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I declare that the work described in this dissertation
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DISSERTATION SUMMARY

Accurate and timely data is vital to any organisation for effective planning, decision-making and organisational efficiency. The increasing use of data from the Casemix coding department in hospital planning and budgeting also provides a strong financial incentive to ensure completeness and accuracy of coded data.

According to [King, 2003], 20% of an Irish hospitals budget is dependant on a hospitals Casemix data. In the case of St. James's Hospital 20% of Inpatient activity and 10% of Daycase activity is dependant on Casemix data. This puts in context the importance of top quality data from the coding department.

This thesis describes the development and implementation of an electronic tool to provide the staff of the Casemix Coding Department in St. James's Hospital with the skills required to continually improve the quality of their data through audit.

The tool is finally evaluated and the data resulting from this evaluation is analysed providing the conclusions to the thesis.

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ABBREVIATIONS

CD	Compact Disk
CMI	Casemix Index
DRG	Diagnostic Related Group
ESRI	Economic & Social Research Institute
GRP	Group Base Price
HIPE	Hospital In-patient Enquiry System
ICD	International Classification of Disease
ICD- 9-CM	International Classification of Diseases, 9th Revision-Clinical Modification
ICD-10-AM	International Classification of Diseases, 10th Revision-Australian Modification
ICT	Information and Communications Technology
IMS	Information Management Services
IT	Information Technology
MDC	Major Diagnostic Category
MRSA	Methicillin Resistant Staphylococcus Aureus
NCI	National Cancer Institute
NHS	National Health Service
NHSS	National Health Service Scotland
NPRS	National Perinatal Reporting Scheme
PAS	Patient Administration Scheme
RV	Relative Value
TQM	Total Quality Management
USB	Universal Serial Bus

1 INTRODUCTION

[Department of Health and Children, 2005] stated in the National Health Information Strategy that its primary aim is to recommend the necessary actions to rectify present deficiencies in health information systems and to put in place the frameworks to ensure the optimal development and utilisation of health information.

For health information to be beneficial it is necessary for it to be of a high quality.

This dissertation focuses on developing, implementing and evaluating an electronic learning tool to provide the staff of the Casemix Coding Department with the skills required to continually monitor and improve the quality of their data through audit.

Audit was chosen as the tool for quality improvement. Audit requires literature reviews to ascertain standards of best practice in a given discipline thus promoting a culture of continuous education and leading to evidence based practice. Audit provides a means for assessing and improving work standards and creating a culture of quality improvement in the clinical setting [Irish Medical Council, 2002].

1.1 WHAT IS CASEMIX

There are many definitions of Casemix. It involves grouping patients according to their diagnosis, procedures, age and length of stay so, as to allocate funding objectively. [Casemix Unit, 2005] defines it as the comparison of activity and costs between hospitals by measuring individual hospital output. Casemix is defined by [France, 2003] as a classification of treated patients according to diagnosis.

The Department of Health use hospital activity captured on the HIPE (Hospital In-patient Enquiry System) and hospital financial information from the specialty costing system to measure hospital performance relative to its peer hospital. [Department of Health and Children, 2004] states that it is fully accepted that the clinical workload of hospitals varies greatly and that Casemix is the attempt to categorise and quantify this

"mix" of cases by classifying patients into discrete classes or groups. These DRG's (Diagnosis Related Groups) share common clinical attributes and similar patterns of resource use. The development of DRG's provides an operational means of defining and measuring a hospital's case-mix complexity, and comparing it with other hospitals.

1.2 WHAT IS HIPE

HIPE was established in 1971. St. James's Hospital began coding in 1988, initially coders filled in forms using pen and paper and then posted them to the ESRI. In 1990 this process was computerised and in 1994 St James's Hospital became involved with Casemix.

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'The Hospital In-Patient Enquiry system is the principal source of national data on discharges from acute public hospitals in Ireland. The HIPE is a computer-based health information system designed to collect clinical and administrative data on deaths and discharges from the 62 largest hospitals in the county, this number includes 2 private hospitals. Since 1990, management of this system has been contracted by the department of health and children to The Economic and Social Research Institute where the HIPE & NPRS (National Perinatal Reporting Scheme) Unit is responsible for overseeing the collection, coding, input, quality, processing and reporting of data from participating hospitals.' [HIPE & NPRS Unit, 2002] The data collected by HIPE is shown in figure 1.

DATA ITEM	DESCRIPTION
Hospital Number	3 digit code allocated by ESRI
Chart Number	Up to 7 digits
Date of Admission	ddmmyyyy
Type of Admission	Priority of admission
Source of Admission	Where the patient was prior to admission
Date of Discharge	ddmmyyyy
Discharge codes	Identify the discharge destination
Date of Birth	Ddmmyyy
Infant Admission Weight	Patients < 1 year (Not applicable St. James's Hospital)
Sex code	Sex of Patient
Marital Status	Patients Marital Status
Medical Card Indicator	1 digit code indicating medical card holder
GMS Patient Number	Medical Card Number
Area of Residence	4 digit. Where patient would normally abide
Patient status on discharge	1- Public 2-Private
Day Case	Inpatient or daycase
Day ward indicator	Named day ward
ITU/ICU days	Identifies number of days on ICU/ITU/CCU/HDU/NITU
Admitting Consultant	Identifies admitting Consultant
Discharge Consultant	Identifies discharging consultant
Number of days private or semiprivate as applicable	Midnight Census used
Procedure dates	ddmmyyyy
Diagnosis Code	Alphanumeric with 1 principle diagnosis and as many as 19 secondary diagnosis
Procedure Codes	Alphanumeric with 1 principle procedure and as many as 19 secondary procedures

Figure 1 Data Collected by HIPE

[HIPE & NPRS Unit, 2005]

1.3 RATIONAL FOR AN ELECTRONIC TOOL

The Casemix Coding Department had towards the end of 2004, cleared its backlogs and was successfully coding 100% of charts. In the beginning to 2005 the Coding Department in conjunction with the I.T. (Information Technology) Department had made the decision to focus on data quality improvement. The departments were at this time commenced the process of implementing steps to improve the data quality in a formal structured manner. This is a necessary component of the hospitals application for Accreditation. The mission of the Irish Health Services Accreditation Board is to be a key driver for the continuous quality improvement of the Irish Health Service and one of the stated requirements for accreditation is to self assess the service provided on a regular basis and implementing improvements where identified [Irish Health Services Accreditation Board, 2005]. To achieve Accreditation status a healthcare organisation must demonstrate that it has a comprehensive quality system, which actively seeks to identify problems within the provision of care and rectify them. [Irish Health Services Accreditation Board, 2005].

The Departments also saw the necessity of taking the quality issues beyond the coding department, particularly to improve the quality of the chart data, and with particular interest in the discharge summary form. [The Economic and Social Research Institute, 2005] has said that "The importance of consistent complete documentation in the clinical record cannot be over emphasised. Without such documentation the application of all coding guidelines is a difficult, if not impossible task".

The Casemix Steering Group was formed to assess how best to approach the issue. This Group consists of four members drawn from the IT Department and the Casemix Coding Department. They meet on a monthly basis to discuss strategies to improve the quality and quantity of data coded by the Casemix Coding Department and to deal with any issues arising within the department that may inhibit performance.

Audit was the tool of choice for the Steering Group to improve the performance of the department. This was a new departure for the department and there was a lack of formal training in the area of audit. There was a clear need for a learning tool. There

were various reasons for choosing an electronic tool over a manual tool such as a book or a manual. The final decision to use the website was driven by its versatility and lack of dependence on a physical means of transportation such as a disk, key or network. There is an existing culture within the I.T. department of using the internet to present information. Much of the documentation within the department is available via the internet and any book or manual created would be required to be made available to users on either the intranet or the internet. Placing the elearning tool on the internet is also in line with the current plans within the I.T. Department to further develop the internet and the intranet for elearning purposes.

1.4 DISSERTATION OVERVIEW

This dissertation is presented in 7 parts namely St. James's Hospital and Casemix Coding, St. James's Hospital and Casemix Coding, Audit, St. James's Hospital and Data Quality, Instructional Design Process, Website Design Process, Data Collection and Conclusions and Recommendations.

1.4.1 ST. JAMES'S HOSPITAL AND CASEMIX CODING

This chapter provides an overview of the domain. It gives an overview of St. James's Hospital and the Casemix Coding Department and explains how the Coding Department operates and what its role is within St. James's Hospital. It also discusses the levels of coding measurement used within the department (ICD, DRG and MDC).

1.4.2 ST. JAMES'S HOSPITAL AND DATA QUALITY

This chapter gives an explanation of Data Quality, Total Quality Management and current initiatives to improve data quality within St. James's Hospital.

1.4.3 AUDIT

This chapter explains what audit is, discusses the benefits of undertaking audit, and describes the steps of the audit cycle. Audit is a broad topic and information provided in this dissertation is relevant to the Casemix Coding Department with a focus on improving data quality.

1.4.4 INSTRUCTIONAL DESIGN PROCESS

The instructional design chapter describes how the author assessed the needs of the department and the audience and selected teaching strategies and used these to develop course content for the elearning tool.

1.4.5 WEBSITE DESIGN PROCESS

This chapter explains how the website itself was designed. It goes into detail on the style and layout of the website pages and follows this with an evaluation of the website from a user point of view.

1.4.6 DATA COLLECTION AND ANALYSIS

The data collection chapter evaluates the tool as a learning devise. Users knowledge of audit, TQM (Total Quality Management), data quality and aspects of the Data Protection Act are evaluated prior to and after using the educational tool. This chapter also includes a description of the data collection process, how the data was analysed and the ethical considerations taken into account.

1.4.7 CONCLUSIONS AND RECOMMENDATIONS

The final chapter discusses the results of the data analyses and makes recommendations for the future of the website

2 ST. JAMES'S HOSPITAL AND CASEMIX CODING

2.1 ST. JAMES'S HOSPITAL

St. James's Hospital is the largest acute general hospital in the Republic of Ireland. It has been in existence since 1727 since a foundling hospital was opened on the site. Nowadays there are approximately 780 beds, and 3,500 staff and annual turnover is circa €250 m. A comprehensive range of diagnostic and treatment services, many with national or regional status are provided. There is considerable emphasis on day treatment.

