Service Implementation - Do Once and Share

Urgent Care Action Team

Final Report

People, Process, Technology

A Guide to Urgent Care Service Improvement with IT

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1	NPFIT-SHR-QMS-PRP-0015	Glossary of Terms Consolidated.doc	6

Glossary of Terms:

List any new terms created in this document. Mail the NPO Quality Manager to have these included in the master glossary above [1].

Term	Acronym	Definition

Abstract

Objectives As part of the English NHS Connecting for Health (CfH) programme, the objective of this study was to identify the care processes provided by Urgent Care Providers (UCPs) in order to establish their high-level Information Technology (IT) requirements.

Methods The project ran workshops with local ED staff in West Yorkshire, UK, to explore their key processes. Analysts then made visits to four ED's in the study area, the regional NHS Direct headquarters, the regional out-of-hours service, a walk-in centre and the regional ambulance service. The visit records were returned to the sites for verification and correction, and became the basis for building process models of their care activity. The results were informed by an independent model representing the generic care process – the cycle of care. The output was used to establish high-level IT requirements for Urgent Care, and form the basis for a related paper on iT requirements for an Emergency Department..

Results The results of the visits confirmed that there are indeed generic emergency care processes delivered by the sample of UCPs studied, centred around a common cycle of care. This process models were used to develop a high-level set of UCP IT requirements to inform related discussions within NHS CfH. The study also illustrates and contrasts two techniques for describing processes in this complex setting.

Conclusions Describing and understanding what a UCP does by process modelling is an essential prerequisite to improving its efficiency and efficacy by process re-engineering – while also crucial to identifying the right IT support needed. As urgent care provision is a complex system, especially Emergency Departments. any attempt to understand its activity by using a typical patient journey is not enough. A better approach is to elucidate the key core processes basic to urgent care, and then to look at the rules governing their combination. In this context a generic model of the health care process has proved valuable.

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1 Introduction

At the beginning of a new century, the healthcare systems of the western world are under pressure to provide more and increasingly sophisticated health care to the ageing and less healthy populations that they serve (Watts 2001). That pressure is being expressed as increased efforts to manage health care in the primary and community sectors, and more pressure on Urgent Care staff (including Emergency Physicians) to act as gatekeepers to the acute/ secondary care sector.

1.1 Urgent Care & Change

Although we have seen enormous changes in the way urgent care has been delivered in the UK, demands for further improvements in the service continue. The 2004 report 'Transforming Emergency Care' (Alberti, 2004) details the successes achieved by the Reforming Emergency Care investments and changes within Emergency Departments in England. It also points to the need for the process to embrace the entire Urgent care sector, Indeed the only permanent feature of the 21st century NHS is likely to be change.

1.2 Urgent Care is a Complex System

When exploring the NHS, the emerging science of Complex Systems can be useful. The NHS made up of many elements linked in a way that is definitely not 'command & control', and it relies on continual interaction between semi-autonomous components - thus exhibiting a perpetual novelty.

Complex systems are inherently difficult to describe in detail, and it is hard to predict exactly how they will respond to a given stimulus. A more fruitful approach is to seek simple components and simple rules that can generate or influence the behaviours of the system. (Smith, Feied, 2002)

Urgent Care is itself provided by a network of services, which may involve several inter-service patient transfers in some cases of unscheduled care. Within that network, an Emergency Department is also a useful microcosm of the NHS, with its various service components (e.g. Resuscitation, Observation ward, Review Clinics, Theatre, etc), so any lessons learned within it should be shareable across the NHS.

1.3 People, Process, Technology

In simple terms, complex organisations such as Out–of-hours services or Emergency Departments can be seen as being made up of three key elements - people, process (i.e. the way staff work) and technology. Improving the performance of any organisation must focus on changes in any combination of them.

Changes in staff are one option in delivering organisational change- e.g. by hiring new staff or retraining existing staff. Humans are the ultimate intelligent agents and currently cope with incredible pressure and workloads when the situation requires it.. To improve services - such as Emergency Departments - further, it is unreasonable to ask staff to work harder - rather we have to work smarter, by changing processes and supportive technologies to make the work of our staff easier and/or more effective.

What defines a speciality or indeed any organisation is “what we do”, i.e. our “processes” - the data we need and generate exists to support that process, not the other way around. When exploring organisation change, it is widely accepted that process changes offer the most room for improvement. The recent introduction of walk-in centres and NHS Direct have provided new ways to provide unscheduled care, and in recent years Emergency Departments have been transformed with the introduction of a single, simple rule – the four-hour target. Just monitoring patient flows to ensure that emergency patient care is provided from arrival to discharge within 4 hours has had a revolutionary impact on the rest of the system.

Technology also has a role in change - though it is now acknowledged that just providing new technology is rarely an effective means of achieving business benefit. When exploring best practice in change/IT management, allowing staff to explore their processes is central to organisational change efforts, while IT is best placed as a supporting enabler of that change: the IT ‘tail’ should not wag the business ‘dog’. At the same we must not miss any opportunities to do things differently / do different things which new technology enables (ICL, 1990).

1.4 Urgent Care is information intensive

Urgent care is an information intensive discipline. We continually gather, integrate, analyse and act on information – whether that is seeing new patients, co-ordinating the “shop floor” or working on improvements in service delivery. Urgent care also usually involves two or more internal patient handovers – from reception to triage, and from triage to the relevant care stream or provider. It is therefore vital that accurate, comprehensive and up-to-date patient information accompanies – or in some cases precedes - the patient as he or she moves through the urgent care network. It follows that information management processes are at the heart of what we do: their improvement could significantly benefit the whole system. (Feied et al, 2004).

Some improvements can be delivered by simply rationalising and changing these processes, but many could be further improved with the help of the *right* technology.

Figure 1- Emergency Medicine - People, Process, Technology- Information Intensive

The strategy for ongoing NHS reform is currently planned to move under the helm of the Integrated Service Improvement Programme (ISIP). The ISIP strategy is to bring many of the disparate strands of NHS reform together under one umbrella. As part of the ISIP reform framework, it is suggested that we focus on three key elements - the people, processes and technologies that make up our services. Within that ISIP environment NHS Connecting for Health (CfH) is delivering the National Programme for Information Technology (NPfIT). Across the five English regional "Clusters", CfH aims to allow staff to handle patient information with a small number of electronic Care Record services across all NHS care settings - acute, community, primary care etc.

CfH and NPfIT are offering us both a unique challenge and a unique opportunity: where and how can information technologies support reform and release benefits to the service? This in turn begs the question of how to cater for the local variations in healthcare (and information management) processes that occur between different departments when IT applications are procured regionally and nationally.

1.5 An evolutionary approach to change is needed

It is acknowledged that the way we work will not be automatically improved with the simple deployment of new IT systems – IT 'silver bullets' are few and far between. Furthermore, in a complex environment such as healthcare with a variety of existing IT systems, an evolutionary approach is much more likely to succeed than a "big bang". This approach should be made up of successive cycles of change and these cycles of change should be mirrored in CfH NPfIT terms by successive phases of analysis, design, build and test of the related IT applications.

1.6 A simple yet consistent focus on process is essential

One of the key issues at the interface between CfH NPfIT and Urgent Care is the language used to describe the issues involved. In the same way that a common language facilitates multidisciplinary working in a resuscitation situation (i.e. Airway, Breathing, Circulation etc) a common language is required to allow staff (clinicians, management, IT staff and suppliers alike) at all levels in the NHS to discuss the way the NHS works and identify IT requirements.

NHS staff need to examine their core processes to identify the right technology.

