews ranged from 1 to 25 years (mean 10.6, SD 7.1).

Information is recorded on single disease templates which contain all the necessary read codes to record information for QOF activity[1] or for audit purposes. Where a read code does not exist, or the template does not have a read coded section for a particular item, information has to be entered as free text which makes audit more difficult. Only three (12%) nurses, all from the same practice, reported that they always conduct single disease reviews, never integrated reviews. The main reason for this was due to time constraints. The appointment system was set up for 20 minute review appointments and patients are booked in for one LTC review only. Seventeen (65%) nurses across 12 practices conduct integrated reviews when there was sufficient time within the allocated appointment time. Certain LTC reviews require a more detailed clinical assessment, such as foot and eye assessments for diabetes or spirometry for COPD, therefore, longer appointment times are allocated. Where patients were only booked in for a diabetes or COPD review but the patient had other LTCs such as hypertension or AF, practice nurses would conduct these as well if they had time and then cancel the patient's subsequent AF and hypertension appointments. Six (23%) practice nurses across four practices always conduct integrated reviews and appointment systems are set up to accommodate this. Across the 16 practices, appointment times range from 10 to 60 minutes with a mean minimum appointment time of 22.1 minutes (SD 6.5) and a mean maximum appointment time of 31.2 minutes (SD 7.7).

Single disease templates are used for both single disease and integrated reviews. Nineteen of the 20 nurses that do not always conduct integrated reviews reported that they repeated items using single disease templates; clinical assessment (n=19 100%), lifestyle discussion (n=18 95%), education (n=18 95%), and medication advice (n=8 40%). Fewer nurses repeated medication advice as not all the practice nurses interviewed gave medication advice. Figure 27 shows the nurses who reported repetition when using single disease templates by the items repeated. When integrated reviews are conducted, nurses go from one template to another to complete the necessary reviews.

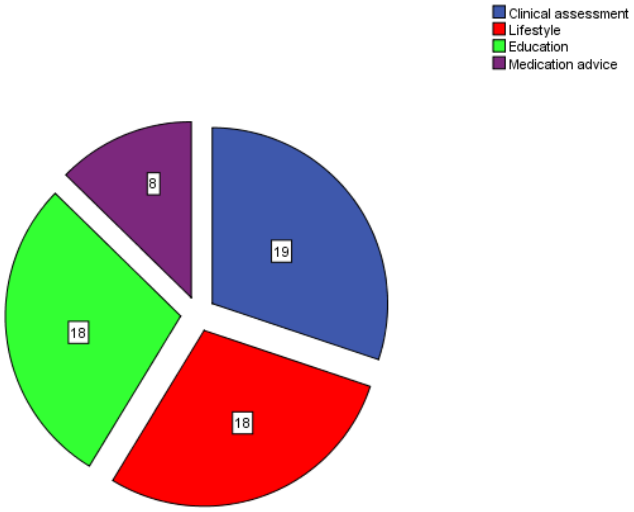

Figure 27: Pie chart showing the frequency of repeated items during single disease reviews

At baseline, practice nurses scored the single disease templates on a scale of 0-10, providing their views on the quality of the single disease templates with 0 as the worst score and 10 the best. There was varied opinion as to the value of the current single disease templates among the 26 nurses who completed the baseline evaluation. Some were very happy with their current templates, they were familiar with them and they were confident that all the read codes were accurate for QOF[1] purposes. Others however, had just changed to a new system; EMIS Web or SystmOne and they were having difficultly learning to use a new system as well as coping with a busy time of year. Ease of use achieved the highest mean score (mean 6.2, SD 2.5). Two nurses gave this item a 10 whilst the majority gave a score of six to eight. Most nurses believed that the single disease templates were organised logically (mean 5.2, SD 2.3), provided an efficient (mean 5.0, SD 2.4) and standardised review process (mean 5.2, SD 2.8). A few zero scores reduced the mean for these items. Figure 28 presents the distribution of scores for the four items.

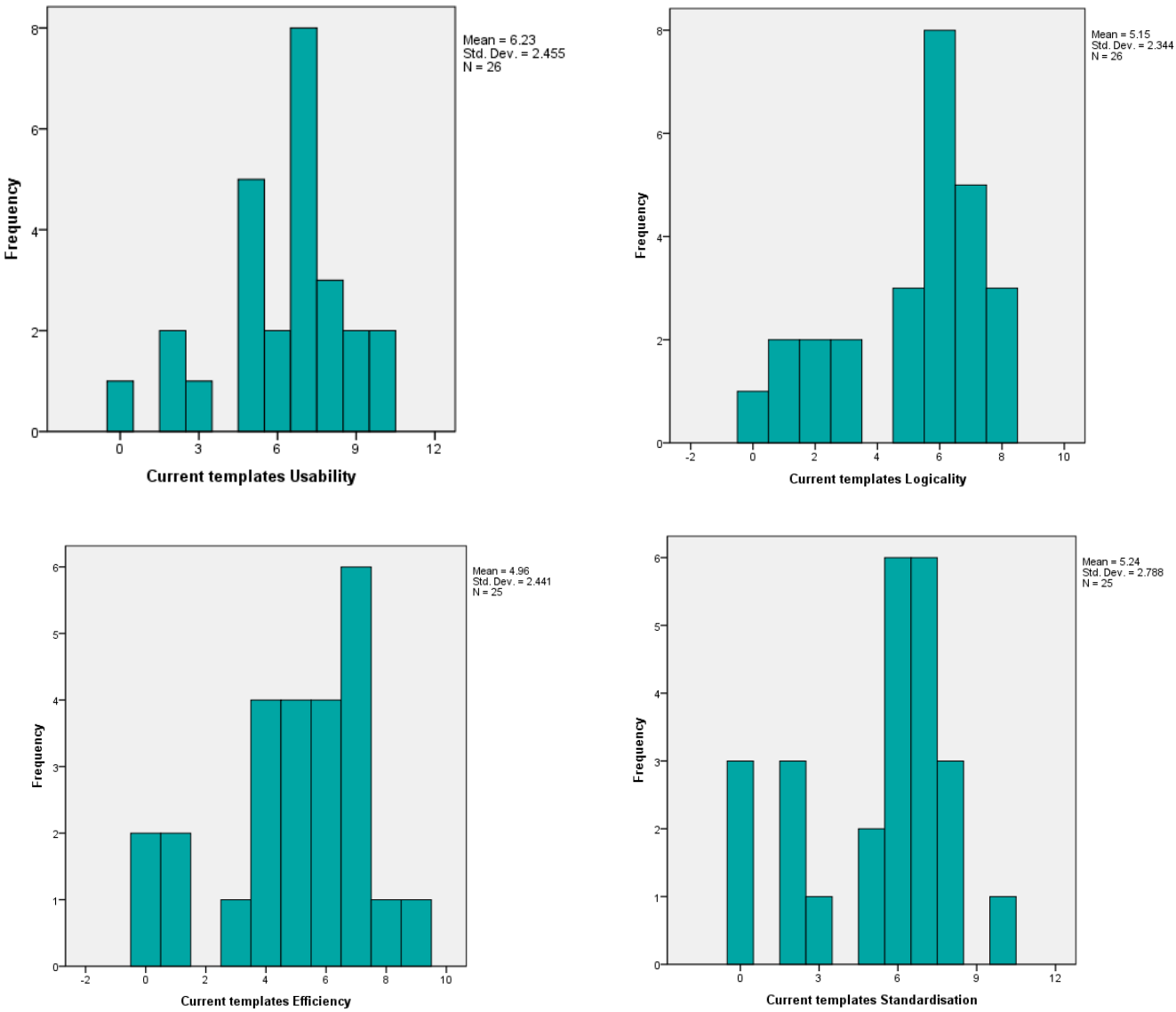

Figure 28: Histograms showing distribution of individual review process scores for single disease templates

The combination of these scores gave an overall score for the review process (mean 21.3, SD 9.1). Figure 29 presents the distribution of scores.

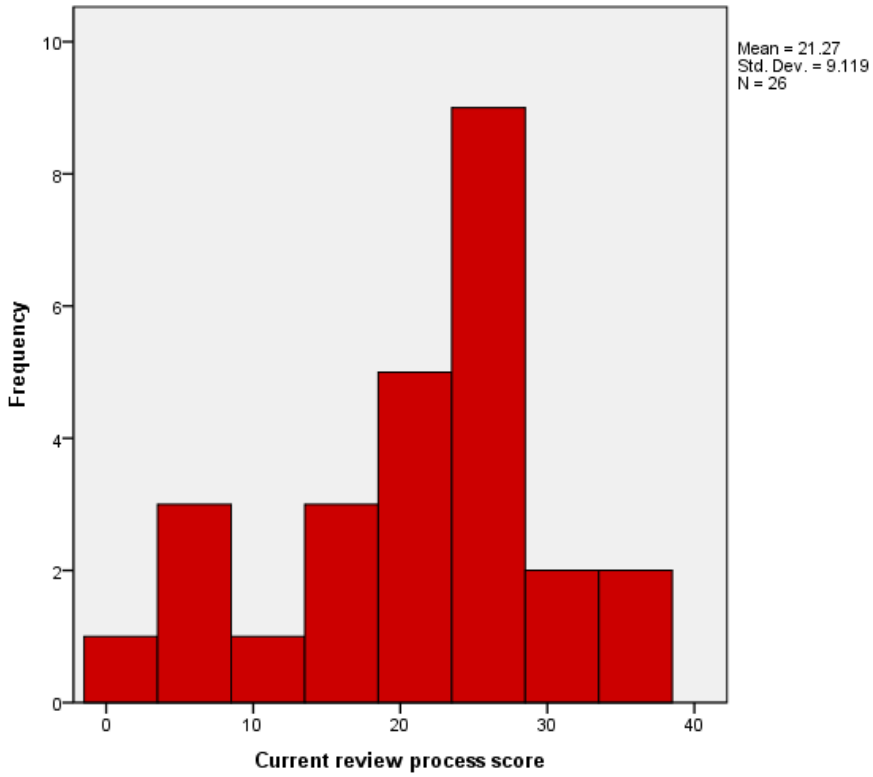

Figure 29: Histograms showing distribution of combined current review process scores

When asked whether the single disease templates address multimorbidity, practice nurses were less convinced about the single disease templates reliability in providing this. Identifying multimorbidity achieved a mean of 3.1 (2.5 SD), assisting practices to manage multimorbidity achieved a mean of 2.8 (2.4 SD) and providing a holistic review process achieved a mean of 2.7 (2.3 SD). The mean combined score for addressing multimorbidity was 8.7 (6.7 SD). Figure 30 presents the distribution of scores for individual and combined results.