The main Clinical and Clinical Services at the Hospital have been organised into 10 Clinical Directorates. These Directorates are the basic business blocks through which core services of the hospital are planned and delivered. [St. James's Hospital, 2005]

St. James's is also a major teaching hospital for Trinity College with a new teaching centre on campus, which was officially opened in 1994. This building incorporates the clinical departments of the medical school, the unit for dietetics and nutrition, the nursing school, the postgraduate centre and the library of the Faculty of Health Sciences. [Coakley D., 2005]

The corporate structure of St. James's Hospital is shown in figure 2. The I.T. Department known as the I.M.S. (Information Management Services) Department comes under the corporate division. The I.T. Department was established in 1992 and there are currently has a staff complement of 43 and also has 6 staff from other departments working on projects as domain experts. The I.C.T. framework for the department is outlined in figure 3 and as can be seen from the diagram the Casemix Coding Department comes under the umbrella of the I.M.S. Department.

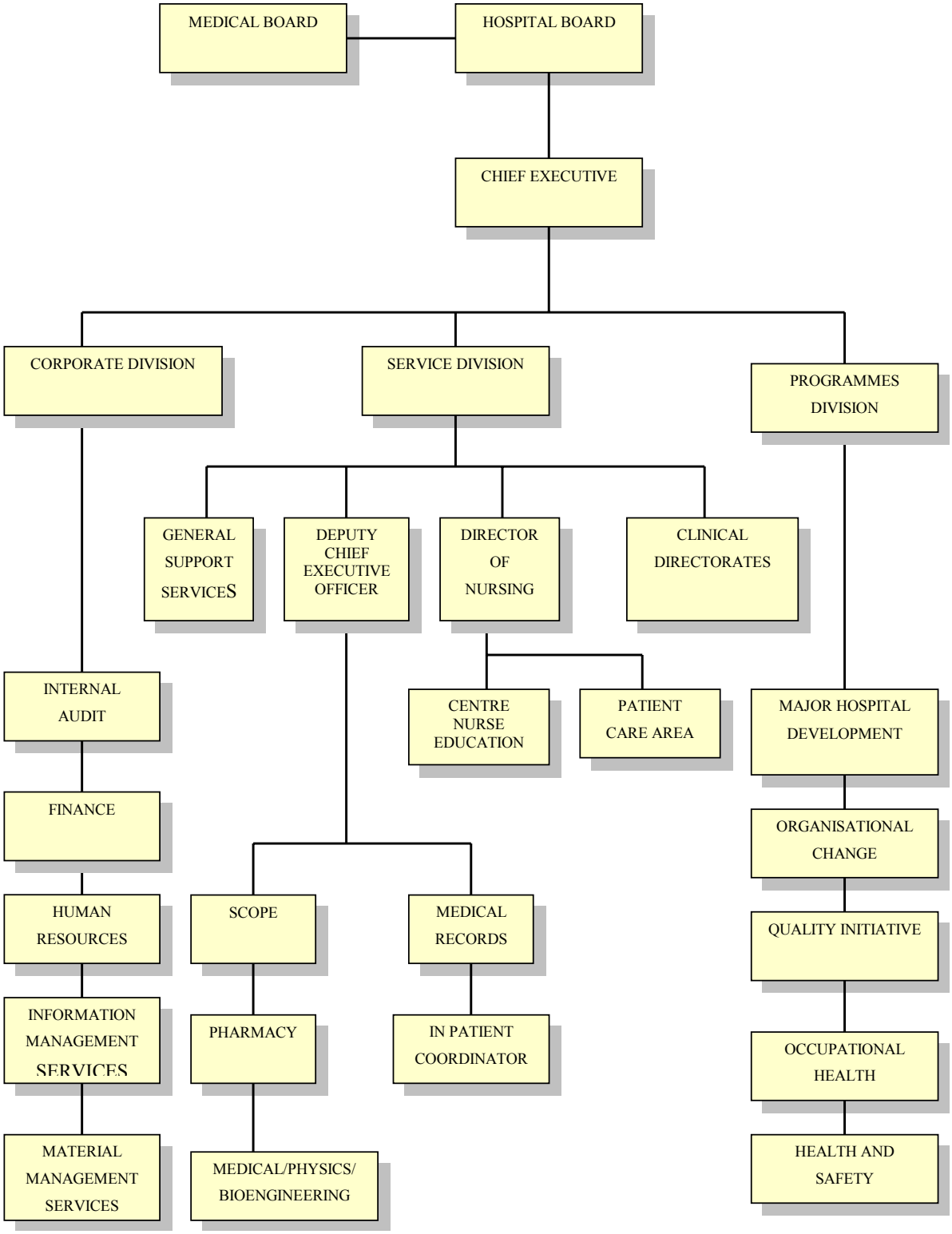

Figure 2 St. James's Hospital Structure

[adapted from St. James's Hospital Website, 2005]

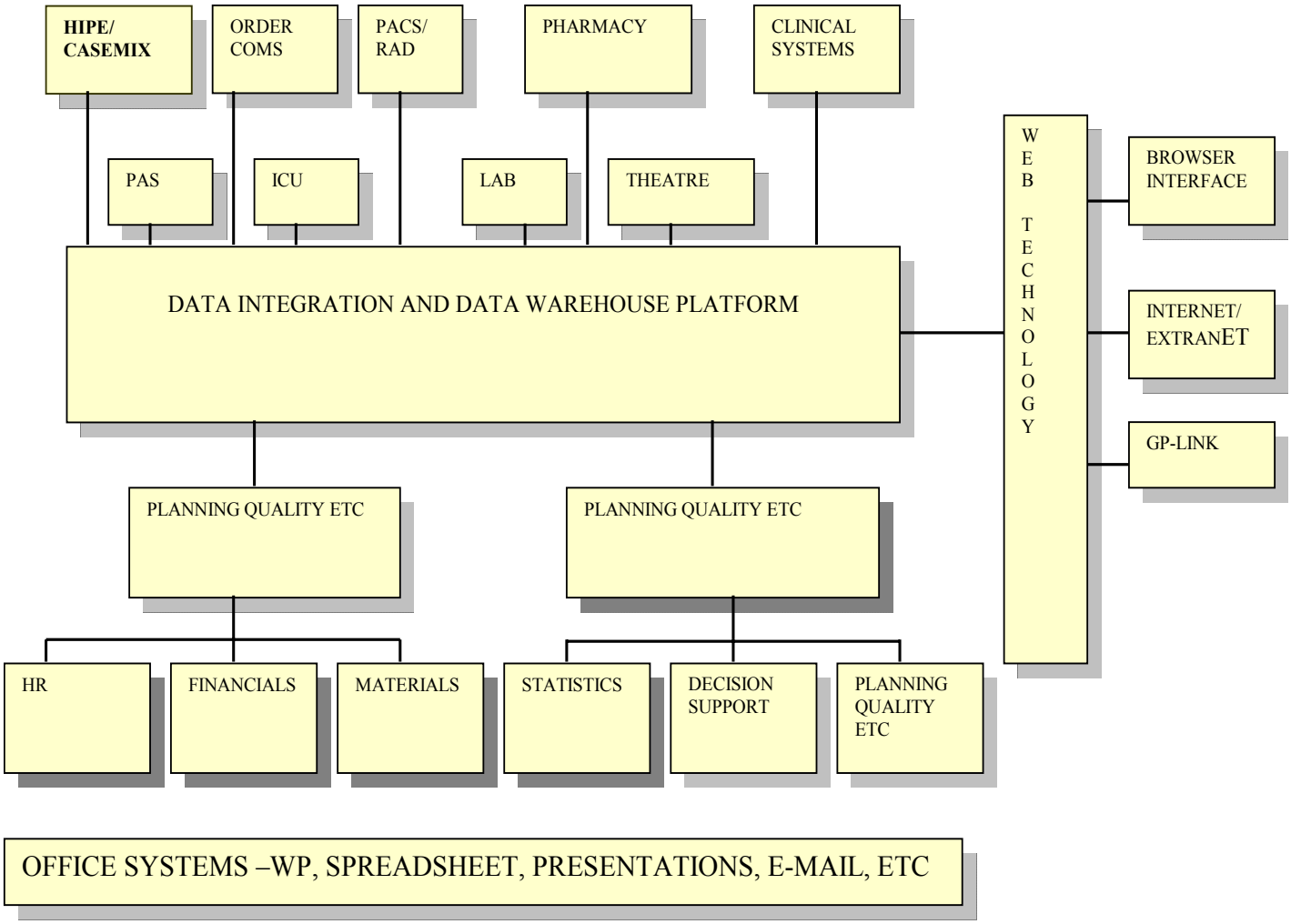

Figure 3 ICT Framework for St. James's Hospital

[adapted from Information Management Services, 2003]

2.2 CASEMIX CODING DEPARTMENT

The Coding Department has been in existence since 1988 and has been involved with Casemix since 1994. The structures of coding departments vary throughout the country with some departments being part of finance, some under medical records and more as part of the IT department. Currently the staff assigned to St. James's Casemix Coding Department consists of 1 co-ordinator, 6 coders, 1 part-time nurse and a part time database administrator. There is no single recommendation for staffing levels for

Casemix departments and staffing numbers and skill mixes vary from hospital to hospital.

The Casemix Coding Department is responsible for clinical coding of both inpatients and daycase discharges within St. James's Hospital. The department coded approximately 23,800 inpatient and 32,700 daycase charts in 2004. The Casemix Coding Department currently codes 100% of patient episodes. The department aims to code all episodes within one day of discharge, the majority of episodes are at present coded within 4 weeks of discharge.

2.3 HOW DOES CODING WORK IN ST. JAMES'S HOSPITAL

Due to the extensive and specialised nature of the coding involved each coder is assigned to directorates, this enables the coder to liase closely with the clinical multi-disciplinary teams and the business managers. The ESRI (Economic & Social Research Institute) recommends that each coder codes 7500 charts per year. The workload breakdown for coders is shown in figure 4 and the specialties within each directorate are shown in figure 5.