The first step in any evolutionary change programme is an analysis phase exploring our processes, which should also identify our information requirements. This is a crucial phase and has a major influence on the design, build and testing of related IT solutions. In order to minimise unnecessary effort and maximise our influence on these developments, a structured, co-ordinated approach to this exploration has been taken.

2 Scope

We have taken urgent care to mean:

patient care contacts triggered when a person (or someone on a persons behalf) accesses health or social care without prior arrangement.

This study includes:

- all urgent services provided by NHS Direct, i.e. advice to symptomatic patients, and information to non-symptomatic patients.
- all urgent care provided by ambulance A&E services
- all care provided by emergency departments
- care provided by GMS out-of-hours services, subject to the exclusions below
- all care provided by walk-in centres

It provides a high-level description of the logical process for providing urgent care to people, including managing the queues for services which may build up. It does not cover the various non-patient facing functions that urgent care provision requires, such as service planning & development and resource management.

This study excludes urgent care provided by::

- primary care in-hours services
- community pharmacists
- mental health services
- social services
- intermediate care services
- dental care services.

3 Objectives

The following objectives of this work were identified at the outset;

- Use a people, process and technology framework, to explore with NHS urgent care staff the important key core processes that underpin their service.
- To use these key processes to identify key core information requirements/ IT requirements.
- To examine and explore these requirements and prioritise them on the basis of their impact on quality of care and patient safety (risk) issues
- To begin with, to define a language to describe the issues involved. This is also intended to stimulate discussion on the potential changes in staff, processes and information technology required to move Urgent Care forwards.

4 Methodology

In order to explore these issues we have taken a structured approach based on best IT management/software engineering practice. It consists of:

- A project sponsored by West Yorkshire SHA Reforming Emergency Care (WYREC) group to pursue these objectives.
- An initial large workshop set up by WYREC to engage Urgent Care staff across the SHA
- A series of workshops with smaller numbers of ED staff to explore their work and related information/IT issues.
- Visits to four emergency departments, the regional NHS Direct headquarters, the regional out-of-hours service, the regional ambulance A&E operations centre and a walk-in centre to gather information on working practices.
- Using expert input on business process analysis from the NHS Modernisation Agency and elsewhere to ensure that best practice was followed.

5 Results

Early field work has shown that a variety of perspectives of urgent care activity exist. Attempts to identify a patient journey that typified urgent care exposed the sometimes chaotic nature of the work and were not successful. This is because of the unpredictable nature of the individual complaints presenting for urgent care, and the large number of different routes possible through the urgent care network. The variety of presenting complaints also made it impossible to develop sufficient problem-specific care pathways in the time available, as has been done, for example, in the diabetes mellitus and breast cancer do-once-&-share projects. However when the processes that underpin urgent care activity were examined in more detail, some simple patterns began to emerge.

5.1 Identifying the key core urgent care processes & information requirements

5.1.1 Process at several levels

It became clear that it is important to recognise that all service providers operate on three levels.

- Operational
  Processes providing care to a single patient. Even within an A&E attendance, this often involves several staff groups at different times.
- Tactical
  Processes that coordinate the care of more than one patient, e.g. managing the queues for a primary GP care centre, or ED triage.
- Strategic
  Process directed towards the service as a whole – and therefore service patient populations. For example strategic planning, audit, research, service redesign, etc

Of particular interest are those operational processes that occur repeatedly during an individual patient journey through the service. If these processes are supported with the right IT, then related information can inform the tactical and strategic processes.

5.1.2 A patient journey – a process view

Let us begin this exploration with a patient who approaches the NHS for emergency service- by calling NHS Direct with Chest Pain, see figure 2.

a) An NHS Direct health adviser takes a call, identifies the patient, triages the request and transfers it to an NHS Direct nurse assessor. She assesses the case in more detail and decides the case is urgent. She then formulates a care plan (based on “possibly cardiac”), delivers care in the form of verbal advice (“take an aspirin”) and transfers the call to the local ambulance service.

b) A local ambulance service call handler assesses the case, decides it is category A and passes the call to an ambulance dispatcher who selects an ambulance to go to the patient

c) The paramedic who arrives with the ambulance conducts another assessment, formulates a care plan (based on “probably cardiac”) and delivers further care (e.g. Oxygen) while bringing the patient to the Emergency Department (ED).

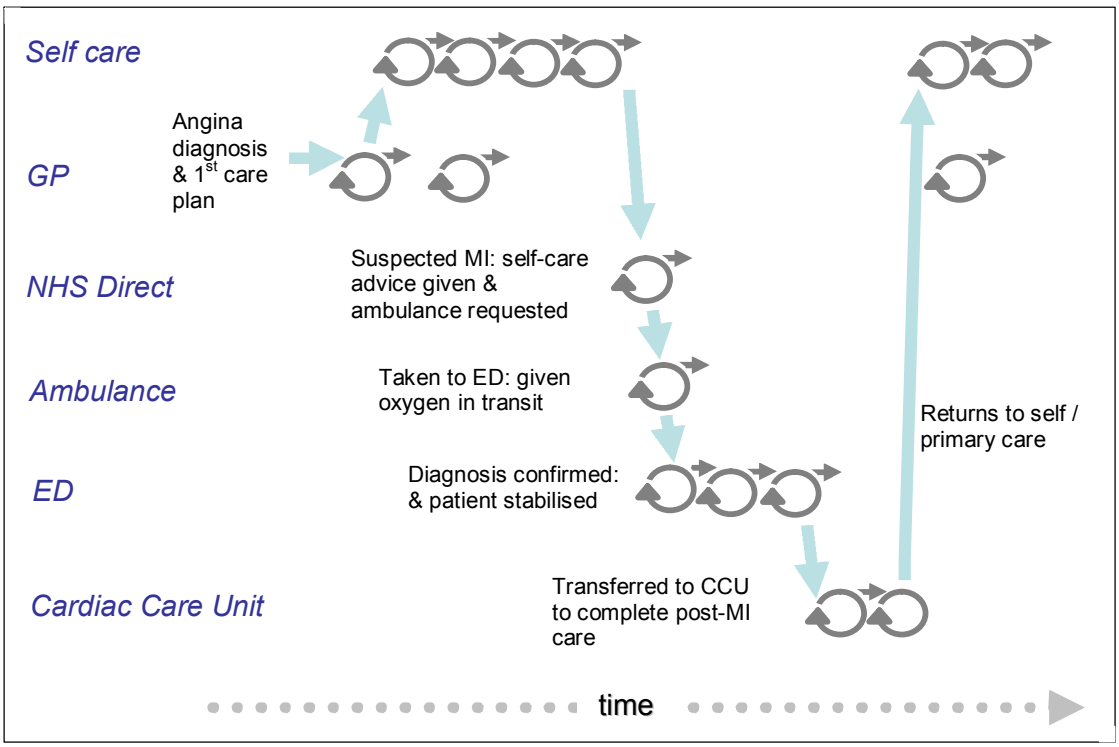
d) The initial nurse in the ED conducts another assessment, formulates another care plan and delivers further care (e.g. GTN buccal medication).

e) The ED SHO conducts another assessment, (including an. ECG which confirms MI), formulates another care plan (based on "definite MI") and delivers further care (e.g. thrombolysis).

f) The patients condition worsens, the ED SpR is called, she conducts another assessment (i.e. ?allergy to the thrombolysis), formulates another care plan and delivers further care (e.g. suspends the thrombolysis).

This cycle continues throughout the patient's contact with the health service. So even in this brief exploration there are two views: one is of a long series of disparate activities, the other of a set of recurring generic processes that make up the key elements of NHS activity - including Urgent Care – as depicted in figure 2below.