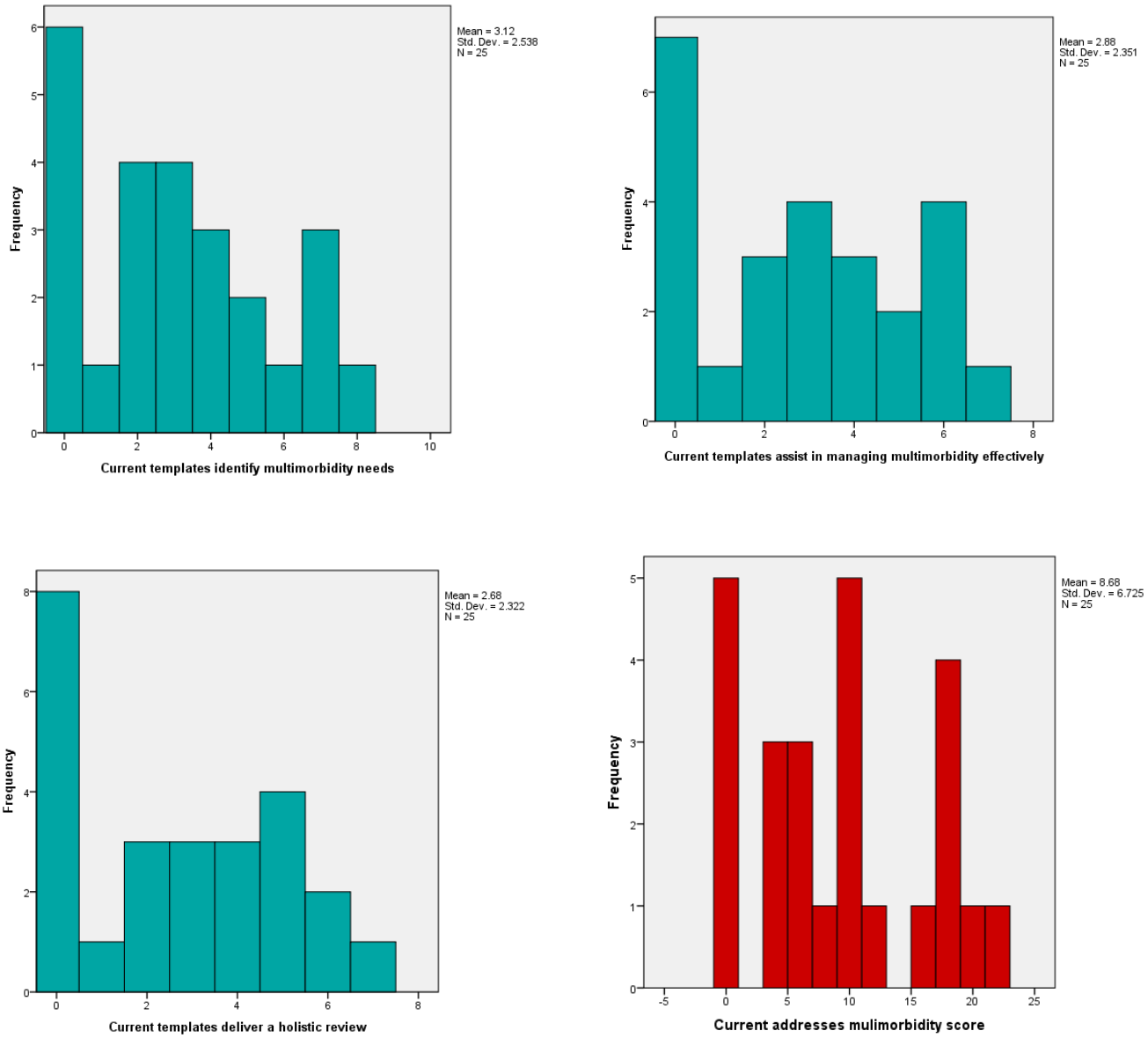

Figure 30: Histograms showing distribution of individual and combined scores for addressing multimorbidity

The single disease templates were not judged highly for their ability to guide practice (mean 3.5, SD 2.2), identify educational needs for less experienced nurses (mean 2.8, SD 2.1), or improve knowledge (mean 2.6, SD 2.1). Combined scores for educational content achieved a mean of 8.8 (9.6 SD). A number of practice nurses felt that templates in general could not address educational needs as they relied on nurses own competencies to ensure they were completed correctly. Figure 31 presents the distribution of scores for individual and combined educational content scores.

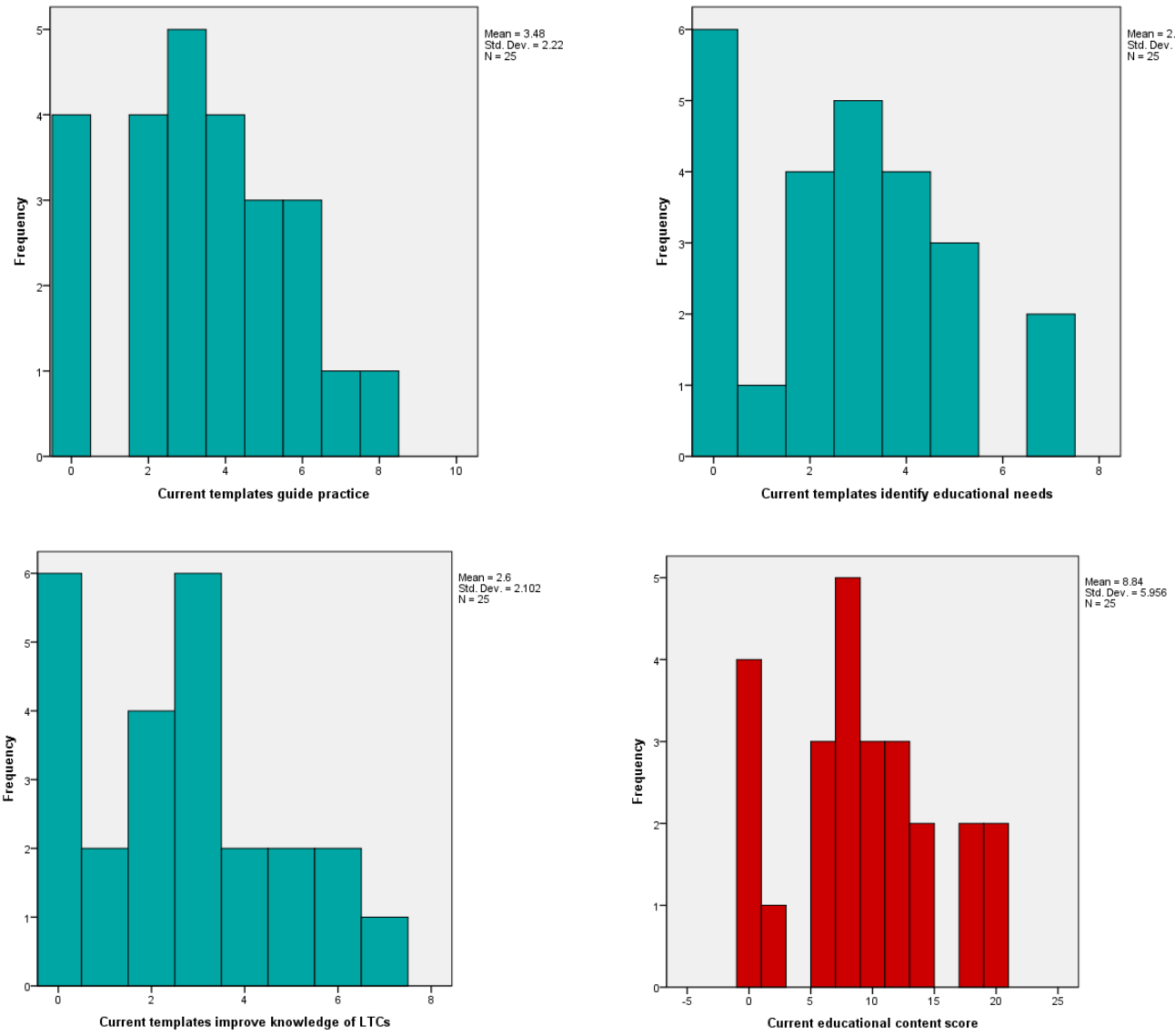

Figure 31 Histograms showing distribution of individual and combined scores for educational content

Scores for the 10 items were combined to give an overall mean score. The single disease templates achieve an overall mean score of 38.2 (SD 19.4, Figure 32). Twenty-two (85%) nurses believed that an integrated review template would improve the review process at their practice, one was not sure (4%) and three (11%) thought it wouldn't improve the review process.

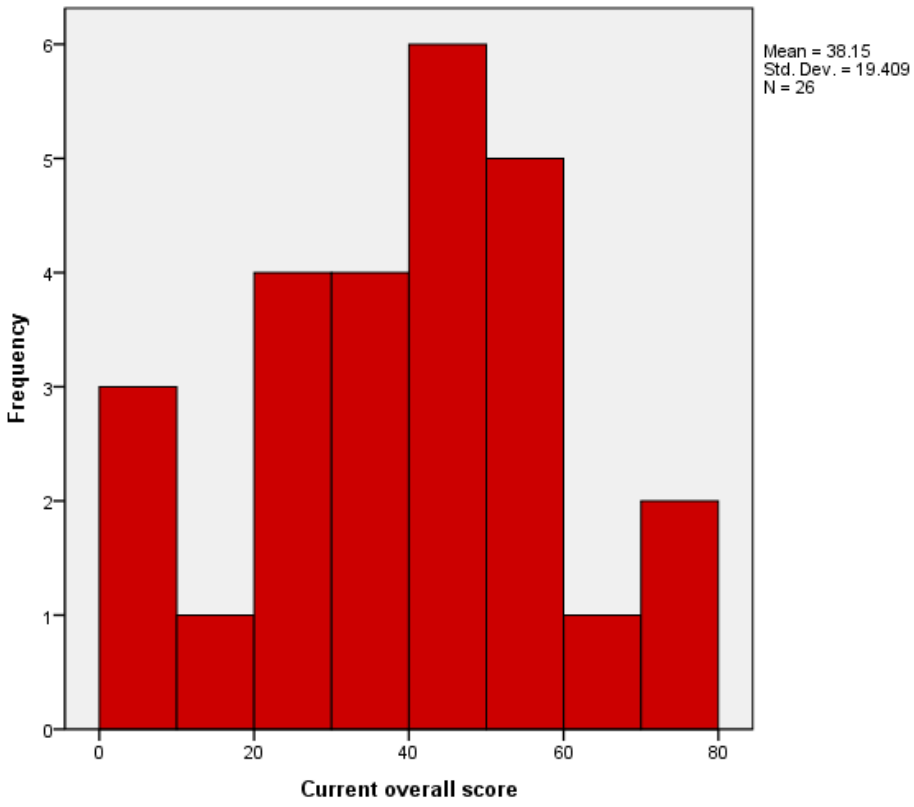

Figure 32: Histograms showing distribution of combined overall score for current templates.

8.4. Review process with the GM-ELIRT

Eighteen nurses completed the final evaluation. Practice nurses completed between two and 20 reviews with the GM-ELIRT (mean 9.5, SD 5.3). The GM-ELIRT was most frequently used to review patients diagnosed with asthma, diabetes and hypertension. Thirteen (72%) practice nurses reviewed patients with asthma, 15 (43%) reviewed patients with diabetes and 12 (34%) hypertension. Fewer nurses reviewed patients with coronary artery disease (n= 9, 26%) and COPD (n=8, 23%). Patients with heart failure and hypothyroidism

were reviewed by only two (6%) nurses, RA by one (3%) and PAD was not reviewed by any of the nurses involved during the testing period. Figure 33 presents the LTCs reviewed by nurse role.