CODER	WORKLOAD
Coder 1	Hope
Coder 2	Crest, Model, Guide
Coder 3	Gems apart from surgery
Coder 4	Sams and Gems(Surgery)
Coder 5	Trauma
Coder 6	The most experienced coder looks after all backlogs, difficult charts, sick leave and any other work that does not fit into the first five categories

Figure 4 Clinical Coder Workload

DIRECTORATE	SPECIALTIES
CREST	Cardiology, respiratory medicine, cardiothoracic surgery, palliative care, pharmacology and therapeutics & vascular surgery.
DIAGIM	Diagnostic Imaging (X-Ray)
EMERGENCY	Emergency Department, Emergency Observation Ward and Chest Pain Assessment Unit.
GEMS	Gastro Intestinal Medicine and Surgery, General Medicine including Hepatology, Renal Medicine, Urology, General Surgery and Immunology.
HOPE	Haematology, Medical and Radiation Oncology, National Centre for Adult Bone Marrow Transplantation and the National Centre for Hereditary Coagulation Disorders.
LABMED	Histopathology, Haematology (including Molecular Diagnostics and Blood Transfusion), Microbiology (including the MRSA and TB reference Laboratories), Immunology and Biochemistry including Endocrinology.
MEDEL	Medicine for the Elderly
ORIAN	Operating Rooms, General Intensive Care Unit, High Dependency Unit, Day Surgical Unit, Laser Unit, Endovascular Unit, Sterile Supplies Unit & Anaesthetics.
TRAUMA	Plastic & Reconstructive Surgery, The Burns Unit, Maxillofacial Surgery, Orthodontic and Cleft Unit and Orthopaedic Surgery.
SAMS	Dermatolgy, Endocrinology, Genito-Urinary Medicine and Infectious Diseases (GUIDE), Gynaecology, Neurology, Opthalmology, Rheumatology, Clinical Neurophysiology and ENT.

Figure 5 Directorates and their Specialties

A trolley containing the charts of discharged patients is brought to the Casemix Coding Department. A coder spends 10 minutes coding an average chart and any chart taking longer than 10 minutes or providing difficulties is put aside for the most

experienced coder. This coder's job is to deal with any difficult or unusual charts, any backlogs and to cover sick leave. (see figure 4)

Coded charts are then placed back on the trolley for return to the chart room. Though all charts are supposed to come directly to the Coding Department the reality is that many of them do not. Much of the coders time is spent following up these outstanding charts. Coders duties also include generating reports for business managers and answering any queries that the ESRI might have regarding coded data.

Data for coding is gathered in accordance with the HIPE Data Collection Process, this is an eight-step process beginning with the discharge of the patient from hospital see (figure 6). The physician completes the discharge summary following discharge of the patient. [HIPE & NPRS Unit, 2002] states that the source document for coding for HIPE System is the medical record or chart, which is reviewed in full, therefore the entire chart and not just the discharge summary form is sent to the coding department.

The charts are then divided up among the coders according to directorate. The required data is extracted from the discharge summary form and the episode history is read to check for omissions or discrepancies. The coder extracts the required data and inputs it onto the HIPE System. Further data such as name, address, date of birth, admission and discharge dates and length of stay is downloaded from the PAS (Patient Administration System) onto HIPE (Hospital In-Patient Enquiry) System. There is a monthly data export to ESRI and this data is entered on to the HIPE National Database for local and international reporting.

In January of 2005 the Coding Department in St. James's Hospital began coding in ICD-10-AM (see chapter 2.4.3). Prior to this coders coded in accordance with ICD-9-CM (see chapter 2.4.2). This changeover was expected to cause major backlogs of charts due to the steep learning curve involved in the changeover. This did not however occur due to a good attitude within the department and adequate preparation in the form of staff training prior to the commencement date.

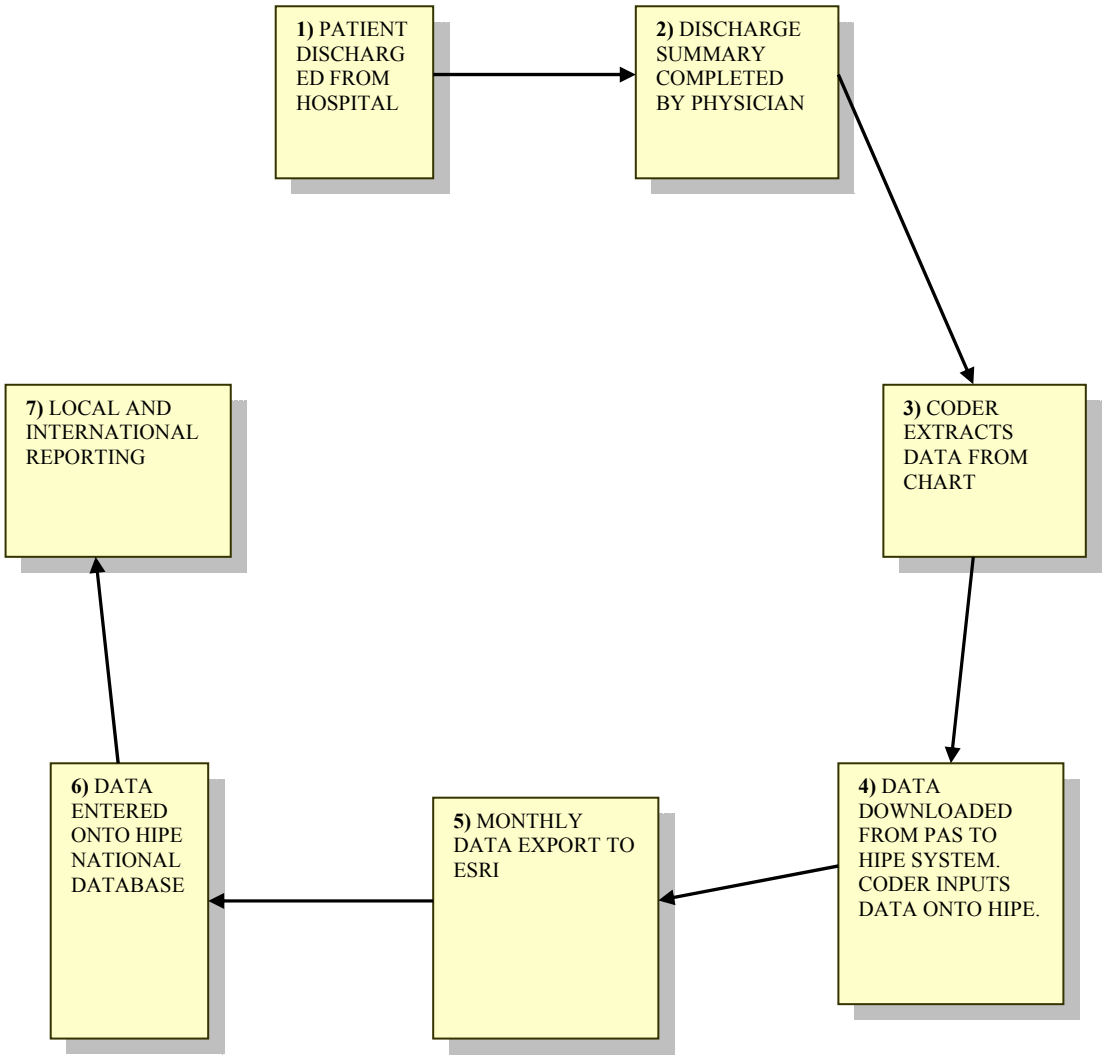

Figure 6 HIPE Data Collection Process

[adapted from HIPE & NPRS Unit, 2004]

2.4 CODING CLASSIFICATION

According to [King P., 2003] there are three main levels of classification or category in which patients and their conditions can be grouped. Firstly a patient's diagnoses and procedures can be identified by associating the relevant ICD (International Classification of Disease) code. This can then be further consolidated by grouping the ICD information into a DRG (Diagnostic Related Group) code and finally to the MDC (Major Diagnostic Category) which is a more general breakdown.

2.4.1 ICD

ICD is the International Classification of Diseases published annually by the World Health Organisation for the classification of morbidity and mortality information for statistical purposes- this assists health organisations world-wide, to speak the same language [Casemix Unit, Department of Health and Children, 2005. Various modifications of ICD are used for casemix coding.

2.4.2 ICD-9-CM

ICD-9-CM is the clinical modification of the International Classification of Diseases. *"*ICD-9-CM diagnostic codes are organised within a framework of 3-digit codes 001-999, some of which are further sub-divided into 4th and 5th digit codes to provide more detailed clinical information." [HIPE & NPRS Unit, 2002]

2.4.3 ICD-10-AM

ICD-10-AM is the Australian Modification of the tenth version of the International Classification of Disease. ICD-10 is currently the most comprehensive statistical classification of diseases and related health problems in the world [HIPE & NPRS Unit, 2004]. It has almost twice the categories of the previous ICD-9 resulting in a more thorough and in-depth coding process than ICD-9-CM. Its structure is alphanumeric with the diagnostic codes organised within a framework of 1 principle procedure and 19 secondary procedures and 1 principle diagnosis and 19 secondary diagnoses.

Figure 7 shows a comparison of ICD-10-AM codes and ICD-9-CM codes. In the first example neoplasm's categorised according to ICD-10_AM have one hundred and thirty six different categories from C00-D48, Neoplasm's categorised according to

ICD-9-CM have 92 different categories from (140-239) thus demonstrating the more thorough and in-depth coding offered by ICD-10-AM.

	ICD-10 Code ranges	**Number of 3-digit categories**	**ICD-9 Code ranges**	**Number of 3-digit categories**
I	Neoplasms (C00-D48)	136	Neoplasms (140-239)	92
II	Disease of the circulatory system (I00-I99)	77	Diseases of the circulatory system (390-459)	58
III	Diseases of the respiratory System (J100-J99)	63	Diseases of the respiratory system (390-459)	50
IV	Diseases of the digestive system (K00-K93)	71	Diseases Of the digestive system (520-579)	48
V	Diseases of the skin and subcutaneous tissue (L00-L99)	72	Diseases of the digestive system (520-579)	26
VI	Diseases of he genitourinary(N00-N99)	82	Diseases of the genitourinary system (580-629)	47

Figure 7 Comparisons of ICD-10 and ICD-9 at level of 3-Digit

[Irish Medical Council, 2002]

2.4.3.1 DESCRIPTION OF A DIAGNOSIS

According to the [National Health Data Committee, 2003] the principle diagnosis is defined as "The diagnosis established after study to be chiefly responsible for occasioning the patients episode of stay in hospital (or attendance at the health care facility)." [NCCHD ICD-10-AM, 2004] defines additional diagnosis as "A condition

or complaint either coexisting with the principal diagnosis or arising during the episode of care or attendance at a health care facility". Figure 8 shows an example of a patient's condition. Though three diagnoses are recorded – renal insufficiency, coronary artery disease and myocardial infarction the latter is the primary diagnosis as this is the event, which occasioned the patients episode in hospital the other two being secondary diagnosis as they co-exist with the episode.