Figure 2 A journey through the urgent care network



While the generic processes are shared, staff vary in their focus, ability and responsibility around these processes. This in turn constrains the kind of information collected / required to support them. As an example, let us take NHS Direct. Its assessment can currently only involve taking a patient history and (possibly) looking at any electronic data previously collected for the same patient by NHS Direct: a patient examination is not possible. Care delivery is currently limited to recommending actions that the patient / carer can perform (e.g. take an aspirin, see the GP the next day, go to ED ASAP) and / or ordering a very limited range of services for the patient (e.g. a visit by the Out-of Hours service or an Emergency Care Practitioner, an ambulance trip to the ED).

5.1.3 Operational processes & the core care cycle

So when we attempt to follow a typical patient journey, it is clear we see a set of recurring processes that are common to all members of the urgent care services and that underpin all their activity., be it call handling, a primary care OOHrs consultation, triage, minor treatment, major treatment and so on.

- Registration
- Assessment
    - Gathering
    - Analysing
    - Diagnostics
    - Problem identification
- Care Planning
- Care Delivery
- Sorting / Referral
- Patient Tracking

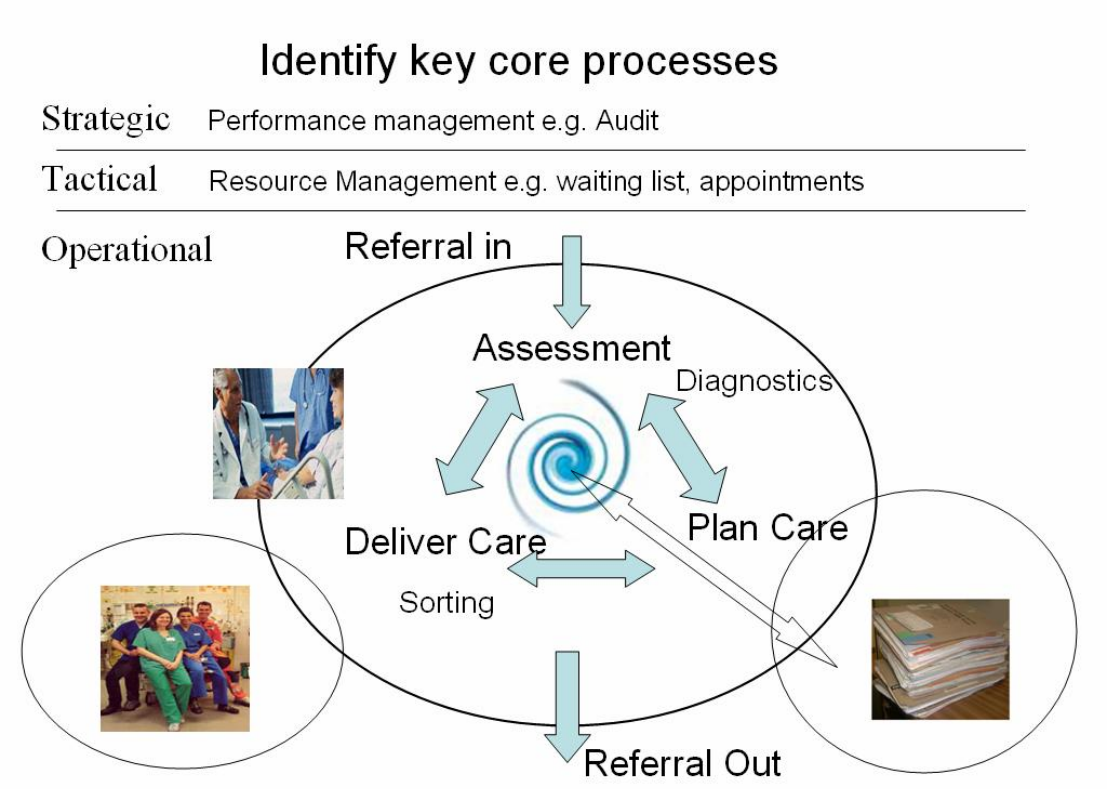


Figure 3- One view of the key core processes within urgent care

Although these processes are cyclical in nature, staff can move between individual core processes at random - as often happens when staff are multitasking, dealing with a number of patients simultaneously.

5.1.4 Data, Information and Knowledge

Data can be defined as data without context e.g. “Patient’s BP is 120/80 on 12th Feb 2002”

Information is best seen as data in context e.g. the same blood pressure reading as part of the patient record. This should allow interpretation of the blood pressure reading, e.g. at the basic level, whether the patient’s blood pressure is rising, stable or falling./ normal or abnormal

Knowledge can be seen as information that is relevant beyond the individual patient case, e.g. “a 5-year-old with a BP of 120/80 is abnormal”.

Patient data in isolation from the rest of the patient record is of very limited use, but it becomes very valuable in the context of a patient’s record. Knowledge from

authoritative sources available at the point of care (e.g. departmental / trust / academic / professional guidance / etc) helps to ensure that patient data is interpreted properly, and that the care delivered is based on the best available evidence.

5.1.4.1 Key core processes, information and knowledge

Each process requires seeking patient specific information from care records and / or from patients / carers / etc via history taking, examination and so on. Any new information obtained is then written to the care record in order to share it with staff members involved in succeeding steps of the cycle and subsequent cycles of care. This is the prime function of the patient record.

At the same time, knowledge from existing resources helps support staff during each process to decide what the case is (e.g. diagnosis), what to do about it and sometimes how to do it. This includes non-clinical business rules, such as how to register patients when their NHS number is not available.

There is also a third class, information about things that are not patients, e.g. catalogues of service providers, their contact details and current bookings. For the moment this kind of material has also been treated as knowledge, although we know that this is an approximation which will have to be refined in the future.

5.1.5 Linking related activities and / or observations together

Some items in a record should be linked together. One kind of link between activities recognises the fact that all activities have a lifecycle, and that we wish to relate items recording successive stages of an activity's lifecycle together. For example we would wish to relate the request for an external service (e.g. radiology diagnostics) at 10: 00hrs 12th May 2004, the provision of the service (e.g. Chest X-ray) at 10:12hrs and its result available to the ED at 10:21hrs. Another might link the taking of a sample with the results of its analysis in the laboratory. Links can also be used to reflect causality and purpose, and the fact that an activity or observation has taken place during a particular patient encounter. All kinds of linkage are a vital part of patient data, but as they are peripheral to the purposes of this paper they are not considered further: see the OpenEHR Information Model for more information on this topic. (OpenEHR, 2006)

5.2 The Operational Level- Processes & Information requirements

For the sake of simplicity, clarity and pragmatism, we have attempted to define these key core processes before identifying the key related information/IT requirements. It is accepted that these definitions and requirements require further refinement.

The patient begins their "journey" when they identify a health concern. At that point they usually make contact with the health service.

5.2.1 Registration

Definition: Registration of an individual patient seeking a health service

Information read	Patient demographics (if available: could be local, e.g. PAS, or national, e.g. NHS Patient Demographic Service)
Knowledge needed	Registration rules
Information captured	Patient identifier
	Patient demographics (updates)

	The service whose help is being sought
	Patient / carer's reason for seeking health care
	Date & Time registration occurred

5.2.2 Assessment

Definition: The gathering and analysing of patient information

This process involves two substeps. The first involves the act of gathering patient-related information. The second is a cognitive step, i.e. analysing information, which may be undertaken subconsciously, e.g. to assimilate the information gathered in order to formulate differential diagnoses.