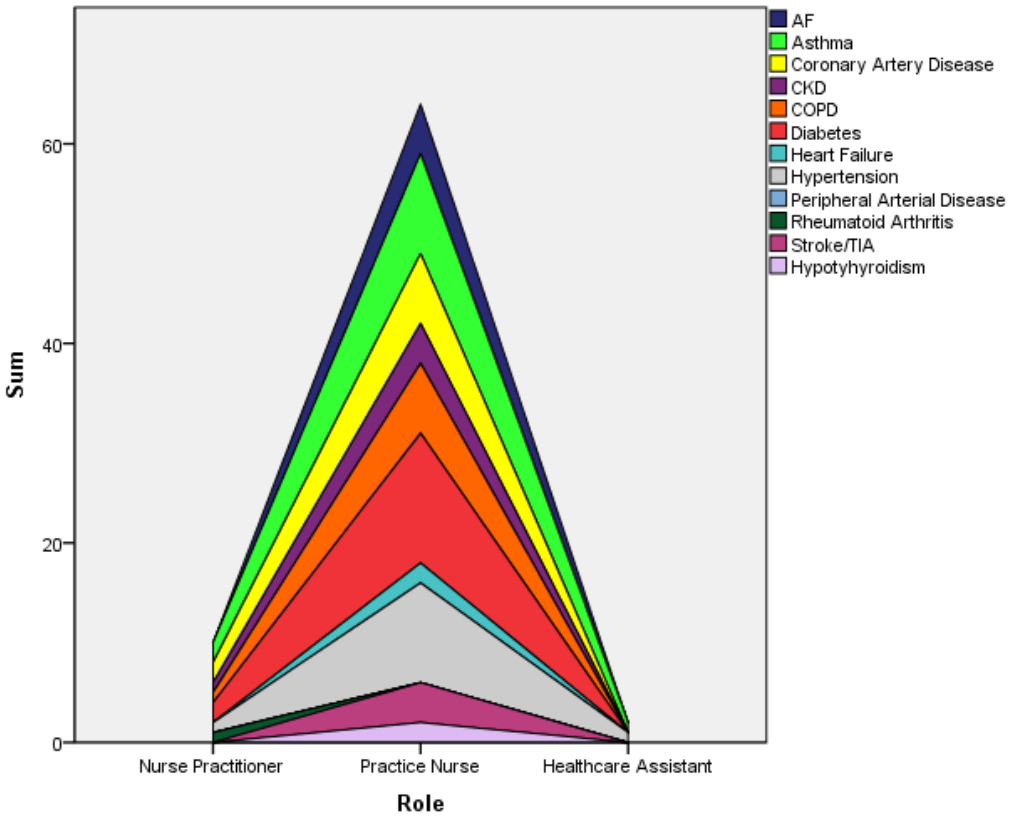

Figure 33: Area graph showing LTCs reviewed with the GM-ELIRT by nurse roles

Using the GM-ELIRT, integrated reviews were always performed by seven (39%) practice nurses, sometimes performed by nine (26%) and never performed by two (6%). The latter two were the same nurses as for the baseline results. Seven nurses (41%) across six practices reported that the length of appointment time had increased to accommodate integrated reviews since the introduction of the GM-ELIRT. The range of appointment times remained the same as at baseline (10 to 60 minutes), the mean minimum consultation time was slightly less at 20.6 minutes (SD 7.9) and the mean maximum consultation time was slightly longer at 32.7 minutes (SD 9.5) with the GM-ELIRT.

The GM-ELIRT's scores for usability, logicality, efficiency and providing a standardised review were similar to the current single disease templates giving only a marginally higher overall review process score of 24.3 (SD 10.8, Figure 34)

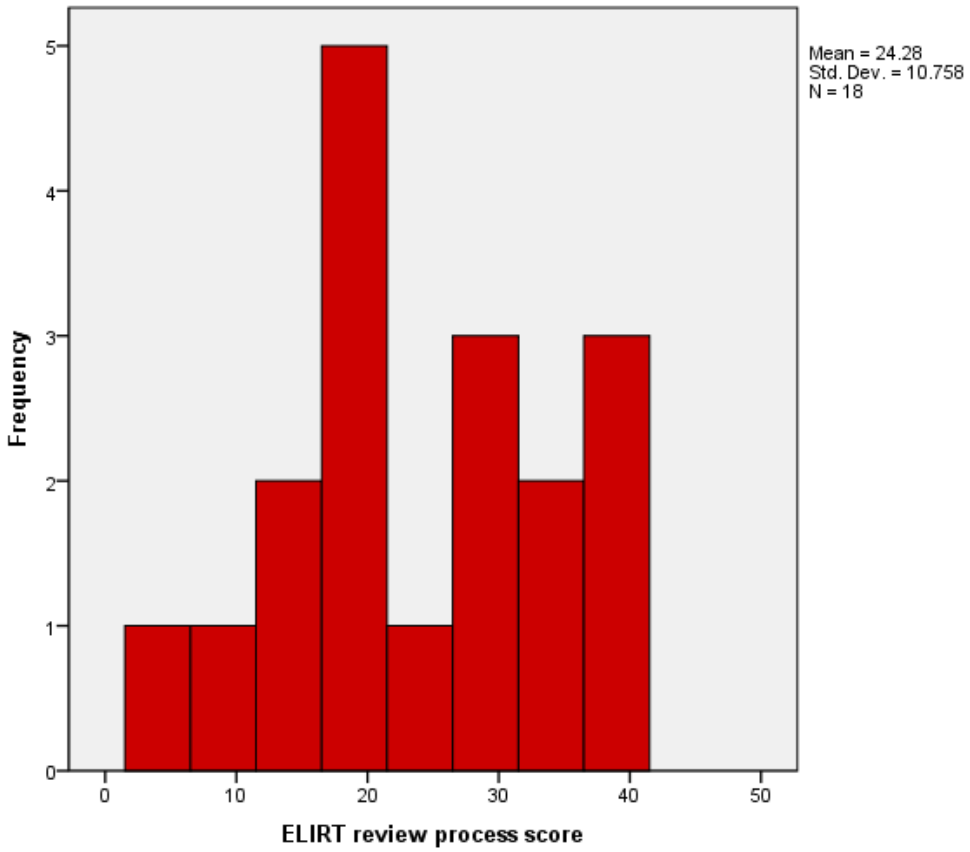

Figure 34: Histograms showing distribution of combined review proves scores for the GM-ELIAT

Higher scores were achieved for identifying multimorbidity (mean 5.4, SD 2.5), assisting practices to manage multimorbidity (mean 5.6, SD 3.4) and providing a holistic review process (mean 6.2, SD 3.1). The mean combined score for addressing multimorbidity was 17.2 (SD 9.5). Figure 35 presents the distribution of scores for individual and combined results relating to multimorbidity.

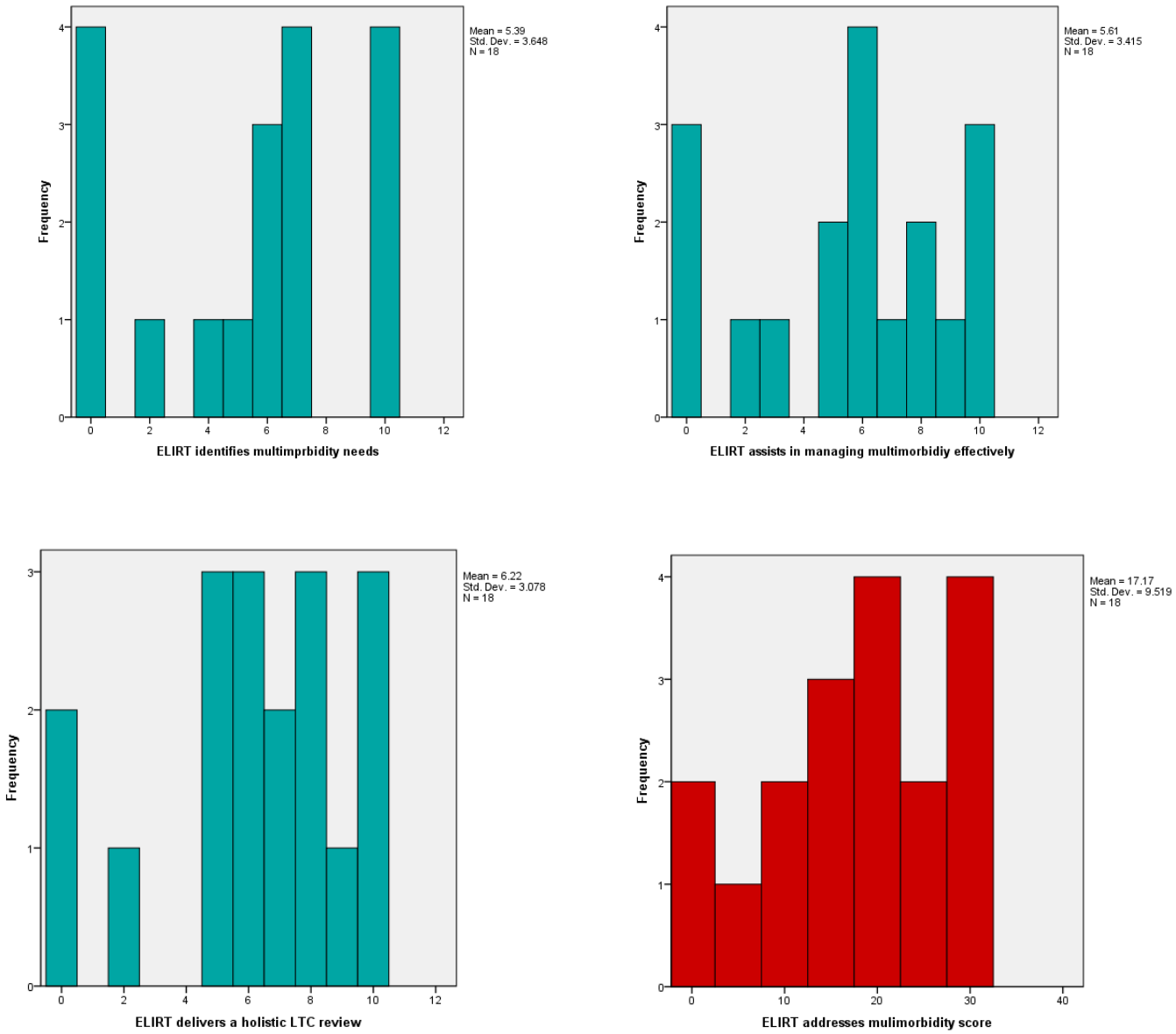

Figure 35: Histograms showing distribution of scores for addressing multimorbidity for the GM-ELIRT

The mean score for the GM-ELIRT's potential for guiding practice was 6.3 (SD 3.3), identifying educational needs for less experienced nurses 5.8 (SD 3.3), and improving knowledge 5.6 (SD 3.6). The combined mean score relating to educational content was 17.9 (SD 8.6, Figure 36).