Diagnoses:
Renal insufficiency
Coronary artery disease
Myocardial infarction

History of present illness:
Patient experienced severe chest pain radiating down his left arm at home and was transported to hospital where he was admitted to the coronary care unit.

Figure 8 Example of a Primary Diagnosis

2.4.3.2 DESCRIPTION OF A PROCEDURE

All of the information in this section regarding a procedure was provided by [National Health Data Committee, 2003] and is not the authors own work.
A procedure is defined by the as a clinical intervention that:

- Is surgical in nature; and/or
- Carries a procedural risk; and/or
- Carries an anesthetic risk; and/or
- Requires specialized training; and/or
- Requires special facilities or equipment only available in an acute setting

The order of codes should be determined using the following hierarchy:

- Procedure performed for treatment of the principal diagnosis
- Procedure performed for treatment of an additional diagnosis
- Diagnostic/exploratory procedure related to the principal diagnosis
- Diagnostic/exploratory procedure related to an additional diagnosis for the episode of care

In figure 9 Diathermy of cervix is coded first because it is the procedure which treated the chronic cervicitis. All significant procedures undertaken from the time of admission to the time of discharge should be coded. This includes diagnostic and therapeutic procedures.

Example of a procedure

Principal diagnosis:	Chronic cervicitis
Additional diagnosis:	Human papilloma virus(HPV)
	Menorrhagia
Procedures:	Dilation and curratage, diathermy and biopsy cervix

Figure 9 Example of a Procedure

The definition of a significant procedure is one that either:

- Is surgical in nature
- Carries a procedural risk
- Carries an anaesthetic risk
- Requires special facilities or equipment or specialised training

The difference between surgical procedures and non-surgical procedures is becoming difficult to define, particularly with the introduction of endoscopic and radiological intervention. For example, fine needle aspiration, percutaneous procedures, cardiological percutaneous angioplasties and endoscopic therapeutic procedures together with other treatments often do not require large incisions and may not be performed in the traditional operating room. It is extremely important that all significant procedures including traditional 'non-surgical' procedures are coded.

Procedures which are surgical in nature should always be coded. For example, 'cholecystectomy' or 'coronary artery bypass'.
Procedures which are individual components of another procedure should not be coded. See figure 10.

Procedures which are individual components of another procedure

- Laparotomy
- Bone graft during craniofacial reconstruction
- Suture of abdominal incision after surgery

[National Centre for Classification in Health, 2004]

Figure 10 Procedures, which are individual components of another procedure

2.4.4 DIAGNOSTIC RELATED GROUPS AND MAJOR DIAGNOSTIC CATEGORIES

Following coding of diagnosis and procedures they are categorised according to DRG (Diagnostic Related Group) and further categorised according to MDC (Major Diagnostic Category). [Manitoba Centre for Health Policy and Evaluation, 1997] refers to DRG as a patient classification system that provides a way of describing the types of patients a hospital treats (its case mix) and states that patients within each category are similar clinically in terms of resource use. This is the information typically used by the finance departments when allocating resources.

Figure 11 features MDC 11.4 (Diseases and disorders of the kidney and urinary tract/medical partition). It demonstrates how a medical patient admitted with a disorder of the kidney and urinary tract would be categorised. If the patient has a kidney or urinary tract neoplasm with catastrophic or severe complications they fall into DRG category L62A. If the patient however presents with urinary stones & obstruction they fall into DRG category L66Z. Each DRG is costed accordingly. If we take a look at the options for Kidney & Urinary tract infections we can see how the age of a patient can affect the DRG categorisation. A patient over 69 years of age

in this case will get a higher DRG than one of 69 or under and the hospital will receive greater funding for this patient. In this example a patient over 69 years of age, without severe complications falls into the same category as a patient of 69 and under with severe complications.

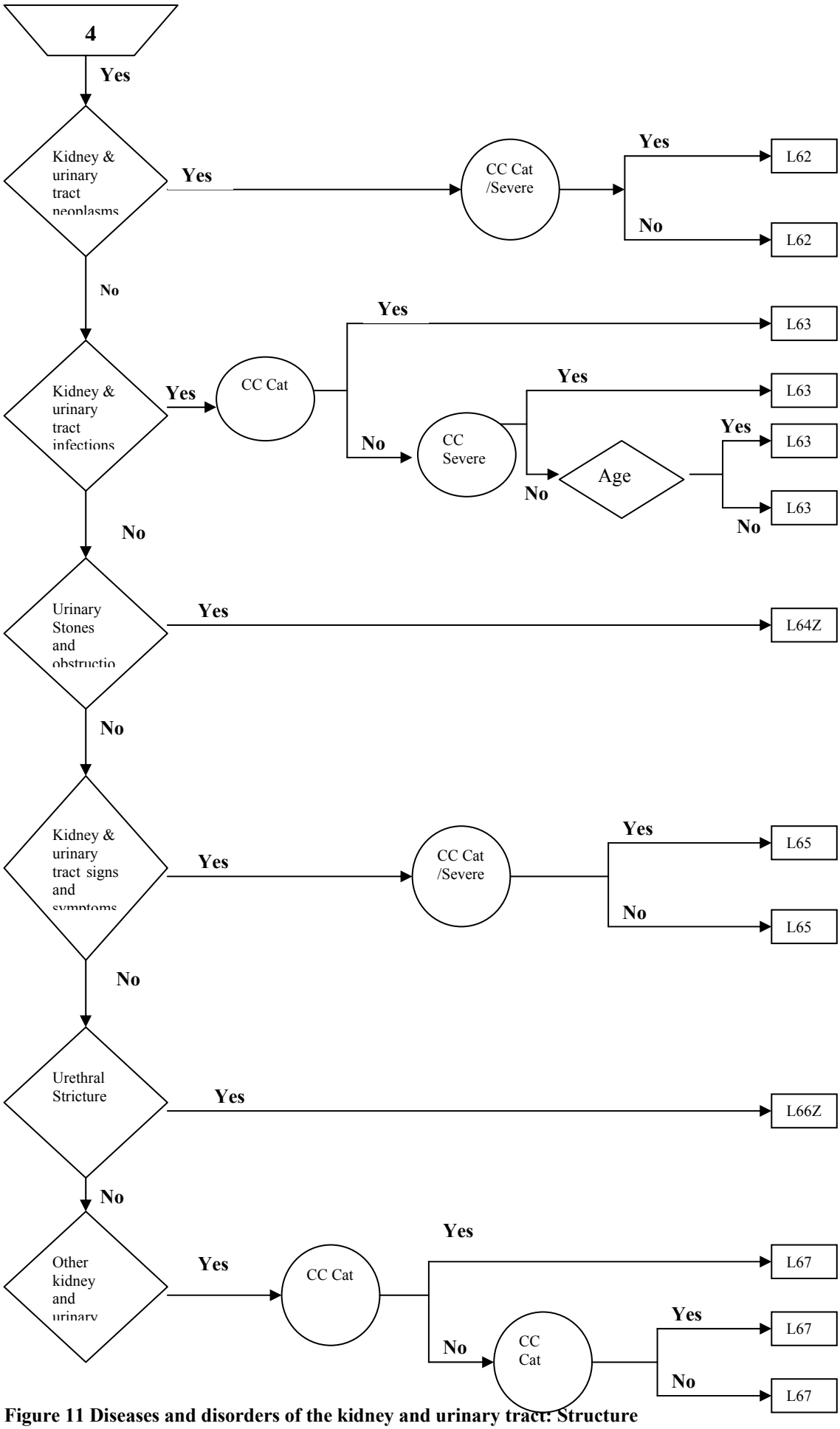

Figure 11 Diseases and disorders of the kidney and urinary tract: Structure

2.4.5 CASEMIX-ADJUSTED BUDGETS

The Department of Health uses a Casemix Budget Model, a statistical model based on hospital financial and activity data, to calculate a casemix-based adjustment to hospital budgets based on:

- RV's (Relative Values), which are a measure of the average cost of treatment of all patients.
- CMI (Case Mix Index), which is a hospital-specific, measure, or index, of the average costliness/complexity of each hospital relative to the other hospitals in the system.
- GRP (Group Base Price), which is the average cost per case in all hospitals in a selected group (St. James's is in a group with eight other major acute teaching hospitals)

These form the basis for calculation of an adjustment to the hospital annual allocation. Figure 12 shows an example of how two patients admitted with a primary diagnosis of Viral Hepatitis, a primary procedure of closed liver biopsy and a secondary procedure of IV fluids received a different RV and a difference of €1526 in monetary value due to the inclusion or exclusion of the secondary diagnosis.

PDX: Viral Hepatitis **SDX:** Alkalosis **P Proc:** Closed Liver Biopsy **O Proc:** IV Fluids **DRG : 205**- Disorders of Liver except Malignancy, Cirrhosis or Alcoholic Hepatitis with CC **RV:** 1.38 **Approx. Monetary Value:** €2476.00	**PDX:** Viral Hepatitis **SDX:** None **P Proc:** Closed Liver Biopsy **O Proc:** IV Fluids **DRG : 206**- Disorders of Liver except Malignancy, Cirrhosis or Alcoholic Hepatitis without CC **RV:** 0.58 **Approx. Monetary Value:** €950.00

Figure 12 Gastroenterology example with/without complications and/or co morbidities

3 ST. JAMES'S HOSPITAL AND DATA QUALITY

The need to demonstrate that work meets acceptable standards has become clear. It is now necessary for staff to show that they are performing well and providing an acceptable standard of work. In the case of the Casemix Coding Department this translates as high quality data.

St. James's Hospital promotes a continuous quality improvement philosophy and also wishes to recognise the hard work, professionalism and dedication of its staff.
Clinical audit is a performance indicator and is part of St. James's quality paradigm.