5.2.2.1 Gathering

Information read	Patient demographics (from previous step)
	Recorded medical history Includes any medications, allergies, adverse reactions, alerts, family & social history and previous examination findings
Knowledge needed	Relevant assessment guidelines / pathways
Information captured	Presenting Complaint
	History of presenting complaint
	Systems review
	Current examination findings

It is clear that access to data outwith the urgent care organisation (e.g. legacy data, primary care data) is of very significant value to clinical users for this crucial process. The value of integrating legacy systems has been borne out by successes in Washington and Boston where ED-led hospital wide IT systems based on integrating existing data have been heralded as great successes. (Halamka 1999, Feied 2000)

As much of the current patient record, particularly in hospital systems, is in a paper format, document management (scanning) solutions would be of real benefit to supporting this process as part of a hybrid patient record in the short term.

Some of the information collected during assessment is amenable to recording electronically with current IT solutions, but some will remain a challenge. For example the incredible variation seen within History of Presenting Complaint suggests that it will be one of the last elements of the record that is suitable for structured electronic recording. Ideally patient-related data should populate the care record as a by product of any automated process, e.g. vital signs monitoring. Entry of manually obtained clinical data in real-time at home / in the ambulance / at the bedside / in the bay will ultimately demand suitable hardware such as ruggedised wireless tablet solutions.

The information gathered in this process is a combination of Subjective and Objective information, which now needs to be analysed to finalise the Assessment in order to formulate a related Plan (as per the standard SOAP approach to medical documentation)

5.2.2.2 Analysing

Information read	Information read and collected during the previous step
Knowledge needed	Differential diagnoses related to presenting complaint, etc
Information captured	Differential diagnoses
	Patient problems which are not diagnoses, e.g. pain

The assessment step is also supplemented by another process, diagnostics.

5.2.2.3 Diagnostics

See 5.2.6 (Request for External Services)

5.2.3 Care Plan

Definition: The planning of care based on the problem list generated by assessing the patient.

Information read	Recorded medical history (from previous step) Includes any adverse reactions, allergies & alerts
	Differential diagnoses (from previous step)
	Problems (from previous step)
	Current care plan (if any), including all current medication
Knowledge needed	Guidelines for diagnosis / problem / referral / treatment / etc e.g. the BNF
	Pathways for diagnosis / problem, etc
	Directory of service providers, including location, waiting times, etc.
Information captured	Any patient-specific goal(s)
	Each activity that is planned

The activities making up the plan may consist of further assessments, diagnostics, care delivery, patient movements, referrals, discharges etc. They may be added as a result of using a guideline or care pathway, or the planner's personal knowledge.

Knowledge resources are vital to informing this decision making process, but patient presentations to Emergency Departments do not always fit within Guidelines/ Care Pathway guidance. If a patient presents with combined Diabetes /Coronary Heart Disease/ CVA problems, related knowledge from disparate sources needs to be accessible in an integrated format.

Knowledge management or "Decision support" comes in two flavours- passive and active.

Passive decision support/ knowledge resources allow experienced clinicians to explore the knowledge base while retaining their clinical freedom. However it needs to be very thoroughly indexed if the aim is to deliver relevant knowledge in real time, i.e. during contact with the patient. There is a real need in the NHS for a nationally coordinated knowledge service which aggregates knowledge from the healthcare evidence base and places it into context for NHS users. Although there is movement towards a common format for displaying guidelines and pathways, at present there is

no agreed national standard for representing the contents of guidelines and pathways, A distributed peer-reviewed content management system online (as per emedicine.com/wikipedia) would share out the load, and allow it to be updateable and available in real-time in a variety of formats.

Active resources have potential too, e.g. warnings for allergies, drug interactions, child protection concerns etc. The challenge here is to provide this in a way that does not interrupt the patient contact with excessive amounts of information that is true but of minor significance, and to avoid telling the user things that he already knows.

5.2.4 Care Delivery

Definition: The delivery of care to the patient, including physical, behavioural and emotional aspects

Information read	Care plan produced by previous step
Knowledge needed	Procedural advice (e.g. drug formulary, etc)
Information captured	Details of activities performed / started / stopped / suspended

This is the most physical of the care cycle processes. This process involves the delivery of care to the patient, e.g. giving patient advice & reassurance, administering drugs, performing procedures, surgery, moving the patient, etc. It also covers stopping or suspended activities which have either achieved their desired effect or which have proved ineffective, intolerable or damaging.

Ideally data is captured as a by product of these physical transactions (eg medication dispensing via Pyxis technology) and recorded in the care record.

The delivery of care can involve the transfer of responsibility for the patient to another health care professional.

5.2.5 Sorting /Referral

Definition: The transfer of patient care to another healthcare professional

If the patient requires ongoing care by another care professional, he or she may leave the current care cycle via a referral. This decision is usually subconsciously made as part of the care planning step and follows the delivery of any immediate care that the current professional carer can provide.

Information read	Care plan
Knowledge needed	Contact details of referree (the intended referee, location, etc will have been decided during the care planning step)
Information captured	Planned destination (e.g. into Resus / MAU/ back to GP) Actual destination
	When care transferred

As this involves a transfer of responsibility for the overall care of the patient and is such a crucial step in care, a feedback loop is essential here. Although available technology (e.g. pagers, sms text messages to mobile phones. etc) means it is possible to transfer responsibility for patient care electronically, it is best to involve a verbal handover of care at present. (Solet et al, 2005)

When necessary, staff will revert to reassessing the patient and going round the care cycle again until the patient is ready for transfer/ discharge from the service.

5.2.6 Request Service (inc. Diagnostics)

Definition: making the request for a specific activity to be done to / for the patient.

Information read	Care plan
Knowledge needed	Service Directory
Information captured	What is requested
	Identifier of any specimen involved
	Who actually made the service request
	When request made
	Planned & Actual service provider– these may sometimes differ

In order to support the key core Urgent Care processes, additional processes are often needed that are outwith the control of the clinician responsible for the patient's care. This involves requesting services from other healthcare staff providing additional services (e.g. laboratory diagnostics, radiology, ECG, portering, patient transport, etc). The service concerned is only responsible for providing the service requested, not the overall care of the patient.

The request will have been established during the Care Planning step. Where analysis of a specimen is involved, the specimen will already have been taken as part of Care Delivery. Processing the result of any analysis is part of the Assessment process, q.v. section 5.1.5.

Electronic support for order entry offers great potential benefit but needs to be implemented carefully (Koppel et al 2005). Results reporting should also offer equal benefit and may involve less implementation challenges initially.

5.2.7 Patient tracking

Definition: This requirement is particularly significant within an ED. which typically contains several subservices each in a specific location within the department. Many different journeys are possible through an ED.

Information read	Care plan
Knowledge needed	Department service structure & layout
Information captured	When patient left
	When patient arrived
	Mode of movement (e.g. self / escorted / portered / by ambulance)
	Planned/Actual destination– may sometimes differ

In today's 4 hour climate this is an all-important process. Ideally information to track the patients journey should be recorded as a by product of the core care processes. Therefore the responsibility for this process should be shared by all those staff involved in a patients care. However the allocation of prime responsibility for this process to a "co-ordinator" role may be more effective: at the minimum the role ensures that patient movements have been properly and consistently recorded.

Currently whiteboards are often used in EDs to monitor the movements of patients- this graphical overview has several advantages and an electronic tracking solution

should try to emulate them. Technologies that automatically track patients through the department have enormous potential to support this process (e.g. tracking technologies such as Radio Frequency ID tags, bar coding, etc).

5.3 Tactical/ Resource management

If the NHS had unlimited resource there would be little need to manage them. However it hasn't, so these processes are highly important. They include managing any queues controlling access to scarce resources.