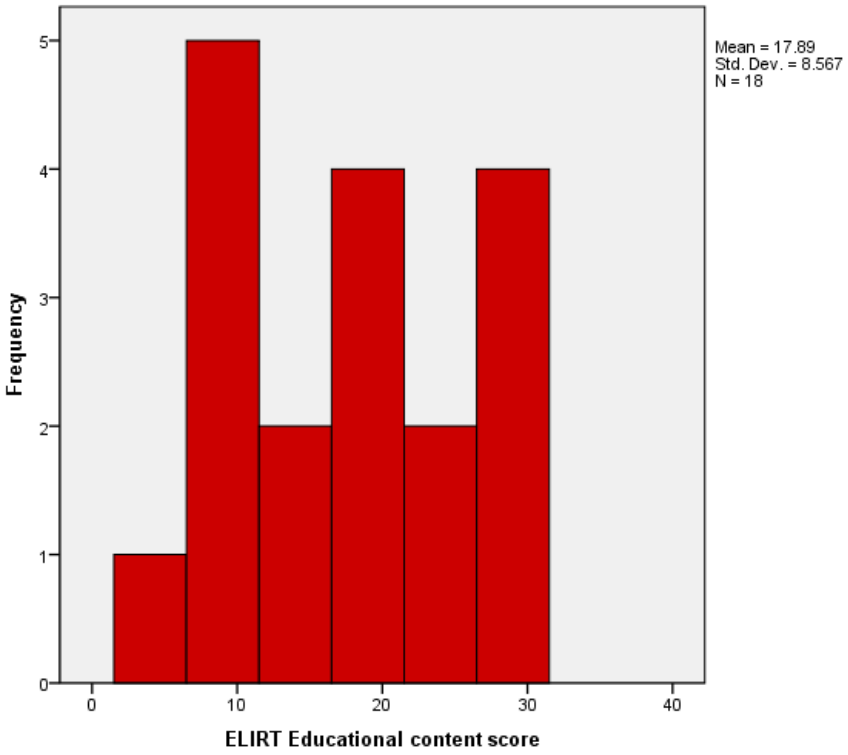

Figure 36 : Histogram showing distribution scores for educational content for the GM-ELIRT

The GM-ELIRT achieved a mean overall score of 59.3 (SD 25.4) Figure 37 presents the distribution of scores.

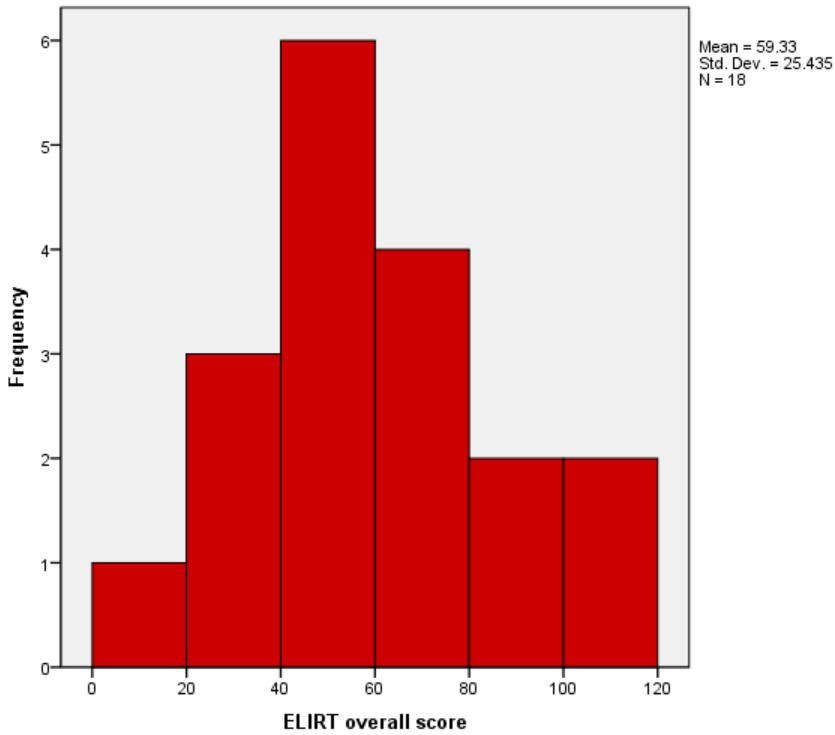

Figure 37: Histogram showing distribution scores for combined overall score for the GM-ELIRT

There were mixed views on whether the GM-ELIRT saved time (mean score 4.4, SD 3.1); scores ranged from 0 to 10. Many nurses reported that reviews had taken longer than usual but admitted that they were not familiar with the template, therefore, spent more time finding the items they needed. Nurses who were already conducting integrated reviews for all patients with LTCs reported that the GM-ELIRT would not reduce repetition as they had already removed the repetition from their review process, but for practices that did not have a completely integrated review process; nurses reported that it did reduce repetition (mean 6.6, SD 2.9)

8.5. Comparison of processes

Differences in scores for both the baseline and final evaluations were compared for nurses who had completed both (n=18). For items relating to the review process, there was very little difference in scores (MD for combined scores 2.00, 95% CI –5.66 to 9.66). Figure 38 presents the 95% CI for the difference in the combined review process scores.

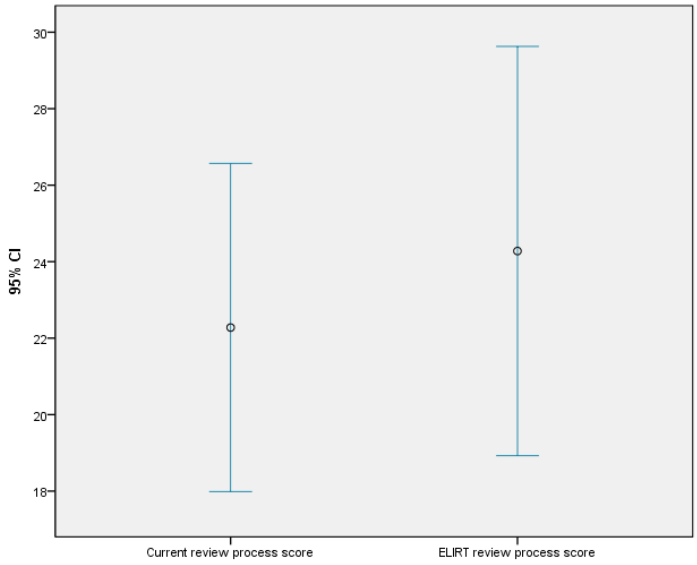

Figure 38: Error bars showing differences in combined scores for review process

Differences were greater for items relating to addressing multimorbidity. Practice nurses scored the GM-ELIRT higher for identifying multimorbidity needs (MD 1.88, 95% CI -0.75 to 4.31), significantly higher for assisting in managing multimorbidity (MD 2.44, 95% CI 0.01 to 4.88) and delivering a holistic review (MD 2.94, 95% CI 0.76 to 5.13) thus providing a significant difference in the combined scores (MD 7.11, 95% CI 0.34 to 13.88). Figure 39 presents the difference between scores for combined items relating to addressing multimorbidity.

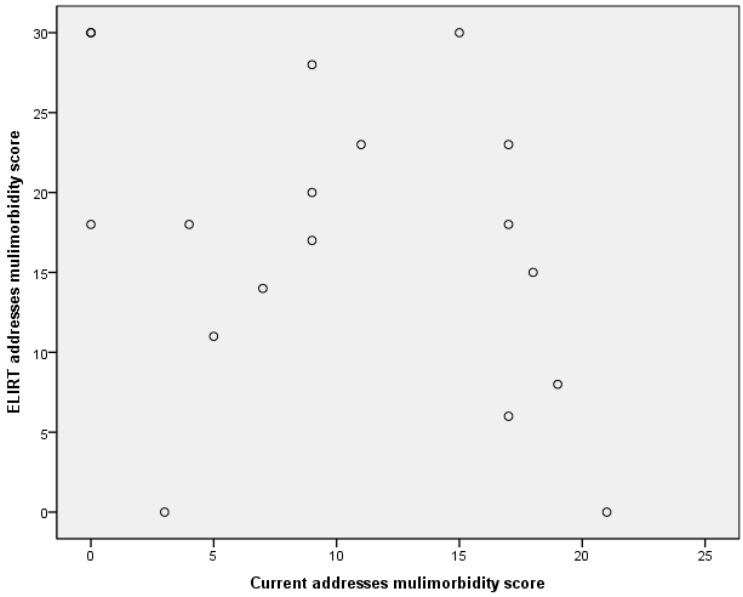

Figure 39: Scatter plot showing differences in combined scores for addressing multimorbidity

Educational content scores were higher for the GM-ELIRT than the single disease templates, providing a significantly higher combined score for these items (MD 7.61, 95% CI 2.1 to 13.1) as shown in Figure 40

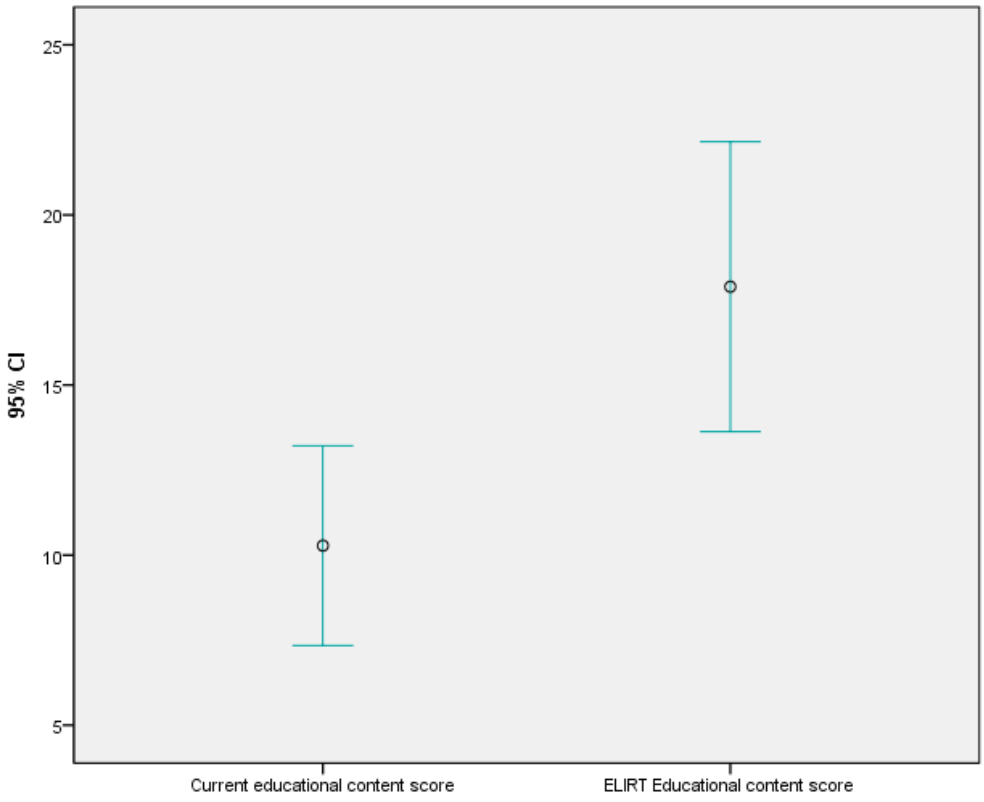

Figure 40: Error bars showing differences in combined scores for educational content

The GM-ELIRT achieved a higher combined overall score than the current disease templates for the 10 items with a mean difference of 16.67 (95% CI -1.33 to 34.66). Figure 41 presents the difference in overall scores and shows a greater range of scores for the GM-ELIRT (8 to 100).