The author believes that TQM (Total Quality Management) through audit is the correct approach to improving the performance and therefore the data quality of the Casemix Coding Department and ensuring that this performance is recognised.

3.1 DATA QUALITY

Much has been published on the topic of data quality, what is it and how to define it.
There are five dimensions to data quality according to [Canadian Institute for Health Information, 2002], accuracy, comparability, timeliness, usability and relevance.
[Canadian Institute for Health Information, 2002] explains these dimensions as follows:

- Accuracy refers to how well information within a database reflects what was supposed to be collected.
- Comparability refers to the extent to which a database can be properly integrated within the entire health information system.
- Timeliness examines whether the data is available for user needs within a reasonable time period.
- Usability describes how easily the storage and documentation of data allows one to make intelligent use of the data.
- Relevance incorporates all of the above dimensions to some degree, but focuses specifically on value and adaptability.

3.2 TOTAL QUALITY MANAGEMENT

TQM involves the entire organisation working together to improve quality.
The emphasis on quality improvement needs to expand beyond the confines of the Casemix Department itself and include all those involved in handling relevant patient data within the hospital. [Tiernan S. D., Morley M. J., Foley E. 2002] states that an important feature of the TQM approach is that the entire organisation is involved in the search for quality improvement and nothing is regarded as untouchable. W. Deming one of the founding members of the quality movement believed that by improving quality, costs would decrease due to less reworking, fewer mistakes, fewer delays and better all round use of time. [Tiernan S. D., Morley M. J., Foley E. 2002].

To completely and accurately code all the casemix data. Nurses and doctors must record information correctly, ward clerks and medical secretaries must send charts to the department, porters must transport charts to the department, the staff of the chartroom must assist in the provision of charts, business managers must assist with the provision of missing information, the IT department provides technical backup and statistical reports, the casemix coders must code all relevant diagnosis and procedures.

It is now clear that the endeavour to improve data quality within the Casemix Coding Department through audit, the staff of the department must look not only at their own department but beyond at many other departments.

3.3 DATA QUALITY STANDARDS GROUP

There is a Data Quality Standards group in existence in St. James's hospital.
This group meets every two months to discuss data quality issues.

The aims of this group are as follows

- Identify and review selected minimum datasets, upon which key hospital management information metrics depend.
- Establish the most effective procedures for capturing relevant data and ensuring quality and accuracy.
- Draw up data standards and definitions where appropriate, including on-line masterfile tables, user guidelines, training requirements, supervision, and central change control.
- Set up appropriate risk measurements and performance indicators to report on level of compliance with acceptable targets. (e.g. number of patients without current GP; wrong public/private status, etc).
- To facilitate the implementation and bedding down of new procedures as quickly as is practicable.

3.4 INFORMATION AND TRAINING

St. James's Hospital as part of its commitment to data quality provides information booklets and training to its staff.

The Data Quality Standards Group provides information booklets that have been drawn up for staff of the hospital. These booklets are intended to show staff how to use hospital information systems, how to enter the correct information to the systems and who to contact in the event of computer related problems. There is a specific booklet related to discharge summary forms, this booklet is provided for any doctor who will be filling out a discharge summary form to make certain that they understand the importance of ensuring that the discharge summary forms are complete

and accurate. This booklet explains to the medical staff that the discharge summary form not only serves as a discharge letter for the G.P. but also how it is used for Casemix. The booklet gives a brief overview of Casemix and how it is used in hospital budgets.

Information manuals are provided by the ESRI to the staff of the Casemix Coding Department to ensure that they know how to code correctly, accurately and completely. Training days are also provided by the ESRI and by the Casemix Co-ordinator to ensure data quality is kept high.

3.5 DATA PROTECTION AND THE CASEMIX CODING DEPARTMENT

The staff of the Casemix Coding Department must maintain complete confidentiality with regard to data at all times. All requests for data go through the Casemix Co-ordinator, who assesses whether the request complies with the Data Protection Act of 1998 prior to divulging the information.

The Data Protection Act of 1998 outlines 8 rules (see appendix 1) that the staff of the Casemix Coding Department must be aware of prior to gathering data for audit.

4 AUDIT

4.1 WHAT IS AUDIT?

Audit involves examining a part of a work practice, comparing it against an agreed standard then making the necessary changes to work practice to achieve the agreed standard. It is an ongoing process defined by [C.N.S.S.L, 2005] as the independent examination of records and activities to ensure compliance with established controls, policy and operational procedures, and the recommendation of any indicated changes in controls, policy or procedures.

[Issix Sigma, 2005] describes audit as a timely process or system of inspection to ensure that specifications conform to documented quality standards. [Issix Sigma, 2005] goes on to say that audit brings out discrepancies between the documented standards and the standards followed and may also show how well or how badly the documented standards support the processes currently followed. [Issix Sigma, 2005] feels that corrective, preventive and improvement actions should be undertaken to mitigate the gap(s) between what is said (documented), what is done and what is required to comply with the appropriate quality standard.

The NHSS (National Health Service of Scotland) sees the aim of audit as identifying how closely local practice relates to best practice as described by standards, clinical guidelines or other sources of best practice. The NHSS feels that in some cases, there is not enough evidence or research from which to develop standards and that in these cases, it is quite acceptable to develop standards based on the opinion of a group of "expert" clinicians or from undertaking a baseline survey in order to determine current practice. [National Health Service Scotland, 2005]

4.2 WHY UNDERTAKE AN AUDIT?

There are many reasons to undertake an audit.

- To improve the standard and quality of work
- To increase knowledge in the field
- To find solutions to existing problems
- To increase communication within the department
- To highlight hard work
- To create a culture of quality enhancement

According to [Irish Medical Council, 2002] audit is a means of assessing and improving work standards and creating a culture of quality improvement in the clinical setting.

[National Health Service Scotland, 2005] maintains that education is enhanced by undertaking audit as it promotes discussion amongst colleagues.

Following the publication of the Government Health Strategy –Quality and Fairness there has been a growing emphasis on improving the quality and effectiveness of healthcare in this country. [Department of Health and Children, 2001]

The primary purpose of the Irish Health Services Accreditation Board is to establish, continuously review and operate an accreditation scheme for the Irish health system within a quality improvement framework.

4.3 AUDIT AND THE CASEMIX CODING DEPARTMENT

Audit is a tool for improving the data quality within the Casemix Coding Department What cannot be measured cannot be improved. [Casemix Unit, 2005]. In order to assess casemix data quality for the five dimensions of accuracy, comparability,

timeliness, usability and relevance, it must first be measured then strategies developed to improve data quality where necessary. Audit is a tool of choice within the Casemix Coding Department for this.

4.4 THE AUDIT CYCLE

The fundamentals of the audit cycle include an iterative cycle of assessment improvement and re-assessment.

Figure 13 The Audit Cycle

[The Office for Health Management, 2005]

This is a continuous process of improving work practice. Each cycle of audit, recommendations and practice change culminating in a higher standard of practice. It should be noted that a single audit cycle may not produce an improvement in work practice and therefore a spiral description may be more reflective of real life audit than the audit cycle above as it portrays a more iterative picture of audit than the audit cycle.

4.4.1 THE STEPS OF THE AUDIT CYCLE

4.4.1.1 SELECT TOPIC

Care should be taken to choose a relevant topic. It must be seen to be of value to those involved in the audit. It must also be an area that can be improved upon by going through the audit cycle. There is a clear distinction between audit and research. The object of research is to discover something new whereas the object of audit is to compare work in practice with existing best practice in the field and then put a plan in place to achieve the existing best practice. According to [Irish Medical Journal, 2005] priorities for audit should be identified. The focus may be on issues of special concern, or high volume, high risk, high cost areas, especially where there may be wide variations in practice.

Audits of clinical coding and data quality within the NHS [NHSIA, 2000] have shown major areas of concern with the integrity, accuracy, completeness and timeliness of

- Medical and surgical documentation
- Patient information on PAS
- Data entered on to system by clinical coders.

. Different coding departments will have their own local issues of concern, which will provide suitable topics for audit.

4.4.1.2 DEFINE OBJECTIVES

Once the topic has been chosen the objectives of the exercise must be defined. What is the objective of the audit? What is the desired achievement?

Examples of objectives would be

- To ensure that all eligible patients entered on to the hospital PAS are subsequently entered onto the HIPE System.
- To shorten the interval between discharge from hospital and discharge summary being coded.
- To improve quality of data captured.

- To increase the volume of charts coded each day.
- To change the chart journey thereby decrease the volume of charts bypassing the coding department post discharge.

4.4.1.3 SET STANDARDS

Setting standards necessitates a comprehensive review of the latest relevant literature. There is an international awareness of the importance of data completeness; quality and consistency. Many journals, websites and books have been dedicated to the topic. In the event of published standards being insufficient or unachievable in a particular instance, it may be necessary for the department to develop their own. According to [Casemix Unit, 2005] explicit quality indicators of care are selected in advance in criterion-based audit.

Standards must be achievable, as consistent failure will cause the participants to become discontented and disillusioned with the audit process. On the other hand it is pointless to set standards too low as this will not achieve the desired quality improvement and will render the audit process meaningless. The aim is to constantly challenge and improve performance.

4.4.1.4 SELECT MEASURES

The measures are the data required for audit. In the case of the Casemix Coding Department and depending on the audit in question this might be diagnosis, procedures or demographics. It may be a list of patients on the PAS system for comparison against those on the HIPE system. Each data element chosen must be clearly relevant to the objectives and standards for the audit.

4.4.1.5 COLLECT THE DATA

Data collected must be relevant to the topic. It must be clear, concise and accurate. Provided that the data collection forms are well laid out, clear and unambiguous, all members of the casemix coding team can be involved in data collection regardless of experience in the field. A pilot of the data collection method will quickly indicate

shortfalls in the forms. Audit can and has been successfully achieved using pen and paper however all data collected for audit in the Casemix Coding Department must be stored electronically in accordance with St. James's Hospital policy on data warehousing. This is to ensure that all data is readily available for re-use.

4.4.1.6 REPORT

Compare the data with the standards. Work out possible reasons for discrepancies. Look for consistencies in the discrepancies. For example in one of the original audits of the Casemix Coding Department a large proportion of the uncoded charts were found to be RIP patients. Further investigation found that these charts did not follow the usual path through the hospital and missed the Casemix Coding Department. The problem was easily rectified and the charts brought back into the loop. When reporting the author recommends that time is taken to stress positive findings as well as the need for improvements as the value of keeping staff enthusiastic and motivated cannot be underestimated.