5.3.1 Departmental co-ordination

Definition This takes the form of shop floor co-ordination, bed management, observation ward rounds, allocation of review clinical appointments etc.

In simple terms this process involves matching demand from operational level activity with supply in terms of available staff and resources (eg mobile GPs, CT scanner etc) in a way that best meets clinical priorities and constraints such as the ambulance service target response times for A, B & C category calls, and ED 4 hour limit.

What follows is a placeholder for a more detailed exploration of the subject.

Information read	Resource demand, e.g. patient volume, queues
	Resource availability
Knowledge needed	Resource allocation & procurement rules
Information captured	Resource allocated, including:
	- type of resource (e.g. ambulance, cubicle, nurse assessor, SHO)
	- amount allocated (as a duration for a temporal resource)
	- service allocated to (e.g. Nurse Assessment, Minor Injuries, Resus)
	- when allocated
	- who allocated it

The resource demand information would ideally be recorded as a by-product of the operational process of providing patient care.

Other related processes at this level that warrant further exploration include queue management, appointment management etc. These processes also exhibit a cyclical nature – assess situation, plan solution, deliver etc.

5.4 Strategic/ Performance management

If the right information is captured from the operational processes and tactical processes (esp. departmental coordination) then this – coupled with information about the properties of the services involved - should provide much of the aggregate data required to support these higher level processes.

In order to plan for the future, aggregate patient data is used to plan improvements in quality, reductions in risk via a number of generic processes including reporting/ /audit (analysis), planning & commissioning (delivery) etc. Once again these

processes exhibit a cyclical pattern - as per the PDCA audit/quality management cycle for example.

These processes have not been explored in detail within this study, and warrant further exploration.

6 Our key IT requirements

Having identified our key core processes we can now deduce our key information / IT requirements

People	Process	Information	Technology
All	Access to IT	Log on details	Biometrics &/or smart cards
Administrative	Registration	Patient Demographics	Access to local service registers, CfH PDS
Clinical	Assessment	Current: problems - medications - allergies - alerts Previous emergency care Recent acute discharges Current care providers	Existing trust- based information Document scanning of legacy paper records, esp. ED & hospital records. Electronic access to Primary Care data
Clinical		History of Presenting Complaint Systems review Vital signs	Mobile wireless tablet PC solutions Wireless monitoring equipment
Clinical	Diagnostics	Previous Results Orders	Electronic order entry Electronic results reporting
Clinical	Care Planning	Guidelines Care Pathways	Wikipedia style resource
Clinical	Care Delivery		Electronic prescribing
Clinical	Sorting/Referral / Specialist opinions	Services directory, incl: - what's available - when - where - waiting times Referral requests Discharge notifications Current info for this urgent care request	Paging/ SMS messaging Electronic referral and discharge letters
Senior Clinicians/ Managers	Patient Tracking		Whiteboards RF ID tagging technology
Senior Clinicians/ Managers	Strategic/ Performance Management		Access to electronic warehouse of operational data,

			e.g. so that NHSD / ambulance staff can see A&E outcomes of urgent care cases they passed on

7 Other issues with relevance to CfH

7.1 Access

As we have explained, given the multi-tasking nature of urgent care delivery, particularly in EDs where staff move between different processes and different patients, it is imperative that login times should be minimal, as users will interact with the technology on an interrupted basis. It may also mean that more than one person may be involved in carrying out a task. The ideal form of logon is likely to involve biometric identification.

7.2 Security & Confidentiality

Naturally it is understood that only those people with a role in a patient's care should have access to that patient's information.

It is possible to facilitate this through a series of measures, including guidance on the ethical and legal issues involved. Furthermore there are a number of technical safeguards which can provide additional security. i.e. strong user authentication, role-based access to the record, an access audit trail and an opportunity to "break the glass" to get at information if required.

7.3 Common User Interface project

Given the complexity of the environment and their mobility, ambulance, OOhrs and ED staff need a user interface that relates to the real world environment they live in; and supports their key core processes / working practices, while allowing for local variations in how these processes are delivered. If this is achieved, it should minimise both training requirements and IT barriers to staff utilisation, while minimising the risk of errors.
(Kushniruk, 2004)

8 Discussion

Reforming Urgent Care has forced us to explore changes in both staffing and processes. The more recent Integrated Service Improvement Programme (ISIP) aims to unite the many disparate reform initiatives (Agenda for Change, CfH, MMC, etc) that currently exist across the NHS which will have further implications for the way we deliver care.

8.1 Benefits

Any exploration of the people, process and technology that underpin the NHS should begin with a view of the desired benefits to healthcare staff/ patients in terms of reducing cost, time or risk and/or improving quality. Once these are identified then the People, Process and Technologies that make up the service can be examined in order to realise those benefits.

8.2 People-

There is little doubt many of these initiatives are forcing us to look at the many staff roles that exist within the NHS. The intention is to look at what unites us as a workforce and get us out of our traditional siloed mentalities- where each and every individual believes that their work is unique. Rather the aim is to promote more flexible ways of working across and within healthcare teams. In this environment is it likely that the traditional boundaries between professionals will become increasingly blurred. If roles are matched with responsibilities across the organisation rather than with professional divisions, then there is great potential for a more productive and harmonious workforce

8.3 Process

There can be little doubt that there is still plenty of scope for improvements in process across the NHS. An exploration of process that helps us improve our service is to be welcomed, which explains why it forms the main focus of this paper. If we are agreed that urgent care staff exploring their processes is of value, what then have we learned from this work?

8.3.1 The problem- there is no single typical patient journey

The early part of this exercise soon revealed an important lesson: there is no single “typical” linear patient journey through urgent care, especially when an ED is involved.

For example, in one ED visited there are 42 different journeys possible through it, based solely on the basis of ED services used and the order of use. This ignores any attendance(s) at an ED clinic and diagnostic imaging, and the different destinations to which the patient could be discharged. This having been said, many of those 42 possibilities are uncommon. This variety of possible patient journeys is true of all four emergency departments visited. It is major factor contributing to the perpetual novelty exhibited by ED - one of the key features of any complex system. If one looks at the current overall network of urgent care suppliers in England, the number of different journeys possible would become much larger still.

Another feature of ED work is that much of the work involves multitasking while the communication between staff is often interrupt-driven – factors which make any attempt to identify linear patient journeys very difficult. (Coiera et al (2002), (Chisholm et al 2000)

8.3.2 Our approach

No approach to modelling urgent care activity could yield a perfect result. But despite the complexity and oftentimes-apparent chaos of urgent care, some simple patterns did emerge from our exploration, - another feature of Complex Systems. This has parallels with medical crises / resuscitation situations, where a simple set of focussed care processes united by a common language assist greatly in facilitating multidisciplinary care (i.e. Airway, Breathing, Circulation etc).

For pragmatic reasons we started this evolutionary journey with an attempt to identify those key core processes that underpin urgent care activity, rather than attempting to elaborate every specific process that occurs during the delivery of urgent care.

8.3.3 Our key process findings- health care Lego bricks

We believe that our exploration highlights an approximation of the key core generic processes we share across urgent care, and indeed across NHS patient care as a whole, i.e.

- identifying patients
- patient assessments, diagnostics,
- planning of care
- delivery of care
- enabling further care, e.g. organising referrals,
- management of resources,
- management of performance etc.

One could argue at length that the care cycle could be split into 3, 4, 5 or more key processes. This highlights the challenge ahead to find a common language to describe what we do. It is clear that no model is perfect, indeed it is acknowledged that all are imperfect. It is simply that some models are more useful than others.