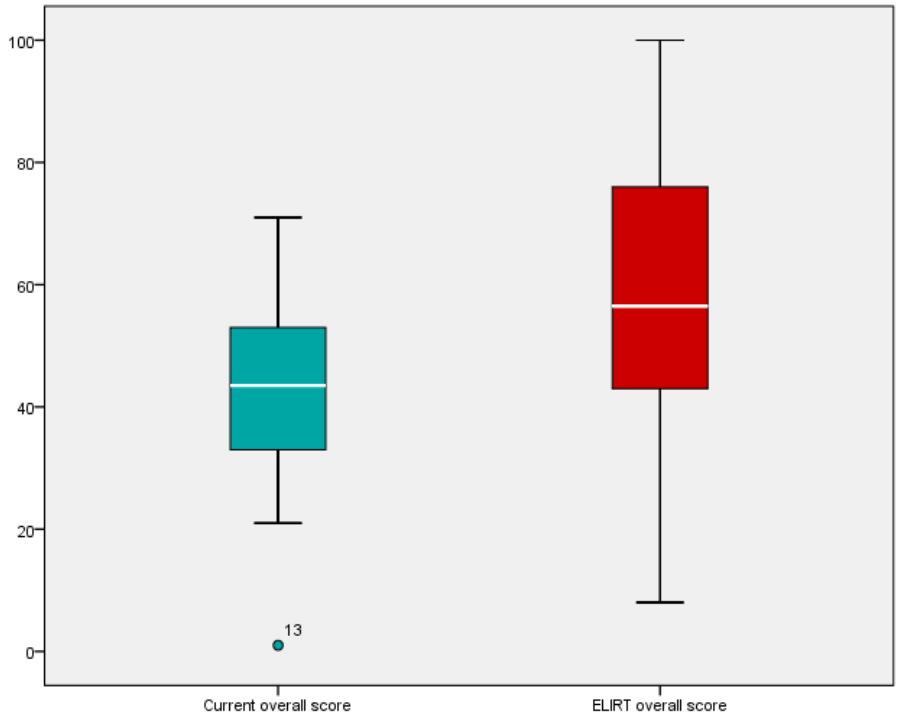

Figure 41 Box plots showing differences in combined overall scores

Table 4 provides more detailed results for all items for closer comparison.

Table 4 : Summary of paired differences for currently used Template and GM-ELIRT (n = 18)

Paired Variable	***Mean Difference***	***95% CI***	***P-value***
Usability	0.00	-2.12 to 2.12	1.000
Logicality	0.11	-1.99 to 2.21	0.913
Efficiency	1.00	-0.97 to 2.97	0.300
Standardisation	1.17	-1.02 to 3.35	0.276
Review Process Score	**2.00**	**-5.66 to 9.66**	**0.589.**
Identifies multimorbidity needs	1.78	-0.75 to 4.31	0.156
Assists the management of multimorbidity	2.44	0.01 to 4.88	0.049
Provides a holistic review	2.94	0.76 to 5.13	0.011
Multimorbidity Score	**7.11**	**0.34 to 13.88**	**0.041**
Guides practice	2.22	-0.12 to 4.56	0.062
Identifies educational needs	2.72	0.82 to 4.62	0.008
Improves LTC knowledge	2.56	0.57 to 4.54	0.015
Educational content Score	7.61	2.13 to 13.09	0.009
Overall Score	**16.67**	**-1.33 to 34.66**	**0.067**

As there was some variation in nurses' overall views of the GM-ELIRT as well as the number of reviews conducted, we tested whether the latter affected the score, and found that there was a significant positive association between the overall GM-ELIRT score and the number of reviews conducted with the GM ELIRT (r= 0.82, p < 0 001). Figure 42 shows this association.

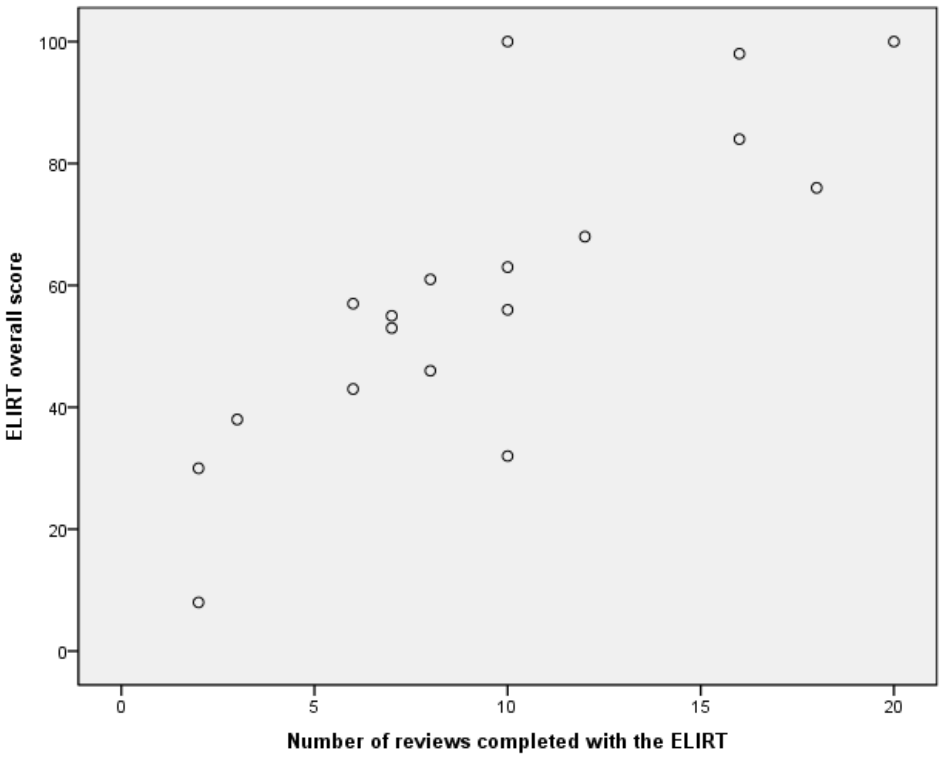

Figure 42: Scatter plot showing association between overall ELIRT score and number of reviews completed

8.6. Facilitation Feedback

Feedback from facilitation meetings and post-review forms was collated and summarised into the following themes.

8.6.1. Benefits to the review process.

Several practice nurses felt that the GM-ELIRT was an excellent template that contained good content, was easy to navigate and easy to use. Practice nurses found the GM-ELIRT to save time during the review, as the

addition of tick boxes reduced the need for copious free text. This also meant that more information entered was read coded which would improve the auditability of the documentation entered. Practice nurses found a number of items that were not included in their single disease templates such as FEV1 on the COPD page and home nebuliser on the asthma page added value to the review. Others liked the way certain pages were organised such as having the list of referrals for lifestyle factors together. The criteria for depression, COPD, asthma and coronary artery disease were especially popular, a number of practice nurses remarked that the GM-ELIRT gave more detail than the single disease templates and particularly like the detail of the asthma clinical assessment and the medication section that included set up/step down criteria.

Although the guidelines embedded in the tool were not used, or not found by a number of practice nurses, most had looked at the laminated copy and thought they were useful, particularly for new and less experienced nurses. One practice nurses asked for the guidelines to be extended to other diseases to explain some of the risk tools included such as the FRAX. A number of experienced practice nurses were very impressed with the template and had conducted several reviews before their first facilitation session. They did not need the clinical guideline or rely on the template to avoid missing anything as they tended to write information as they talked to the patients then complete the template following the consultation. They felt that this process was a lot smoother than single disease templates due to the amount of information it contained which also reduced the time it took to complete, which was seen as beneficial during busy clinic sessions.

8.6.2. Conflicting views

Although some practices nurses found the GM-ELIRT to save time, others found that they spent more time on the review but admitted that this may be due to being unfamiliar with the new template. A number of nurses especially liked the links to websites such as the Pack Years calculator and the GPPAQ on the patient UK website, as these made it easy for them to calculate risks, one practice nurse, however, did not like being taken to external websites. One nurse did not think that ECG is relevant in a diabetes review, while another wanted more specific information i.e. how often an ECG should be carried out.

Some practice nurses found the GM-ELIRT to be concise, while two found there to be too much information they did not use. The latter two, however, conducted only single reviews with the GM-ELIRT and do not review patients with heart failure, PAD or RA. As everything is on one template it is understandable that there would appear to be too much if only certain sections are being used, whereas the single disease template only contain what is required for that condition with would make them more acceptable for a single disease review. One practice nurse did not like the format of the LTCs review dates yet others found this to be very useful in planning and recording future appointment dates. Whilst some believed the GM-ELIRT contained too much detail many required more detail. One practice nurse found the hypertension page too complicated whilst another wanted more criteria to be added.

8.6.3. Obstructions to the review process

Some practice nurses found the GM-ELIRT too complicated to use at the same time as talking to the patient and reported that it looked too busy which caused them to spent a lot of time looking for items they required, although as previously mentioned, they did admit that this may be due to being unfamiliar with the template. Some decided not to waste time looking and reverted back to their current templates. One thought that more use would be needed in order to find a logical way of using the GM-ELIRT. Two practice nurses preferred their own single disease templates for no particular reason, although one highlighted time constraints for conducting integrated reviews.

Two issues that hindered the review process were related to the EMIS versions only. Three nurses reported that when the information was saved in the patient record it looked "*messy"* and did not appear under disease sections as it did when single disease templates were used. One practice nurse mentioned that GPs would not be happy about this and that the clerks were having difficulties finding information for booking follow-up appointments. Nurses also reported that on the EMIS Web version that the left sidebar always defaulted back to the top tab, which lengthened the time it took during the review having to scroll up and down. Some were worried that they had missed pages because of this and others were just irritated by it. Practice nurses were

confused with the wording of some items due possibly to different read codes. For example one nurse found "diabetic dietary review" instead of "diabetic diet review" and wasn't sure whether it was the same read code.

Several nurses complained that the GM-ELIRT took longer to complete; on average five minutes extra, the following reasons contributed, being unfamiliar with the template, being new in the post and the recent change in the practice's computer system. A few nurses mentioned that they had trust issues due to their unfamiliarity with the template. They were conscious about missing something so often had to double-check with their current templates to make sure.

8.6.4. Missing review criteria

Nurses using the EMIS PCS version found that the template was missing rheumatoid arthritis and the GPPAQ questions. These items are on the other versions and will be added to EMIS PCS soon. Due to the limited time nurses had to test the GM-ELIRT they found items to be missing that were on the template, such as erectile dysfunction, dipstick urine, low salt/ low fat diet.

One practice nurse wanted to record, no breathlessness, no chest pain, no oedema. These items are on the EMIS PCS version but had been taken off the other versions to reduce the amount of time spent clicking tick boxes. Others missed functions that had been of value on their current templates to calculate scores

8.6.5. Educational needs

Practice nurses were asked if they had any particular training needs that would assist them in conducting integrated LTC reviews. Many of the experienced nurses did not have training needs although one highlighted the fact that there was very little training offered from the system companies when new systems were installed which made the switch from EMIS PCS to Web at their practice more difficult than is could have been. Training in managing patients with diabetes and heart failure were most frequently mentioned by other practice

nurses. Some felt that respiratory disease was their weakest area and a number mentioned medication in general across LTCs.

8.7. Patient evaluation

We were only able to interview three patients during the pilot project. Contact details for only five patients in total were provided by practice nurses and we were unable to contact two of these. All of the patients interviewed had had an integrated review at their last appointment. Patients agreed (on a scale of 1-5) that integrated reviews were more convenient (mean 4.7, SD 0.6) and they didn't mind if appointments were longer to accommodate reviewing all their conditions at once (mean 5.0, SD 0.0). One patient found the review to be more thorough whilst the other two didn't notice any difference as they had had integrated reviews before (mean 3.0, SD 2.0). Patients felt they were able to discuss all their symptoms and not just those related to one LTC (mean 4.3, SD 0.6) and they were able to discuss concerns about any of their LTCs (mean 4.3, SD 0.6). For those that raised concerns they were addressed effectively. Patients agreed that they received enough information to understand how some of their LTCs are related (mean 4.3, SD 1.2) and they felt supported (mean 4.7, SD 0.6). Scores were collated to give an overall score achieving a mean of 43.3 (SD 2.1) out of a maximum of 50. Figure 44 present the patients mean scores across the 10 items.