4.4.1.7 CHANGE

The difficulties associated with change have been recognised as far back as the sixteenth century when Machiavelli (1496-1527) is quoted as saying that "There is nothing more difficult to take in hand, more perilous to conduct or more uncertain in its success than to initiate a new order of things. For the reformer has enemies in all those who profit from the old order and only lukewarm support of those who will profit from the new."

Indeed change is often the most difficult part of the audit. When the measures have been reported the audit team will sit down and identify the required change s and make the necessary recommendations. Decisions will be made on how to introduce and monitor the changes. The actions for change need to be practical and clearly defined. In order to change and improve performance [Adapted from Tierney et al, 2002] feels that the modern employee to think laterally or 'outside the box' and that this involves opening the mind to new possibilities and eventualities, which would previously have been incomprehensible.

Resistance to change is almost inevitable, as a hospital by its very nature requires organisational stability. Education and communication are key factors in overcoming this. The reasons and the benefits of the proposed changes must be made clear to those affected by the change. A supportive environment must be provided so that those affected are clearly encouraged to voice any concerns that they may have. These concerns must be taken seriously and all attempts made to allay them through a process of education and communication.

A full commitment to change is required. To successfully change work practice the following steps must be taken.

- Establish action required
- Place person or persons in charge of change
- Decide date of commencement
- Choose method of monitoring change
- Decide date for re audit to assess the impact of the change.

4.4.1.8 RE-AUDIT

Re-audit is the final step in the audit cycle. This is necessary to establish whether the changes have resulted in an improvement in work practice. It is possible that the audit cycle has resulted in little or no improvement. The cycle must continue until the required standards are met. If improvements are obvious the stakeholders will be motivated to continue but if none are apparent apathy or discontent with the audit process may set in. It is the role of the audit leader to motivate, lead and to remain enthusiastic.

5 INSTRUCTIONAL DESIGN PROCESS

The elearning tool was developed according to the following model for instructional design process. See figure 14. [Grogan, 2004] found that most models of the instructional design process included similar design and development stages and that this was reflected in the work of [Flagg, 1990], [Gagne, Briggs and Wager, 1992], [Heinich, Molenda, Russell and Smaldino, 1992,] [Leshin, Reigeluth, and Pollock, 1992]. The author on researching this work concurs with those conclusions.

Design: assessing needs for institution, assessing needs of audience, setting goals and objectives for integrating curriculum;
Development: selecting teaching strategies, outlining media, developing course content, designing student interaction:
Implementation: developing evaluation strategy, testing user experience, revision:
Evaluation: evaluating progress (formative) and evaluating results (summative)

Figure 14 Instructional Design and Development Stages

[Grogan, 2004]

5.1 DESIGN

5.1.1 ASSESSING THE NEEDS FOR THE DEPARTMENT AND AUDIENCE

An educational needs assessment was performed to assess the needs of the institution, to assess the needs of the audience and to set the goals and objectives for the elearning tool.

[Grant, 2002] Maintains that learning is more likely to change in practice when needs assessment has been conducted and when the education is linked to practice.

The tool chosen to assess needs in this instance was interview. Initially the author planned on creating a questionnaire to assess the user's knowledge but this was not required as the interviews revealed the user group and all potential users, as a condition of employment in the Casemix Coding Department would be in possession of the required technical skills to use an elearning tool. As the tool would be targeted at both new and existing employees of the department, it would be necessary to include content that would be beneficial to those with no prior knowledge of the content, and also beneficial to those will be using it for revision purposes.

A series of interviews the Casemix Steering Group established that all members of the Casemix Coding Department and those members of the IT department who dealt with the Casemix database needed as a minimum to have an understanding of the fundamentals of data quality, an understanding of audit and the audit process. The group also felt that an awareness of their responsibilities with regard to the Data Protection Act was a necessary requirement for those intending to perform audits. The group stated this as a desired level of knowledge for all members of the Casemix Coding Department and associated members within the IMS Department but felt that there was a gap between the desired and existing level of knowledge. This elearning tool was developed to bridge that gap.

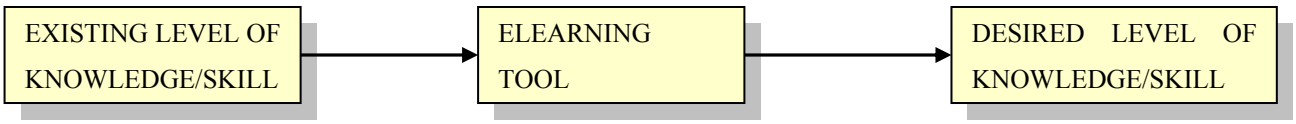

Figure 15 Knowledge Bridge

5.1.2 INTERVIEWS

The section of the dissertation describes the interviews that established the needs of the users and the department. This needs assessment consisted of five interviews with key people within the Casemix Coding Department, The Manager of the Casemix Coding Department, The Casemix Clinical Nurse Specialist, The Website Administrator and the Statistics Manager who is a member of Data Quality Standards

Group within the hospital. The needs outlined as a result of these interviews formed the basis for the development of the elearning tool.

Meeting Number 1 – 18th May 2005

Attendees:

- Manager of Casemix Coding Department
- The Author

Discussed:

In the first meeting with the Manager of the Casemix Coding Department we discussed the project proposal to develop a tool to teach the staff of the Casemix Coding Department how to audit their department. The manager gave the author a comprehensive overview of the Casemix Coding Department and the Clinical Coding Process. The manager also explained the duties of each member of the Casemix Coding Department. In this interview information was gathered regarding everything that the Casemix Coding Department does not only regarding data entry but chart collection and liasing with various members of the multidisciplinary teams.

The author was given relevant publications and training manuals. What was gained from this interview was not only information about the clinical coding process within the department but also information regarding the broader picture of how the Casemix Coding Department relates to the rest of the hospital. With this information it was possible to start looking at the different options for creating the educational tool.

Meeting Number 2 – 27th May 2005

Attendees: The Casemix Steering Committee

- Manager of Casemix Coding Department
- Casemix Clinical Nurse Specialist
- The Author

Discussed:

In this meeting the information requirements of the Casemix Coding Department with regard to a learning tool were discussed. Audit was also discussed and the decision was made to do review the literature to assess what information was available and how it might be applied to the Casemix Coding Department. It was decided to do some further research into data quality and total quality management, which could then be incorporated into the learning tool. It was felt the tool would not be complete without including a module on the responsibilities of the staff of the department with regard to The Data Protection Act so it was decided to review the Act.

As a result of this interview the following information requirements were agreed on.

- Introduction to audit and the audit cycle
- Introduction to Total Quality Management (TQM)
- Introduction to data quality
- Introduction to responsibilities with regards to Data Protection Act

A discussion was held decide on the most appropriate format for the teaching tool. The Casemix Steering Committee required portability, ease of maintenance, reusability and user friendliness of the tool.

As a result of this interview the following requirements for the tool were agreed on.

- Provides clear concise, relevant and accurate information.
- Includes adequate material.
- Provides high quality research based content.
- Is flexible and reusable.
- Is simple and intuitive to use
- Is portable
- Requires minimal staff training

Good computer skills are a condition of employment for staff of the Casemix Coding Department therefore the decision was made to explore the possibility of creating an electronic tool that could be placed on a CD or a USB key or utilising the hospital website. These were also seen to provide the required portability and reusability. Ease of maintenance was to be incorporated into the design phase of the tool. The Casemix Coding Department in James's comes under the umbrella of the IMS Department and are as a result provided with a resource of highly skilled staff therefore ease of maintenance was not seen to be an issue provided the tool was developed in accordance with existing skills within the department.

It was decided at this meeting that once the tool had been developed and tested it would be handed over to the Casemix Manager who would coordinate any required maintenance. This would involve ongoing development of course content by the Casemix Steering Committee who would perform a yearly literature review and also include appropriate new audit or data quality events/experiences/information that would come to light. The relevant technical staff within the department would provide routine technical maintenance and the staff of the helpdesk would provide assistance if required in the event of the tool failing.

Meeting Number 3 – 03rd June 2005

Attendees: The Casemix Steering Committee

- Manager of Clinical Coding Department
- Casemix Clinical Nurse Specialist
- The Author

Discussed

This meeting was called following an assessment of the desktop computers in St. James's Hospital that rendered the use of a USB Key or a CD unsuitable. Many of the desktops were older and only able to accommodate a floppy disk. Certain desktops had ports disabled and were unable to accommodate a USB key. A website was considered to be a satisfactory solution due to the fact that there is internet access throughout the hospital. A well designed website would also fulfill the criteria outlined in meeting 2, providing ease of maintenance, reusability, being user friendly and requiring minimal staff training

Meeting Number 4 – 06th June 2005

Attendees:

- Statistics Manager/Member of Data Quality Standards Group
- The Author

Discussed

This meeting was called to discuss data quality standards and issues within St. James's Hospital. In this meeting Statistics Manager described how the data quality standards group was created within St. James's Hospital to

- Identify and review selected minimum datasets, upon which key hospital management information metrics depend.
- Establish the most effective procedures for capturing relevant data and ensuring quality and accuracy.

- Draw up data standards and definitions where appropriate, including on-line masterfile tables, user guidelines, training requirements, supervision, and central change control.
- Set up appropriate risk measurements and performance indicators to report on level of compliance with acceptable targets. (e.g. number of patients without current GP ; wrong public/private status , etc).
- To facilitate the implementation and bedding down of new procedures as quickly as is practicable.

The Statistics Manager went on to explain how the above would be relevant to the Casemix Coding Department. Information booklets, that had been drawn up for staff of the hospital, were provided. These booklets are intended to show staff how to use hospital information systems, how to enter the correct information to the systems and who to contact in the event of computer related problems. Another booklet related to discharge summary forms, this booklet is given to any doctor who fills out a discharge summary form to make certain that they understand the importance of ensuring that the discharge summary form is complete and accurate. This booklet explains to the medical staff that the discharge summary form not only serves as a discharge letter for the G.P. but also how it is used in Casemix. The booklet gives a brief overview of casemix and how it is used in hospital budgets. Information manuals provided by the ESRI to the staff of the Casemix Coding Department to ensure that they knew how to code correctly an accurately

Meeting Number 5– 07th June 2005

Attendees:

- Website Administrator St. James's Hospital
- The Author

Discussed

This meeting was arranged to discuss development of the Website.