It is worthy of note that the processes we have identified have some overlap with ED processes which have been defined by BAEM/FAEM independently of this work. (BAEM, FAEM 2005). Further investigation into the international experience of healthcare process modelling revealed related work in Denmark. The Danes, who are acknowledged as international leaders in healthcare IT, are using a closely related key core process cycle orientated view of the Danish health service to design and build their EHR structure. (Asp, L, Petersen, J, (2003), National Board of Health, Denmark (2002) There is also much overlap with the Open EHR electronic record architecture standard, which separates an underlying generic process related information reference model from the overlying specific content of the record which is managed by archetypes and templates, (Open EHR, 2006)

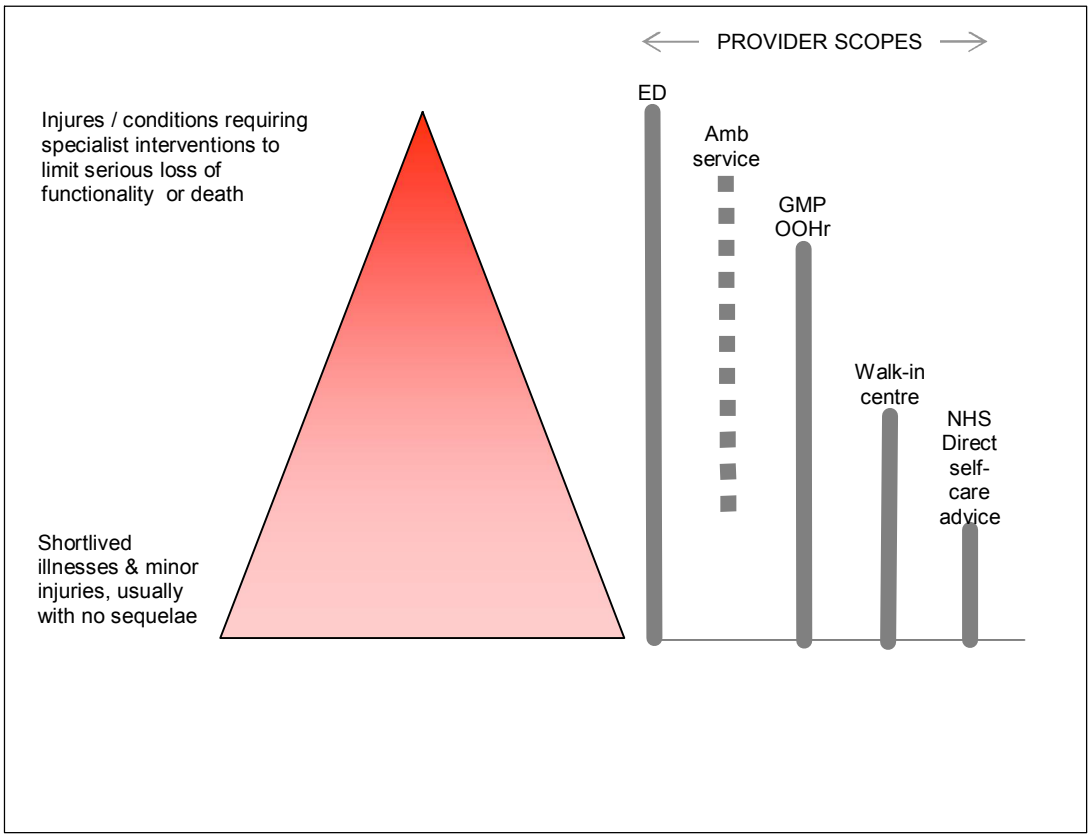
The advantage of identifying these set of core processes is that they allow for an great variety of patient journeys to be supported. This is analogous to the flexibility offered by a small number of different kinds of Lego bricks (intriguingly also a Danish invention), which permit a wide variety of models – buildings, vehicles, tableaux, etc - to be built.

Identifying the core processes also provides a high-level picture of the patient information required and produced by each process, and the knowledge required to provide high quality, evidence-based care. They offer a framework within which to provide systems that are capable of adjusting to changes in technology, organisational structures and government policy.

8.3.4 Overlaps in Urgent Care

Although the different urgent care provider types are intended to deal with different case mixes, there is considerable overlap in their clinical scopes – see figure 4. For example should a person with a minor injury or illness go to their local walk-in centre, contact their OOHrs provider or go to their nearest ED? Are they aware of what each different provider type can - & cannot - offer? . That the system works for patients is a tribute to the common sense and cooperation between the various providers.

Figure 4 Clinical scopes of urgent care providers



There is also duplication of technical service provision. For example NHS Direct, OOHrs and ambulance services all run call centres offering streaming &/or triage, a highly specialised business operation where economies of scale apply. Given sufficient local knowledge & service-specific training, a single call centre might be both more efficacious, less confusing for would-be patients and reduce the number of service requests which are deemed inappropriate and then transferred / redirected to another kind of urgent care provider.

8.3.5 Representing the processes

This attempt to find the right set of core processes has been mirrored by a related search for the right Business Process Modelling language to represent them. Basic flow charting was ruled out at the outset, as it cannot represent parallel processes, and insists on a fixed sequence of operations. The methodology we require must :

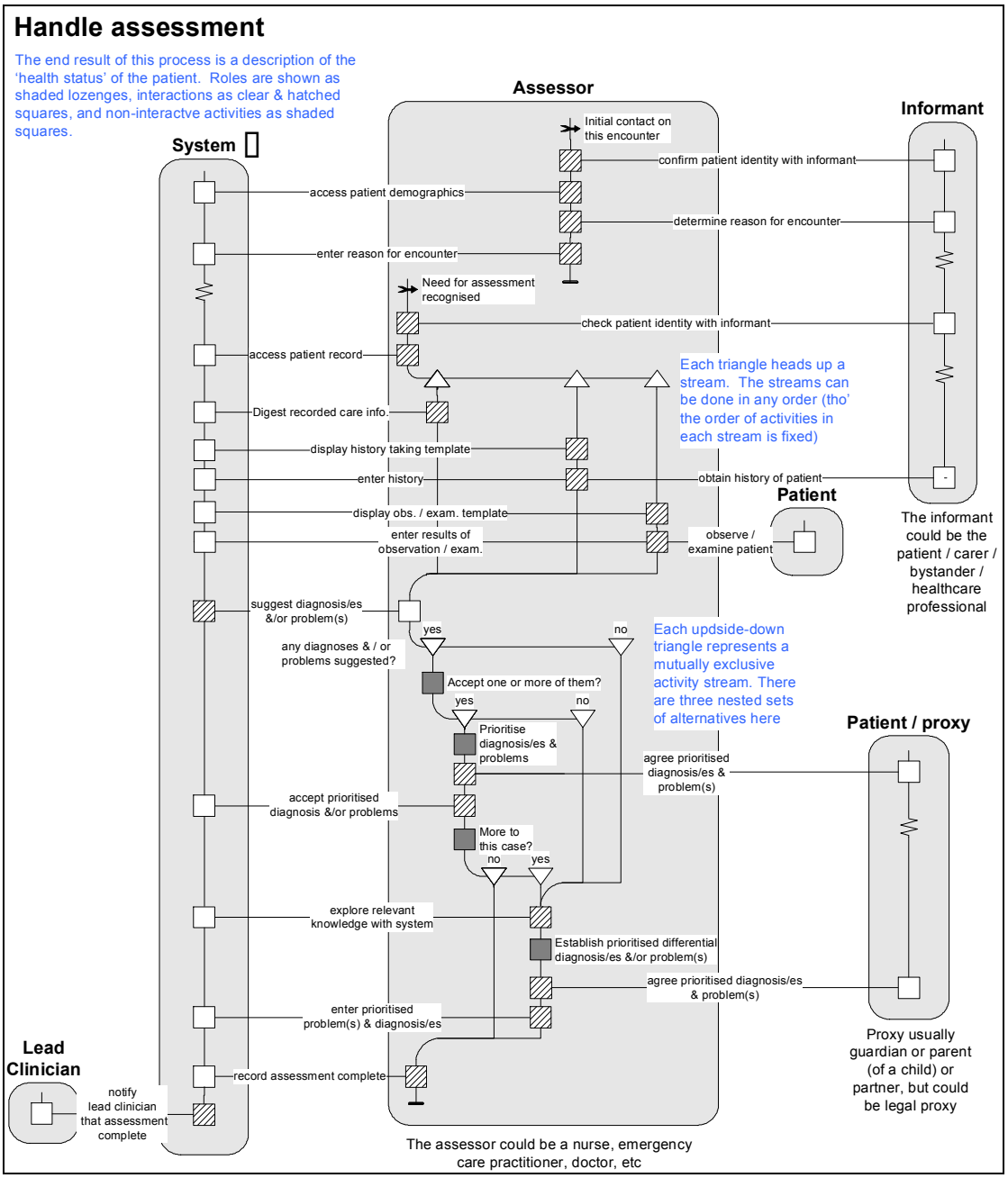
- cater for the flexible, dynamic and concurrent nature of processes seen
- permit us to make use of key core processes,
- allows us to document patient journeys that do not follow linear care pathways
- be able model process at all three levels - operational, tactical and strategic
- be able to show the roles involved in processes
- have outputs that both IT **and** healthcare staff can understand