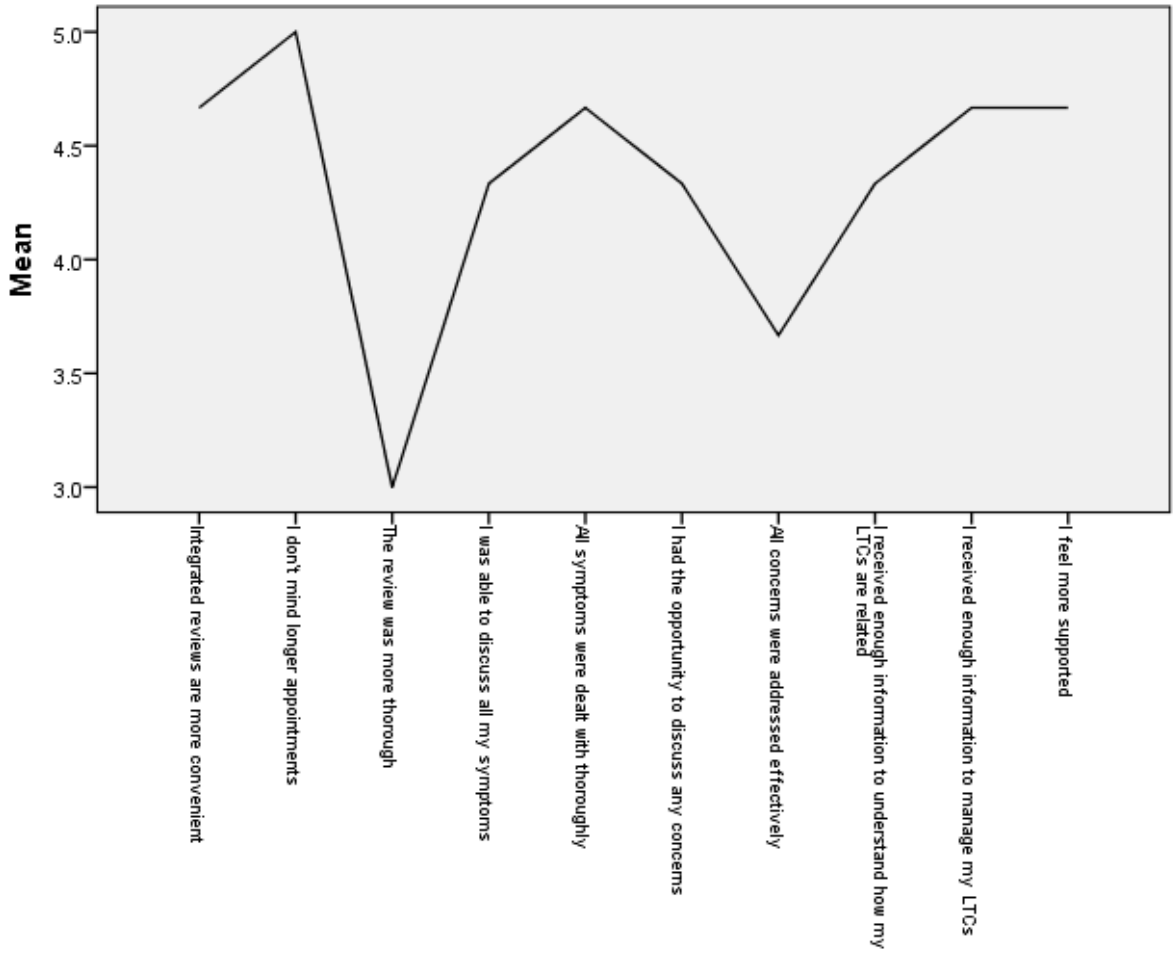

Figure 43: Line graph showing mean scores for patients views

For PEI scores, one patient didn't feel any more enabled to manage her LTCs as she already felt enabled but two felt more able to cope with their LTCs, were more confident about their future health, more able to manage their health and more able to keep themselves healthy as a result of their last review appointment. The mean PEI score was 5.3 (SD 4.6) out of a maximum of 12. The scores for the patient who already felt enabled to manage her LTCs reduced the overall mean score.

The few patients who were interviewed were very complementary about the practice nurses and the GP practice they were registered with. One felt he was much more motivated to live healthier after his last appointment, was given more information about modifying his diet, given exercises he could manage and lots

of encouragement. Another was very happy with the care she received at all her review appointments. One patient did, however, feel that there was often limited time at appointments to discuss any additional concerns.

9. Discussion

Most nurses who were very familiar with the single disease templates installed at the practice liked them for their logical order, they felt that they contained only the assessment criteria they required for each review and as they were very familiar with them they knew where to find items easily. The single disease templates did not score as well for addressing multimorbidity. For experienced practice nurses this was less of an issue as they were able to use their clinical expertise to ensure that nothing was omitted when they were reviewing all of the patients LTCs at the same appointment. Nurses also felt that single disease templates did not assist in guiding practice or addressing practice nurses' educational needs.

The three versions of the GM-ELIRT did receive generally positive responses, particularly for their potential to address multimorbidity, to reduce the repetition that occurs with single disease templates and for their potential to guide practice, by embedded evidence based guidelines. Responses were, however, quite varied for improving the review process; some were very enthusiastic finding it to contain more detail than the single disease templates they currently used which added value to the review and speeded the process by reducing the amount of free text required and the number of templates they used. Others preferred their current templates. The wide range of responses may be due to the following factors: Firstly, as we found, use of the GM-ELIRT varied considerably, those that had conducted more reviews generally, scored the integrated template higher. The majority of nurses did admit that they were not yet familiar with the template when they completed their final evaluation. Secondly, nurses had a wide range of clinical experience, the more experienced nurses rely very little on templates to guide their reviews but see the value of templates for recording and monitoring patients' conditions and ensuring that QOF indicators are accurate and up to date. Some of the less experienced nurses do not complete such a detailed review, and therefore, need less information displayed on the screen. Thirdly, appointment schedules at practices varied considerably, some

having very short appointment times which made it difficult to conduct more than one LTC review at a time and others allocating up to an hour. Fourthly, the evaluation involved three different templates and although the information was similar, the formatting for each system was quite different; therefore, nurses would have had different experiences. Interestingly though, the EMIS PCS template was the first to be developed and was quite a difficult template to build and use, compared to the other two, it didn't allow for many of the additions that we have since been able to include on the EMIS Web and SystmOne versions. The first four practices recruited were EMIS PCS users and this version only received favourable reviews by two of the six practice nurses. When a fifth EMIS PSC practice wanted to test the template towards the end of the pilot, we were very surprised to receive one of the most positive responses across the testing sites. The final factor is practice nurses' pre-existing beliefs about their current templates. Some had used the same templates for a number of years; were very familiar with them and they could rely on them to record accurate QOF data. Others had changed clinical systems within the last year, had got used to the new systems which offered more than their previous system, and review templates had been modified by the practice staff to cater for the practice's clinical record keeping needs. For both of these groups there was less of an incentive to try something new. For others, however, clinical systems had only recently changed, nurses were unfamiliar with the standard review templates that came with the system, which hadn't been modified to suit their needs, so were more willing to try something new. If the testing period had been longer, nurses would have had more time to evaluate the GM-ELIRT properly and if we had been able to recruit more nurses for a longer testing period, the larger sample size may have evened out some of these inequalities found. This short pilot has, however, provided considerable feedback to take forward to refinement and further development.

10. Refinement

Given the short development time for the three versions of the GM-ELIRT refinement is inevitable. As the EMIS PCS version took the longest to develop, the analyst responsible was able to transfer some of the skills learnt to the EMIS Web version and pass on these skills to the analyst responsible for building the SystmOne version. Having said this, the systems are quite different and did require considerable investigation into their

functioning for development and refinement purposes. As we were recruiting practices and showing them screen shots of the templates a number of minor issues were highlighted, mainly read code errors, and therefore, these were corrected during the early stages of testing. Prior to recruitment the last EMIS PCS practice amendments were made in line with features we had added to the EMIS Web and SystmOne versions. These included separating the vaccines page from the front page and adding more items and moving depression screening to the symptoms page.

The evaluation has flagged up a number of issues as highlighted in the facilitation section and these will be addressed prior to taking this project onto the next stage. Some, such as the way the review information appears in the patient record for the EMIS versions may take further exploration and discussions with EMIS to resolve. Another issue that was frequently highlighted was the flow of the review using the GM-ELIRT. In developing an integrated LTC review template for primary care, which as far as we are aware has not been implemented before now, we attempted not to make such a radical change to the existing single disease templates to allow the change process to be steered by primary care staff. The current template does have generic sections but also retains a number of single disease elements which forces the user to jump around sections to complete a review. If the aim is to develop a truly integrated template separate disease pages should be removed. This however, warrants further exploration and discussions with practice staff; GP's and nurses to ascertain the most acceptable refinement, to ensure than the GM-ELIRT enhances rather than hinders the review process.

11. Limitations

There are a number of limitations with the clinical systems used to build the GM-ELIRT. Templates developed to date within clinical systems have been designed to review single diseases. Some of the features necessary to allow the template to accommodate several LTCs in a user friendly format were not found during development and some of these issues were highlighted during the evaluation. Further research is needed to explore the full capabilities of each system for complete refinement to take place. GM CLAHRC's data

analysts are very experienced but had not built templates in clinical systems prior to this project; not gaining access to a user manual slowed the process down. Building the templates at practices caused logistical difficulties as we were dependant on having access to available computers and a login facility. For the EMIS PCS version, the analyst and project lead worked together so that any issues could be addressed spontaneously. The EMIS Web and SystmOne versions, however, were built simultaneously which meant that the project lead was not always available to address issues. The project lead has made several attempts through the system companies over several months to obtain dummy versions of the systems to allow the templates to be built in the GM CLAHRC office, it is only in the last few weeks that some progress has been made through the GM Clinical Support Unit (GM CSU) for an EMIS Web version to be made available to us. This has not materialised yet but we hope that it will be available for refinement to take place. We have, however, been able to obtain a Vision dummy version so development of a vision GM-ELIRT can begin once refinement of the other versions is complete.

The timing of the pilot as previously discussed, also meant that there were fewer practices recruited and patients attending practices for LTC reviews, as many of the appointments were taken up with vaccinations. The small numbers and limited time for data analysis has limited the scope of the analyses. With a larger sample size and more time we could have included a number of sub group analyses to show comparison between the systems used, between the level of nurse and between practices, taking patient population into consideration. This pilot has, however, provided an insight into the possibilities for the main evaluation project which could also include clinical system searches to establish how the GM-ELIRT is being used and what the practice, or clinical benefits are.

12. Conclusions

The GM-ELIRT received a favourable response overall. There were extreme views, from particular enthusiasm, rating it as an excellent template, with good content, easy to navigate, easy to use and saving time, to abandoning it on the first attempt. Popular opinion, however, was that it had promising features and

with some refinement could provide an efficient integrated review process for managing patients with multimorbidity. This pilot has given us the opportunity not only to test the feasibility of an integrated LTC template in primary care but has been very useful for piloting and validating the data collection methods used prior increasing the scope and scale of these methods to take the GM-ELIRT forward for more extensive evaluation.