The first step was to decide on the site manager. Initially Dream Weaver appeared most appropriate as the author was familiar with this, found it user friendly and considered it to provide the required functionality. The Website Administrator

however felt that Terminal 4 Site Manager would be more appropriate. Terminal 4 Site Manager provided many advantages over Dream Weaver.
The Website Administrator outlined the following advantages:

1) It is the site manager of choice for St. James's Hospital therefore choosing it would provide consistency with the rest of the St. James's Website.
2) It is covered by all St. James's Website Security.
3) It is easily maintained and updated.
4) It is fully backed up by St. James's help desk.
5) Should someone else be required to take over maintenance of the site full training could be easily provided.
6) It is the site manager of choice for the majority of the health service in Ireland therefore this educational tool though primarily designed for use in St. James's Hospital could be easily given to other Casemix Coding Departments should they desire it.

The limitations of Terminal 4 Site Manager were also discussed and as it does not support flash multimedia and video clips such as .avi and .mpa, they could not be included. This was considered to be problematic, as it was felt that they would have increased user interest and interactivity but it was not considered to be an impossible task to provide this by alternative methods supported by Terminal 4.
As a result of that meeting it was agreed that the website would.

- Be built using Terminal 4 site manager
- Follow St James Hospital Website Standards
- Be consistent with the rest of St. James's Website.

The website would not include

- Multimedia
- Video clips

5.1.2 SETTING GOALS AND OBJECTIVES

[Lynch S, Horton, 2001] recommends a short statement identifying two or three goals should be the foundation of Web site design.

Following the interviews with the Casemix Steering Group and the website administrator the following goals were agreed upon.

Build a website that would give the users

- An understanding of the importance of data quality, including Total Quality Management.
- An understanding of the principles of audit and the audit cycle
- An understanding of their responsibilities with regard to the Data Protection Act

5.2 DEVELOPMENT

5.2.1 SELECTING TEACHING STRATEGIES

A teaching strategy is the way in which a class is taught so that the goals and objectives are achieved.

[Vitaliy et al, 2005] defined an instructional strategy as a purposeful activity to engage learners in acquiring new behaviours or knowledge. An instructional strategy should have clearly defined steps or a clear description of what the teacher does.

[Grogan L., 2004] found that the choice of delivery mode is informed by a needs assessment process (of the institution and the learners).

[Newman et al, 1995] showed that learners adopt deep or surface learning strategies. [Newman et al, 1995] associated surface learning with skim learning, memorising and

regurgitating for tests and felt that surface learners never gained a true understanding of the subject matter and deep learning whereby the learner gains a thorough understanding of the subject matter and integrated it into their knowledge. They connected deep learning with active learner participation.

There are many types of teaching strategies in existence. They include lecture, demonstration, discussion, problem based learning, online learning. This elearning tool was developed the result of a comprehensive departmental and user needs assessment.
The strategy of choice was elearning, the tool chosen was the hospital website.

When developing this elearning tool every attempt was made to encourage active learner participation so that the users might have complete understanding of the information and benefit the coding department by incorporating the knowledge provided into their day today work. Deep learning was promoted by providing as the users with active participation such as quizzes and links to various items of interest.

The Casemix Steering Committee plan to get each member of the Casemix Department to commence auditing their own area within a fortnight of using the elearning tool. This will not only reinforce the lesson but also begin the process of data quality improvement through audit, ensuring the practical usefulness of the elearning tool.

5.2.2 OUTLINING MEDIA

[Strauss J, Frost D. R., 1999] outlined the following key factors, influencing instructional technology (IT) media selection

- institutional resource constraints
- course content appropriateness
- learner characteristics
- course learning objectives
- learning location

- time (synchronous versus asynchronous)
- media richness level
- The teachers teaching philosophy, technology skills

The needs assessment performed covered these factors and led to the author developing an elearning tool which is hosted on the hospital website and developed using Terminal 4 Site Manager.

5.2.3 DEVELOPING COURSE CONTENT

An extensive review of the literature was performed to establish the most up-to-date material regarding audit and the audit cycle. Data quality within the hospital and TQM were also included in the course content as were relevant points from the Data Protection Act.

Links were included on the elearning tool to informative websites on the topics of Audit and TQM, a link was also provided for the Data Protection Act.

5.2.4 DESIGNING STUDENT INTERACTION

Students interacted with the website using a number of test yourself quizzes. Links were provided to relevant websites such as the Data Protection Act and the NHS, Principles for Best Practice in Clinical Audit and Total Quality Management. There were links provided to real life scenarios such as audits in different hospitals and their experiences of audit both positive and negative. Much work has been done in the field of audit in other countries some of which was felt to be of interest to users and this was felt to be a useful way of learning from others in the form of anecdotes etc.

5.3 IMPLEMENTATION

5.3.1 DEVELOPING EVALUATION STRATEGY

A review of the Literature [Educause, 2001], [Semler, 2001], [Neilson, 2003] consistently revealed the following criteria for evaluating learning technology

- Layout, appearance
- Ease of navigation
- Quality of content
- Interest
- Applicability

The website was developed with those criteria in mind. It was built following a basic tree structure. The layout was restricted, as it was required to follow the format and structure dictated by the St. James's Website. The site was required to follow published guidelines provided by the hospital. See appendix 2. This however was not seen to be a negative factor as it provided a look and feel that was consistent and familiar to the user thus ensuring that minimal training was necessary. The two most important factors taken into consideration during the design phase were usability and utility. According to [Neilson J., 2003] usability and utility are equally important and that it doesn't matter if something is easy if it is not what you want and equally it is of no value if the system can hypothetically do what you want, but you can't make it happen because the user interface is too difficult. [Neilson J., 2003] further maintained that usability was a matter of productivity and that the time users wasted being lost on the intranet or pondering difficult instructions was money wasted by paying them to be at work without getting work done.

Quality of content was provided by performing a literature review and only including data from dependable sources.

Where possible items of interest such as experiences from St. James's and other hospitals. Users were also given quizzes the reason for this was twofold on the one hand it kept the users interested and on the other hand it promoted student learning by doing. The quizzes were designed to re-enforce the lessons learned. Students were questioned on most important points of each module, on completion of the quiz the user hit the enter key and this brought up another screen which informed the user whether they had got the answers correct or not. The correct answer was provided whether they got the answer correct or not, further re-enforcing the information. Links were also provided to relevant websites this gave the user the opportunity to delve deeper into topics if they felt that they interested or that they required further information.

Each module was kept as short as possible and each page length was kept to a minimum. Unnecessary information was avoided. Applicability was assured as the information provided was researched specifically for the task in question following a needs assessment review and was also reviewed by the Casemix Steering Committee prior to inclusion on the site.

The site was built with view to being easily maintained in the future. The adding, deleting or updating of the site should not prove to be a problem, as it will receive full technical support from the I.T. Department.

5.3.2 TESTING USER EXPERIENCE

[Krug, 2005] described usability as making sure that something works well: that a person of average (or even below average) ability and experience can use the thing - whether it's a Web site, a fighter jet, or a revolving door - for its intended purpose without getting hopelessly frustrated.

Due to the relatively small number of staff within the Casemix Coding Department these were not asked to assist in the testing phase of the website as it was felt that testing would lead to familiarity with the site thus influencing the final assessment of the site. [Nielson, 2000] found that the best results came from using no more than 5 users, therefore a representative group of 5 users were asked to test the website

5.3.2.1 The demographic characteristics of usability testers.

There were 4 female and one male usability tester. All were in their thirties.
All worked in the I.T. Department of St. James's Hospital. All had previous experience using the Hospital Internet

5.3.2.2 Usability testing environment.

The usability testing took place in a quiet room away from the user's normal place of work, the door was shut and phones were removed from the room to prevent interruptions. The room temperature was comfortable and lighting was good. An individual Dell PC with internet access was used. Due to segment of the user testing requiring verbal responses from the users, they tested the elearning tool individually. This was to limit distractions and to prevent the users from influencing each other.

Prior to testing the users were given a verbal description of the testing process, purpose and objectives. Users were also given an assessment form to fill out that assessed the site on usability [APPENDIX 3]

Users were asked to navigate through the site and were encouraged to voice their opinions as they proceeded through the tree structure of the site. See figure 19. Their opinions were sought with view to look, feel and navigation. Users were asked to point out areas of difficulty; they were also given blank sheets of paper and a pen and asked to write down any comments that came to mind as they navigated through the site.

5.3.2.3 RESULTS OF USABILITY TESTING

User Number 1 and 2 gave top marks to all questions except questions B ("Do you get trapped in the software?") and C ("Do you get lost easily in the elearning tool?"). User 1 gave both a score of 4 – agree while user 2 gave both a score of 5-strongly agree.

Both users felt that the menu structure (see figure 16) was confusing and commented that once you proceeded beyond the first menu it was easy to get lost and forget where you were and that it was difficult to remember what parts of the course you had previously covered and what parts of the course remained.

It was decided at this point to suspend testing due to the difficulties with navigation of the site. The authors then asked user 1 and user 2 for their opinions and ideas to resolve the issue. They felt that clearer labelling would improve matters considerably. Once the menus had been re-labelled, users 1 and 2 were asked to reassess the site.

On re-assessment the users felt that it was slightly less confusing but that navigation remained a serious downfall. At this point the author decided to re-design the structure of the site.

The decision was made to move away slightly from the style of the St. James's Website, as the menu structure was leading to difficulties. St. James's website had been designed to provide information to patients, staff and visitors. It was possible to provide this information quite easily with a maximum of four clicks to reach the required information. It was a new departure to use the website for elearning purposes. The problem was obvious, the design was not efficient and the users were having to step through too many menus (six at one point) to reach the necessary information. The provision of breadcrumbs did not lessen the problem as the users were not inclined to follow them and even when reminded of their existence, did not find them to be helpful.