The candidate methodologies included UML activity diagrams, Business Process Modelling Notation (BPMN) and RIVA .– in particular role activity diagrams (RADs). The table below summarises the properties of each methodology.

	UML 2.0 Activity Diagrams (Unified Modelling Language)	**BPMN** (Business Process Modelling Notation)	**RIVA** (Role Interaction Via Activites)
Key concepts	A development of the flow chart for OO system design use	A general purpose notation for representing business process in sequence, now part of the UML stable	A process modelling technique focused on roles and interaction between them
Sees process as linear sequence of activities?	Yes	Yes	No
Intelligible to both IT & health staff?	By and large	Yes with some training	Yes with some training
Can represent:			
Concurrent processes?	Yes	Yes	Yes
Sequence-free activities	Yes, but as an exception	Yes, but as an exception	Yes
Consultative activities?	No	No, but workaround possible for simple cases	Yes, by design
All three levels of activity?	Yes, but not explicit in method	Yes, but not explicit in method	Yes, by design
Roles?	Yes, but not explicit in method	Yes	Yes, by design
Are tools available to support it?	Yes	Yes	Yes

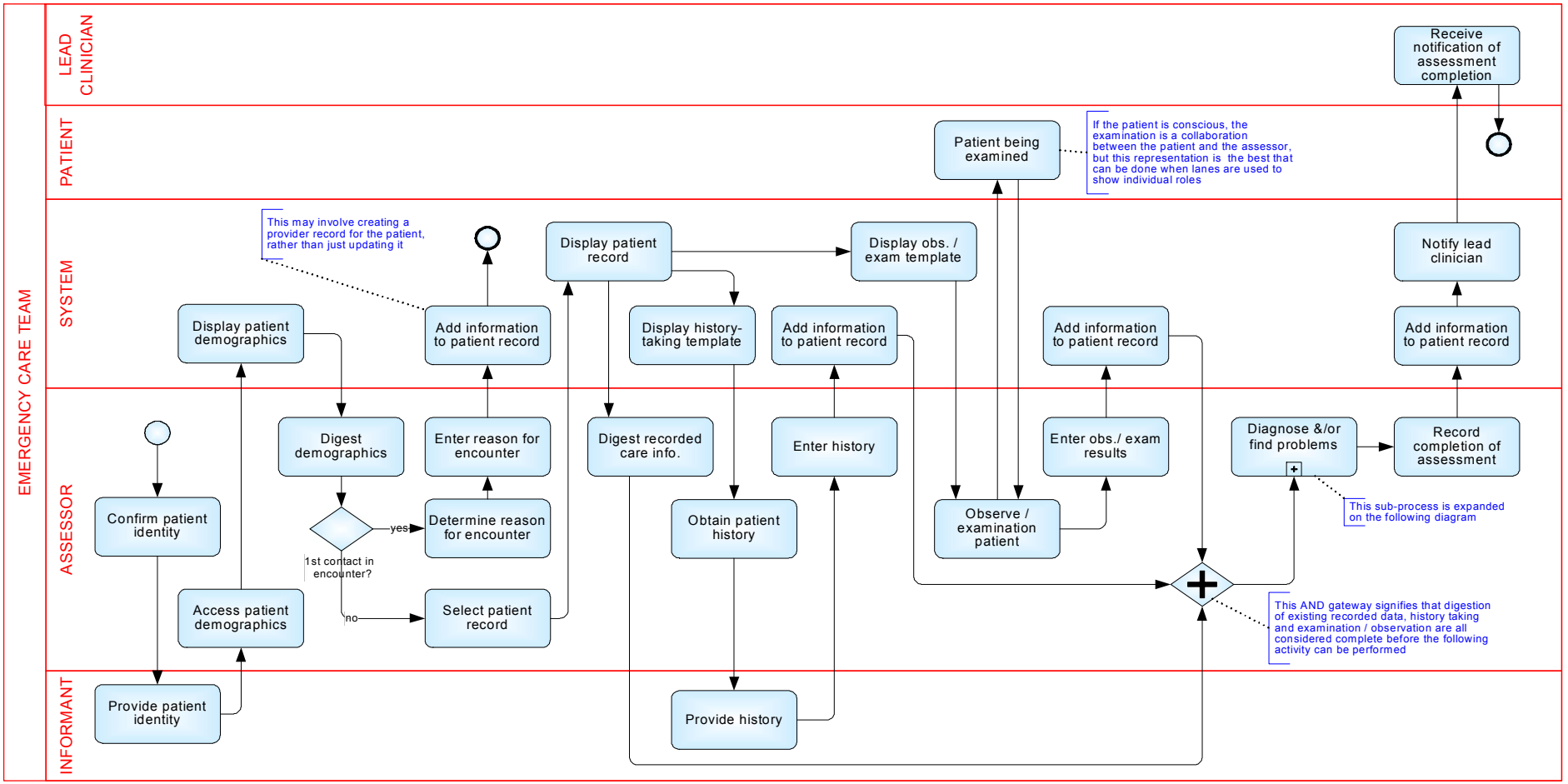
As the table shows, RIVA is best suited to our purpose of requirements analysis, and this is the technique that we have used for this study. However each approach has its merits and a standard approach to BP Modelling within CfH would be welcomed. Here is the RIVA diagram that describes the generic assessment process.