13. Future work

Development of the Vision GM-ELIRT version will begin once refinements are complete and further discussion has taken place with practice nurses and GPs to ensure the refinements made are in line with clinical practice and review process procedures. Discussions with previously interested partner CCG leads in Salford and Bury will resume regarding testing the Vision version. Links with the GMCSU and partner CCGs, such as Central Manchester and East Cheshire will be further developed to extend the scope of testing the refined versions of the GM-ELIRT across Greater Manchester.

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Appendix 1

Stages	Version	Date	Summary of work (Including: new additions/amendments)
TD TR	EMIS PCS	03/13 05/13	**Development New Template. Handed over to MY. Modifications to:** Main, Signs & Symptoms, Clinical assessment, Lifestyle, Asthma, AF, CHD , CKD, COPD, Diabetes, HTN, HF, PAD
		06/13 to 11/13	**New Templates**: Bloods & Urine, Vaccinations, Stroke. **Template Updates:** Main, Bloods & Urine: removed: Blood sugar, replaced: Micro albuminuria by Urine micro albumin. Signs and symptoms: added: Erectile dysfunction, CHD: Exercise grading from Education to Lifestyle, replaced: Exercise grading by GPPAQ list, removed: Risk assessment, added: Depression. HTN: added: Brief intervention for physical activity list, Physical activity brief intervention follow-up, dates. HF: added: Education, Fluid intake advice & weight monitoring, Brief intervention for physical activity list/follow-up,date. Disease: re-designed: Clinical assessment, Investigations, Procedures, Risk Assessment, Symptom Review, Medication Review, Education, Referral, Follow-up, replaced: BP & pulse input items by last reading values. Diabetes : Added: '9 key tests' comment, Weight Height BM, Erectile dysfunction in Symptom review , Referral single items in Referral, Physical activity brief intervention follow-up, date, Button to open Diabetic eye check template, PHQ9 &QRISK hyperlink in Depression, Referral to diabetes structured ed prog in Referrals, Brief intervention for physical activity list in Exercise, Extended: Daytime symptoms list with never causes daytime symptoms, right & left amputation lists in Investigations. Lifestyle: replaced: Single items instead of diet list, GPPAQ list instead of Exercise grading in Exercise, added: low salt diet, single item in Diet, removed Depression, Advice low salt diet moved to Diet. Asthma: removed: MRC Breathlessness list, added: symptoms, daytime symptoms, Exercise & Activities lists in Symptom Review; changed: Medication & Education, Asthma control steps list in Medication review, Control steps list in Symptom review, Step up/down list items in Medication list. AF: removed: Procedures, added: Single items in Education & Referral, Framingham & Qrisk in Risk assessment. CKD: added: Urine protein & Renal func tests in Investigation, Renal function monitoring in Follow-up, Framingham & GPPAQ, Brief intervention for physical activity list, Physical activity brief intervention follow-up, date, replaced: bloods input boxes. PAD: added: Brief intervention for physical activity list, Physical activity brief intervention follow-up, date. Stroke: added: Brief intervention for physical activity list, Physical activity brief intervention follow-up, date amputation check box and foot check refused. LTC Review: standardised: Vaccination page. Pulse oximetry: read code updated on all associated pages.
TD	EMIS Web	09/13 09/13 to 11/13	**Development of EMIS web version** of template (Tyldesley practice). **New Templates**: Asthma, AF, CHD, CKD, COPD, Diabetes, HF, HTN, PAD, Stroke/TIA, Clinical assessment, Symptoms, Bloods & Urine, Lifestyle, Risk Assessment, Vaccinations pages added, LTC review (front page), RA, Hypothyroidism, Follow up Page. **Template Updates**: Risk assessment, Symptom review list, Clinical Assessment moved. LTC review: added: LTC's reviewed, 6 month reviews, follow up lists, Review & Follow-up, removed: Follow up & Disease pages, lists multiselect. Symptoms: added: Referrals, General Symptoms, Other Symptoms, Depression,Cardiovascular, Respiratory, Musculoskeletal, Mental Health, Neurological, Symptoms lists across, Mental Health renamed as Depression screening, Symptoms: 'Comorbidity screening' (specific lists), Deteriorating balance, Confusion, poor concentration, Neurological (symptom list). Lifestyle: added: Education, Diabetes structured edu pro in Referrals, GPPAQ hyperlink. Clinical Assessment: added: BMI assessment. Risk assessment: added: CHADS2 & CHA2DS2VASc, HAD, Adherence, FRAX, FRAT, memory test 6cit/GPCOG, main header text (Comorbid risks assessment), Combined Falls & Fracture screenings. Follow up page: added: Follow up, 6 month reviews and follow up lists. Bloods and Urine: Urine moved. HF: Palliative care referral, HF type. Diabetes: added: Eye & Foot check pages, further views, Refer to diabetic specialist nurse, multiselection box 'Amputation' Foot check, eye check. Asthma: Control steps moved from Medication to Symptom. COPD: removed: Antiplatelet list, Added: Medication list (generic list options), Patient on maximum tolerated dose, Medication increased, Free text box (list). Vaccination: added: contraindicated items. Hypothyroidism: added: review in annual review CHD: changed: Coronary Artery Disease headings, added: Palliative care referral in cardiothoracic surgeon. Disease pages: removed: Review and Follow-up. Risk Assessment: disease specifics, added: Specific med lists, New medication. Medications moved position. CAD, PAD, Stroke: Changed: Antiplatelet lists to multiselect. Disease pages: added: Free text input, Eye Exam, Foot Exam, Rheumatoid Arthritis., Average BP; combined: Aspirin list with alt antiplatelet list, renamed: Antiplatelet.
TD	SystmOne	09/13 10/13	**Development** of SystemOne version of template **New Templates**: Stroke, RA, Symptoms, Entry for test results, Diabetes. **Template Updates:** Symptoms, Condition specific medication, Bloods & urine: renal profile, lipid profile, Re-format. Risk assessment: expand, re-format, adherence. Symptoms: (Other symptoms, neurological). HF. Diabetes: separate templates for diabetes eye and foot checks. Front Page: re-format. Follow-up: re-format. Clinical guidelines: updated.

Template Development (TD), Template Refinement (TR)

Appendix 2

BP Targets according to Patient Group	NICE	Target systolic range	QOF
Hypertension ≥ 80 yrs	**<150/90**[1]		**≤150/90**[2]
Hypertension <80 yrs	**<140/90**[1]		**≤140/90**[2]
CKD stage 3-5	**<140/90**[3]	120-139[3]	**≤140/85**[2]
Diabetes Type 1	**<135/85**[4]		**≤140/80**[2]
Diabetes Type 2	**<140/80**[5]		**≤140/80**[2]
CKD with microalbuminuria or proteinuria	**<130/80**[3]	120-129[3]	
Diabetes Type 2 with CKD stage 3-5 or Stroke/TIA or Diabetic retinopathy	**<130/80**[5]		**≤150/80**[2]
Diabetes Type 1 and microalbuminuria or (hyperlipidaemia/hypercholesterolaemia and waist circumference > 94cm (M) >80cm (F)	**<130/80**[4]		

Target Resting Pulse Rate Targets according to Patient Group	NICE	QOF
Atrial Fibrillation	<90bpm (110 bpm- recent onset)[6]	
Heart Failure (sinus rhythm)	≤ 70bpm[7]	

Cholesterol Targets according to Patient Group	NICE	QOF
CVD	TC<4mmol/l, LDL <2mmol/l[8]	TC ≤5mmol/l[2]
Diabetes	TC<4mmol/l, LDL <2mmol/l[5]	TC ≤5mmol/l[2]

Prescribing recommendations by patient group (Up titrate as appropriate until optimal dose reached)

LTC	To maintain target BP as single therapy or in combination.	To control heart rate as single therapy or in combination.	To maintain target cholesterol	To reduce thromboembolic risk as single therapy or in combination.
AF		BB , CCB , digoxin[6]		Anticoagulant (or aspirin) for Chads2 score ≥1[7]
Asthma				
Coronary heart disease	ACEI or ARBs, BB[10]	BB[10], ivabradine[11]	Statin[10]	Aspirin + or alternative antiplatelet Anticoagulant only if clinically indicated[10]
CKD	ACEI or ARBs if 2 raised ACR readings (>30mg/mmol)[3]		Statin[3]	
COPD				
Diabetes	ACEI or ARBs if 2 raised ACR readings (>2.5mg/mmol for men, >3.5mg/mmol for women)[3]		Statin[4,5]	
Heart Failure	ACEI or ARBs, BB, diuretic, digoxin For NYHA classifications II-IV add an Aldosterone Antagonist.[10]	BB + ivabradine[10]		
Hypertension	ACEI or ARBs, CCB, diuretic, BB[1]			
Peripheral Arterial Disease			Statin[12]	Aspirin or other antiplatelet[12]
Stroke			Statin[13]	Aspirin or alternative anti-platelet . Anticoagulant if AF[13]

Early identification of Co-morbidity		
Co-morbid Risk	**Risk factor**	**Screening technique**
COPD	Smokers/ex smokers >35 without a COPD diagnosis	Consider spirometry[14]
Depression	Signs of depression on questioning or PHQ-9	Refer to GP for bio-psychological history[15]
Hyperthyroidism	New diagnosis of AF	TFTs[7]
Coronary Heart Disease	Diagnosis of HTN, HF, AF, diabetes, PAD, CKD, Stroke	Framingham (except for diabetes) QRISK[2]
Increasing cardiovascular risk	Proteinuria in patients with diabetes, CKD	Urine microalbumin, ACR[3]
Familial hypercholesterolemia	TC >7.5 and LDL >4.9	TC (Total Cholesterol) LDL (Low-density Lipoprotein)[8, 16]

Monitoring exacerbation		
LCT	**Indication**	**Action**
COPD	MRC ≥ 3	Closely monitor oxygen saturation
	CAT score, increased by ≥ 5 units since previous assessment indicates a significant exacerbation[14]	Close monitoring
	>2 exacerbations in last year	Refer to breathlessness service/ GP review

Monitoring Therapy		
LCT	**Indication**	**Action**
Atrial fibrillation	Therapeutic range below its 2.0-3.0 target <65% of the time -OR - INR value of >5.0 more than 2 times within 12 months	Consider NOAC therapy[9]

Nine Key tests that should be carried out for diabetes management[4,5]				
Clinical Assessment	**Lifestyle**	**Bloods**	**Urine**	**Further Investigation**
BP	Smoking status	HBA1c	Urine microalbumin	Retinal Imaging
Weight		Cholesterol	Serum creatinine	
Foot check				

Reference

[1, 3-6, 8, 12-16] National Institute for Health and Care Excellence [[1](2011, CG127), [3](2008, CG73), [4](2010, CG15), [5](2010, CG87), [6](2006, CG36), [8](2010, CG67, [12](2012,CG147), [13](2008, CG68), [14](2010,G101), [15](2009, CG90) and [16](2008, CG71)].

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APPENDIX 3

Electronic LTC Integrated Review Template (GM-ELIRT)
Baseline Evaluation

Name _____ **Role** _____

Practice _____ **Date** _____

1 Which clinical system do you use?

EMIS PCS	☐	EMIS Web	☐
SystmOne	☐	Vision	☐

2 Which LTC reviews do you perform?

AF	☐	CKD	☐	PAD	☐
Asthma	☐	Diabetes	☐	Rheumatoid arthritis	☐
CHD	☐	HF	☐	Stroke/TIA	☐
COPD	☐	HTN	☐	Other:	☐
	☐		☐		☐

3 How long have you been conducting LTC reviews?

Years ☐ Months ☐

4 For patients with multiple LTCs, do you complete all the required reviews at the same appointment?

Always (go to 5)	☐	Sometimes	☐	Never	☐

4a Why do you (sometimes) conduct reviews separately? (more than one option can be ticked)

The appointment system is not set up for longer appointments	☐	Patient's prefer each review conducted separately	☐	The appointment would be too long for the patient	☐
There would be too much to do for one appointment	☐	We have always conducted them separately	☐	Other/more details:	☐

_____

5 Is the same amount of time allocated to each LTC review regardless of the patient's conditions?

Yes ☐ No (go to 5b) ☐

5a How long is allocated (in mins)? (go to Q6) _____

5b How long is allocated to each (in mins)?

AF	☐	CKD	☐	PAD	☐
Asthma	☐	Diabetes	☐	Rheumatoid arthritis	☐
CHD	☐	HF	☐	Stroke/TIA	☐
COPD	☐	HTN	☐	Integrated with COPD	☐
Integrated without COPD	☐	Integrated with diabetes	☐	Integrated without diabetes	☐
Other:	☐		☐		☐

6 Do you always complete a review in the allocated time?

Yes (go to Q7 but if answered 'always' to Q4 go to Q8) ☐ No ☐

6a On average how long do you run over the allocated time? (go to Q8 if answered 'always' to Q4)

☐ mins

7 Do you find that you repeat questions or clinical assessments when reviews are conducted separately?

Yes ☐ No (go to Q8) ☐

7a What is repeated?

BP	☐	Waist circumference	☐	Checking exercise status	☐
Pulse	☐	Symptom review	☐	Checking diet	☐
SATS	☐	Checking smoking status	☐	Lifestyle advice	☐
Height	☐	Checking alcohol status	☐	Health education	☐
Weight	☐	Checking for depression	☐	Medication advice	☐
Other:	☐		☐		☐

8 Please rate the current single disease review templates on a scale of 0-10 (0 = 0% confident to 10=100% confident) to show how confident you are that they:

Are user friendly	☐	Fully identify patient's multiple LTC needs	☐	Guide practice according to evidence based guidelines	☐
Assist the review to be performed in a logical order	☐	Assist in effectively managing patients with multiple LTCs	☐	Identify educational needs for less experienced nurses	☐
Provide an efficient review process	☐	Deliver a holistic LTC review process	☐	Improve knowledge of LTCs for less experienced practice nurses	☐
Provide a standardised process across LTC reviews	☐				

More details:

9 Do you think an integrated LTC review template would improve the current review process?

Yes ☐ No (go to 9b) ☐ Not sure ☐

9a How might it improve the process? (End of evaluation)

9b Why wouldn't it improve the current review process?

Thank you for completing the baseline evaluation

Trish Gray
Knowledge Transfer Research Fellow
July 2013

Appendix 4

Electronic LTC Integrated Review Template (GM-ELIRT): Post-review Evaluation Sheet

Please leave a number of these sheets in a accessible place on your desk during LTC review clinics so that you can add brief comments about the review template after each review while it is fresh in your mind.

Practice _____ **Date** _____

Practice nurse/Nurse practitioner's initials _____

1 **Patients initials** _____ **How long did the review take?** _____ **mins**

2 **Which LTCs does the patient have?**

AF	☐	COPD	☐	HTN	☐
Asthma	☐	Diabetes	☐	PAD	☐
CHD	☐	HF	☐	Stroke/TIA	☐
Rheumatoid Arthritis	☐	Other:	☐		

3 **Which conditions did you review?**

AF	☐	COPD	☐	HTN	☐
Asthma	☐	Diabetes	☐	PAD	☐
CHD	☐	HF	☐	Stroke/TIA	☐
Rheumatoid Arthritis	☐	Other:	☐		

4 **Did you easily find what you needed to complete the review using the new integrated template?**

Yes ☐ No ☐

Comments:

5 **Was there anything missing?**

Yes ☐ No ☐

Comments:

---

1 **Patients initials** _____ **How long did the review take?** _____ mins

2 **Which LTCs does the patient have?**

AF	☐	COPD	☐	HTN	☐
Asthma	☐	Diabetes	☐	PAD	☐
CHD	☐	HF	☐	Stroke/TIA	☐
Rheumatoid Arthritis	☐	Other:	☐		

3 **Which conditions did you review?**

AF	☐	COPD	☐	HTN	☐
Asthma	☐	Diabetes	☐	PAD	☐
CHD	☐	HF	☐	Stroke/TIA	☐
Rheumatoid Arthritis	☐	Other:	☐		

4 **Did you easily find what you needed to complete the review using the new integrated template?**

Yes ☐ No ☐

Comments:

5 **Was there anything missing?**

Yes ☐ No ☐

Comments:

Appendix 5

Electronic LTC Integrated Review Template (GM-ELIRT)

Facilitation Sheet

Name _____ **Role** _____

Practice _____ **Date** _____

Facilitation session ____

Since starting the project/the last facilitation session.....

1 Approximately, how many LTC reviews have you completed with the GM-ELIRT? ____

2 Approximately, how many times have you used the single disease templates instead? (If 0 go to Q4) ____

3 What made you choose a single disease template?

4 Which conditions have you reviewed using the GM-ELIRT?

AF	☐	COPD	☐	HTN	☐
Asthma	☐	Diabetes	☐	PAD	☐
CHD	☐	HF	☐	Stroke/TIA	☐
Rheumatoid Arthritis	☐	Other:	☐		☐

5 Have you reviewed all LTCs at the same appointment for each patient?

Yes (go to Q6) ☐ No ☐

5a What was the reason/were the reasons for not reviewing all LTCs (that required a review) at the same time?

6 On average how long (in mins) does it take to complete a review with the GM-ELIRT? ____ mins

7 Have you found that the GM-ELIRT helps you to conduct a review in a logical order?

Yes (go to Q8) ☐ No ☐

7a How could this be improved?

8 How easy have you found it to work through the GM-ELIRT?

Extremely Easy ☐ Easy ☐ Neither easy or difficult ☐

Difficult ☐ Extremely difficult ☐

Comments

9 How you noticed that anything is missing?

Yes ☐ No (go to Q10) ☐

9a What was missing?

10 Have you identified any new LTC needs/comorbidities (using the GM-ELIRT)?

Yes ☐ No (go to Q11) ☐

10a What have you identified?

10b What action(s) did you take on identifying new LTC needs/comorbidities?

11 Have the clinical guidelines assisted you in making clinical decisions so far?

Yes ☐ No (go to Q12) ☐

11a How have the clinical guidelines assisted you? (end of evaluation)

11b Could this be improved?

Yes ☐ No (end of evaluation) ☐

11c How could this be improved?

12 Any other comments

Thank you for completing the evaluation

Duration of facilitaiton session ☐ **mins**

Actions

Trish Gray
Knowledge Transfer Research Fellow
July 2013

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Appendix 6

Electronic LTC Integrated Review Template (GM-ELIRT)
Final Evaluation

Name _____

Practice _____ **Date** _____

1 **How many reviews have you completed with the ELIRT?** ☐

2 **Which LTCs have you reviewed?**

AF	☐	CKD	☐	PAD	☐
Asthma	☐	Diabetes	☐	Rheumatoid arthritis	☐
CHD	☐	HF	☐	Stroke/TIA	☐
COPD	☐	HTN	☐	Hypothyroidism	☐

3 **For patients with multiple LTCs, how often did you combine all the required reviews nto the same appointment?**

Always ☐ Sometimes ☐ Never ☐

4 **Why did you (sometimes) conduct reviews separately? (more than one option can be ticked)**

The appointment system is not set up for longer appointments	☐	Patient's prefer each review conducted separately	☐	The appointment would be too long for the patient	☐
There would be too much to do for one appointment	☐	I always conduct them separately	☐	Other/more details:	☐

5 **Has the consultation time for LTC reviews increased since using the ELIRT?**

Yes ☐ No ☐

6 **What is the maximum number of LTCs you have reviewed at once using the ELIRT?** ☐

7 **What was the minimum and maximum time (mins) it took to conduct a review with the ELIRT**

Minimum ☐ Maximum ☐

8 **Did you manage to complete reviews using the ELIRT in the time allocated?**

Yes (go to Q10) ☐ No ☐

9 **On average, by how long did you run over?** ☐ mins

10 **Are there any LTCs you think we should add to the template?**

Yes ☐ No (go to Q11) ☐

10a **Which LTCs**

Cancer	☐	Dementia	☐	Depression	☐
Epilepsy	☐	Learning Disability	☐	Obesity	☐
Osteoporosis	☐	Mental Health	☐	Other	
Other		Other		Other	

11 Please state how much you agree or disagree with the following statements:

11a The ELIRT assist reviews to flow smoothy

Strongly disagree ☐ Disagree ☐ Neither agree or disagree ☐
Agree ☐ Strongly agree ☐

Comments

11b The ELIRT provides useful prompts

Strongly agree ☐ Agree ☐ Neither agree or disagree ☐
Disagree ☐ Strongly disagree ☐

11c The clinical guidelines assist less experienced PNs

Strongly agree ☐ Agree ☐ Neither agree or disagree ☐
Disagree ☐ Strongly disagree ☐

11d I completed items on the template that I have not included in a review before which I think added value to the review

Strongly agree ☐ Agree ☐ Neither agree or disagree ☐
Disagree ☐ Strongly disagree ☐

Please expand if agree or strongly agree selected

11e There are items on the ELIRT that are not required

Strongly agree ☐ Agree ☐ Neither agree or disagree ☐
Disagree ☐ Strongly disagree ☐

Please expand if disagree or strongly disagree selected

11f The ELIRT has helped to improve the review process at our practice

Strongly agree ☐ Agree ☐ Neither agree or disagree ☐
Disagree ☐ Strongly disagree ☐

Do you want to expand on your answer?

12 Please rate on a scale of 0-10 (0 = 0% confident to 10=100% confident) for the following items to give your views on how confident you are that the ELIRT (in conjunction with the clinical guidelines):

Is user friendly	☐	Fully identifies patient's multiple LTC needs	☐	Guides practice according to evidence based guidelines	☐
Assists the review to be performed in a logical order	☐	Assists in effectively managing patients with multiple LTCs	☐	Identifies educational needs for less experienced nurses	☐
Provides an efficient review process	☐	Delivers a holistic LTC review process	☐	Improves knowledge of LTCs for less experienced practice nurses	☐
Provides a standardised process across all LTCs	☐	Reduces repetition	☐	Reduces time spent on the review process overall	☐

More details:

13 Was there anything on the template that you were unsure of and would like more information on?

14 We are planning to conduct a series of educational sessions facilitated by specialist nurses/doctors to assist practice nursing staff in conducting integrated LTC reviews. Are there any LTCs or specific things relating to LTCs that would help you in conducting integrated reviews?

15 Do you have any final comments?

Thank you for completing the baseline evaluation

Trish Gray
Knowledge Transfer Research Fellow
Oct 2013