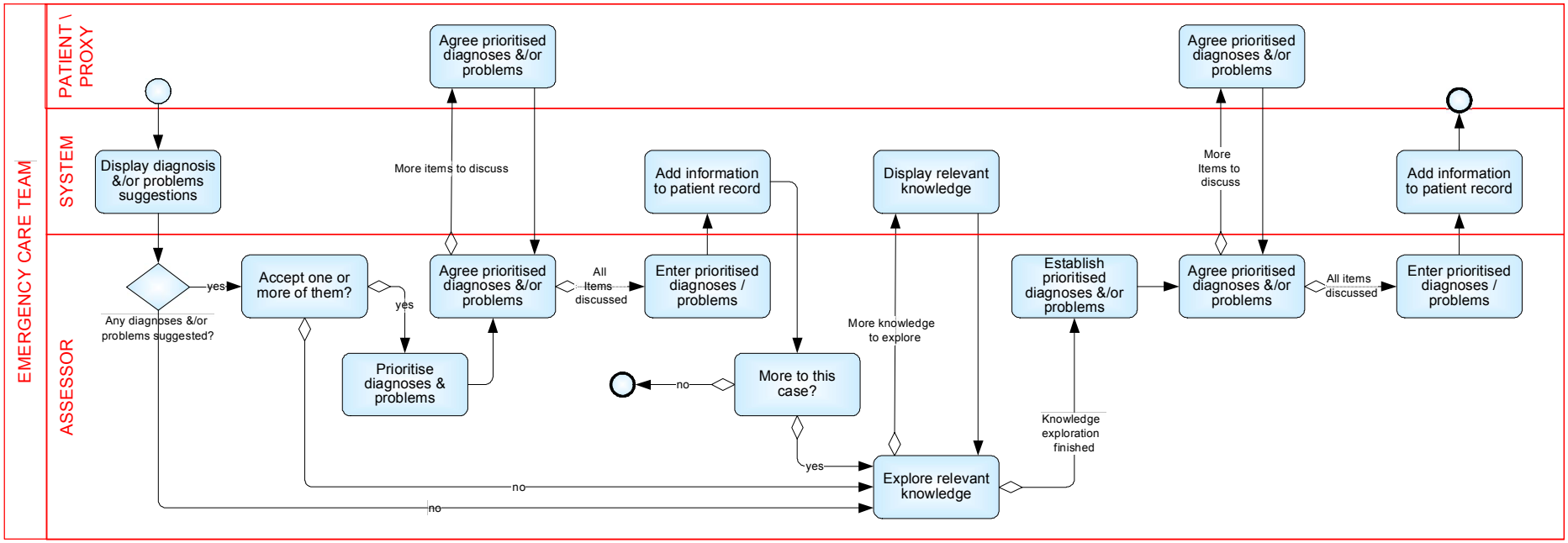
Figure 5- RIVA diagram describing the generic assessment process



Here is the same scenario represented using BPMN v1.0. Note the awkwardness of the representation of interactions.

Figure 6- BPMN diagram describing the generic assessment process





My Diagram	author: Ian Herbert version: 1.0 status: created	created: 23/12/2005 13:32:17 modified: 03/01/2006 14:04:37	© 2003-2005 BPMN powered by itp commerce
Diagnose &/or find problems			
	Assessment BPMN.vsd		

8.4 Technology

If one explores successful change programmes, an evolutionary rather than a “big bang” approach is recommended to effect significant change in a complex environment such as healthcare. To begin this evolutionary cycle we have worked with urgent care staff to explore their key core processes while aiming to highlight related information technologies which could add value/ deliver benefits early on.

Of note typical urgent systems in the current international IT market place tend to see urgent care needs in isolation from the rest of the healthcare system, and to focus on individual urgent care service requirements, without supporting many of our key core processes. The exceptions are UK out-of-hours systems, which are increasingly acting as operational hubs.

It is now essential we ensure that key clinical processes are supported with the right IT (e.g. by integrating clinical information from across the NHS) while administrative / management processes are supported as by-products of this clinical care cycle. As urgent care is complex it is clear that we need to design and build flexible IT solutions to support our requirements, allowing staff to move between their key core processes at random, as well as between instances of the same core process for different patients.

8.4.1 The need for a standard electronic record architecture

From our analysis, it is clear that there is a need to create a logical patient record per unscheduled care episode that grows incrementally as care proceeds, and that accompanies - where possible precedes - the patient as they traverse the unscheduled care network. Such a record is also necessary as the basis for any shared workflow necessary during the episode.

Awareness of what has been established about, and done for, the patient so far in an unscheduled care episode can be achieved solely by messaging between the care providers involved. However the requirement would be more fully satisfied by a more comprehensive integrated Electronic Health Record

The record-based approach would allow representation of the linkage between various elements of the patient’s information in both stored and displayed formats.
When the mobility of people needing care is taken into account, such an approach ideally requires a common record architecture if patient data is to be interpreted reliably by computer applications, e.g. to enable automatic linkage to knowledge sources and use for computer-driven decision support.

In the absence of a transparent EHR architecture published by NHS Connecting for Health, from an exploration of current international EHR standards we believe that the openEHR architecture offers an open and transparent solution. (openEHR, 2006)

8.5 Future work

This work has aimed to identify key core processes and related requirements. We suggest that an exploration of these requirements should inform their prioritisation.

This comes down to asking::

- What process needs to be improved?
- What is the related IT requirement?
- What is the related benefit?

From our initial analysis this has been compiled as follows;

Process	Information	Technology	Benefit	Priority
Access to IT	Log on details	Biometrics &/or smart cards	Save time	1
Registration	Patient Demographics	Access to local service registers, CfH PDS	Save time, reduce risk / improve quality	1
Assessment	Current: problems - medications - allergies - alerts Previous emergency care Recent acute discharges Current care providers	Existing trust- based information Document scanning of legacy paper records, esp. ED & hospital records. Electronic access to Primary Care data	Save time, reduce risk / improve quality	1
	History of Presenting Complaint Systems review Vital signs	Mobile wireless tablet PC solutions Wireless monitoring equipment	Likely to get more comprehensive records, which should better quality / reduced risk	3
Diagnostics	Previous Results Orders	Electronic order entry Electronic results reporting	Save time if access to viewing application universally available	2
Care Planning	Guidelines Care Pathways	Wikipedia style resource	Improve Quality	2
Care Delivery		Electronic prescribing	Reduce Risk	2
Sorting/Referral / Specialist opinions	Services directory, incl: - what's available - when - where - waiting times Referral requests Discharge notifications Current info for this urgent care request	Paging/ SMS messaging Electronic referral and discharge letters Electronic transfer of info. generated so far this urgent care request	Save time Reduce risk Better quality care Less wastage of services	2
Patient Tracking		Whiteboards RF ID tagging technology	Save time	2
Strategic/ Performance Management		Access to electronic warehouse of operational data	Improve quality and timeliness of management information, given a satisfactory operational system.	

We would welcome further input on the identification of gaps in our requirements and the prioritisation of these requirements.

Once this analysis work and prioritised IT requirements are agreed, this can inform the design and build of related IT tools, which can then be tested to ensure they are fit for purpose before deployment into the NHS.

9 Conclusion

The NHS must continue to change. Urgent Care is a key part of the NHS, and any change in this complex environment will involve both hurdles and opportunities. The complex interface between Urgent Care and NPfIT means that a consistent approach to this challenge is essential if we are to make the most of this very valuable opportunity.

This work has been structured to give the clinical and IT management a single common language to discuss the way forward. It introduces a framework to examine urgent care focussed on people, process and technology with particular attention to processes which can be improved with the help of the right technology.

The results of our exploration reveal that urgent care work operates at three levels:

- Operational: dealing with the individual patient case
- Tactical: managing groups of individual cases, e.g. the patient caseload of an OOhrs Patient Care Centre
- Strategic: managing the service / sub-service as a whole, including audit, clinical governance, sourcing and re-engineering.

Each of these when examined exhibits a cyclical nature (e.g. the cycle of care) and we have used a modelling technique (RIVA) which explicitly recognises the three levels identified. This approach has identified a number of key core process-related IT requirements, e.g.

Key process - assessment:

Key requirement – access to legacy data.

We anticipate that our further work will attract wider ownership from urgent care community, and help to inform the Design Build and Test of related IT solutions.

We welcome further input on this work.

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