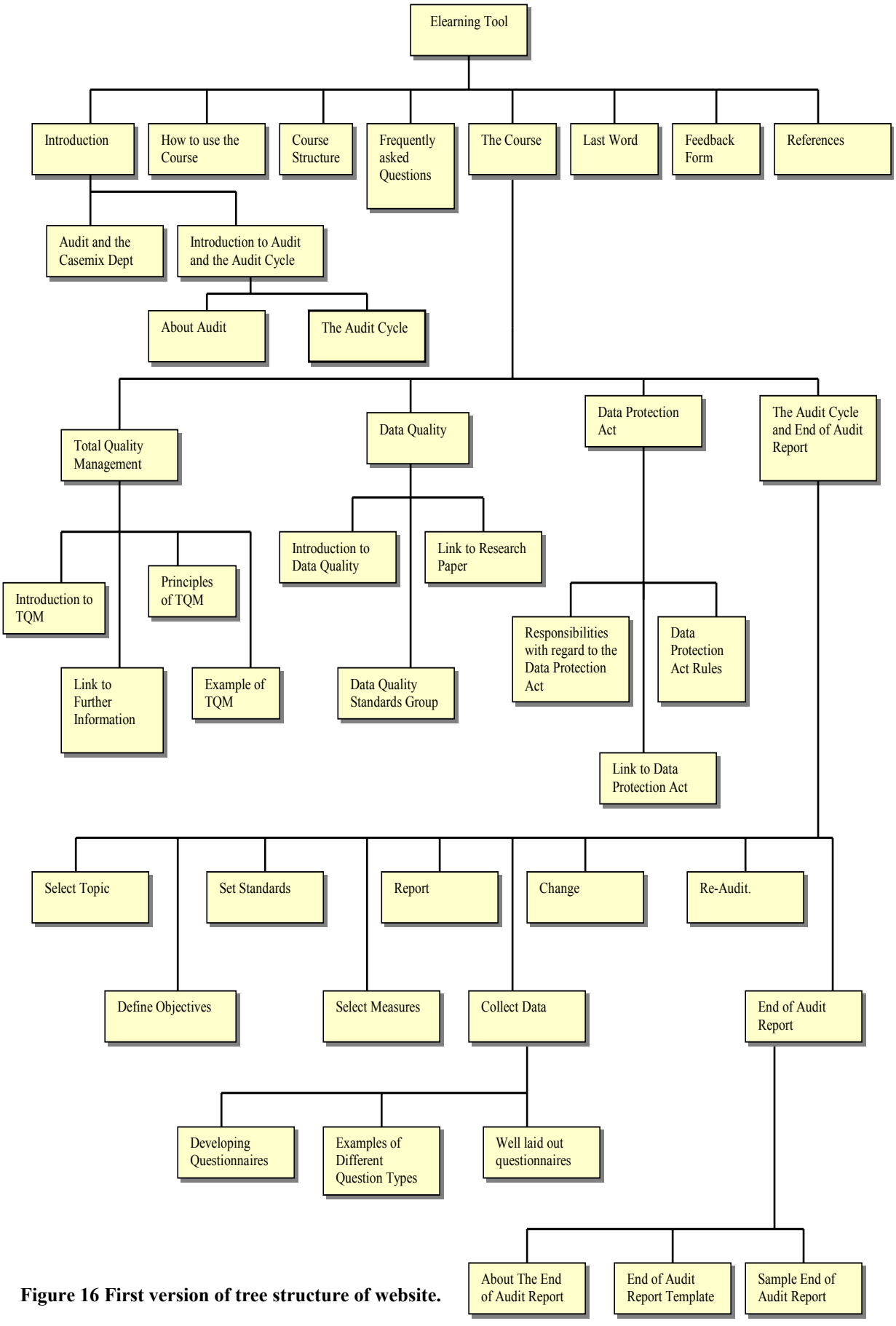

Figure 16 First version of tree structure of website.

The section entitled ‘Introduction to the Course’ and the section entitled ‘About Audit and the Casemix Department’ did not cause any problems. The problem surfaced at the area entitled ‘The Course’. At this point the menu structure became deeper to include the modules of the course. Certain modules had sub menus. It was necessary at this point to modify the structure. Various styles were tried and every attempt was made to stay as close to the original website style of moving forward to a leaf and then back to the mother menu.

Finally a page was designed that provided links to the course pages of the site (see figure 17 and figure 18). This proved to be easy to navigate and was very close in behaviour to the original style of the site.

Under each module title were the links to the pages of the module. These links were indented. Modules with further submenus such as Audit Cycle Step 5 Collect Data had these submenus further indented. (See figure 18)

Figure 17 Improved navigation of website

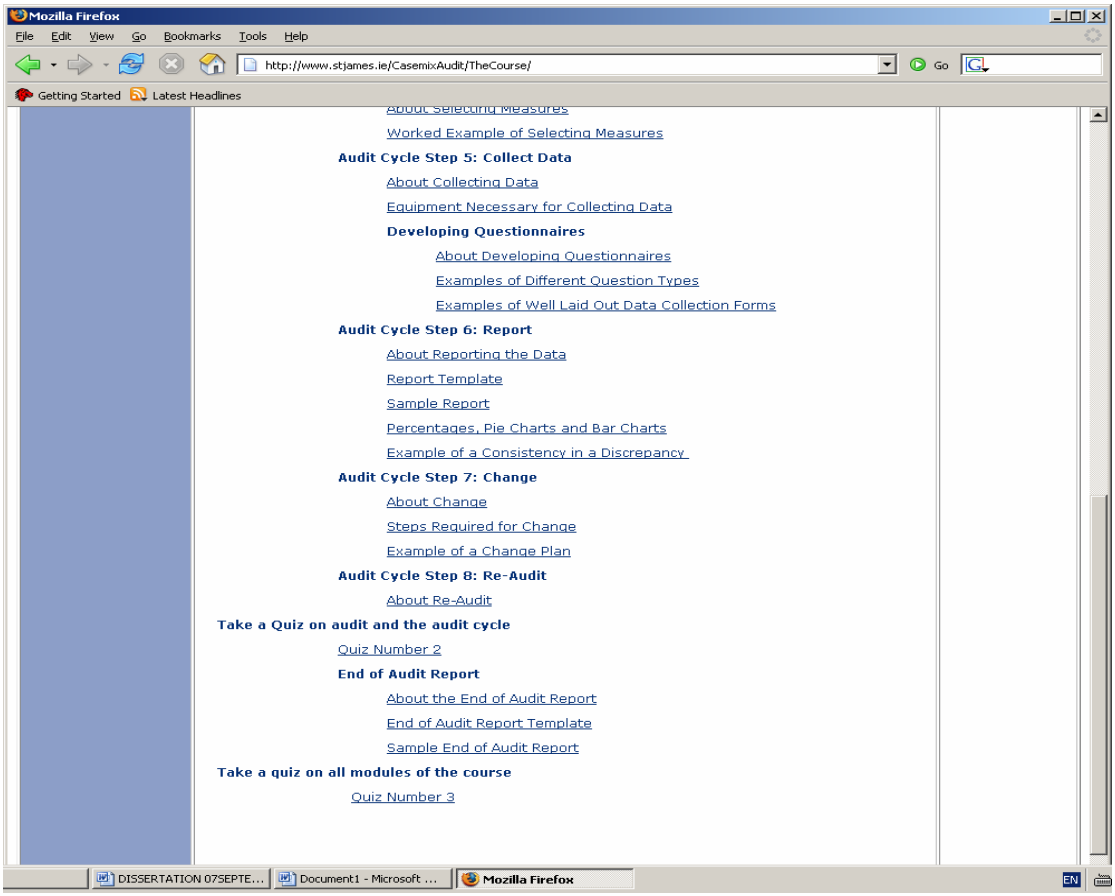

Figure 18 Improved navigation of website part 2

Users number 1 and number 2 reassessed the site and found it to be simple to navigate and that as far as they were concerned the issue was resolved.

Users number 3, 4 and 5 were not informed of the previous problems with navigation so as not to influence their opinions. Users 3, 4 and 5 had absolutely no issues with confusion or getting lost on the site. The only reservations voiced by User 3 was not liking having to navigate to a leaf in the structure and then back to a menu before navigating to the next leaf. User 3 would have preferred to be able to continue to the next page without having to retreat back to a menu. User 3 did not however find that this created any difficulty or confusion and did not feel that this would interfere with the potential effectiveness as a teaching tool, but stated rather that this was a personal preference. User 3 did however feel that this was not a particularly attractive way to present the information to students and gave question H a 2- Disagree, otherwise all users gave the improved structure of site full marks for usability.

5.3.3 REVISION

The staff of the Casemix Coding Department will be asked to carry out the programme on a yearly basis to revise what had been learned the previous year and to benefit from any updates to the website. The Casemix Steering Committee felt that this would also ensure that the staff of the Casemix Coding Department were aware that the management of the department were fully committed to improving data quality through audit and considered it to be a high priority activity.

5.4 EVALUATION

5.4.1 EVALUATING PROGRESS (formative)

Users were asked to complete two quizzes through the course of the elearning tool. One quiz covered Data Quality, Total Quality Management and the Data Protection Act. The second quiz was on Audit and the Audit Cycle. The Casemix Steering Committee indicated that they expected and 80% score on each quiz as a minimum requirement. Users failing achieve the required 80% were asked to repeat the course section until they achieved the required score.

5.4.2 EVALUATING RESULTS (summative)

On completion of the entire program the users were asked to complete a different test. This tested each module a second time to ensure that users had retained the knowledge that they had learned as the progressed through the program. The Steering Committee again required an 80% minimum and any user failing to achieve the 80% were asked to revisit the module that they fell down on until the desired 80% was achieved. Users were allowed to spend as much or as little time as they required on each module.

5.4.3 CHAPTER SUMMARY

The instructional design process clarified the needs for the users, for the department. It outlined the topics required for inclusion in the elearning tool. A review of the literature on those topics clarified the content required for the elearning tool. The process also outlined the availability and the limitations of software to the department. The next item on the agenda is to design and build the tool using the information gathered as a result of the instructional design process. This process is covered in detail in chapter 6.

6 WEBSITE DESIGN PROCESS

6.1 WEB DESIGN GUIDELINES AND HEURISTICS

A review of the literature using a search engine and the keywords web design guidelines returned a huge amount of hits and many sets of guidelines including guidelines from IBM, Google Webmaster Guidelines, National Cancer Institute.
There was much published information such as [Bailey B, 2000] and [Lynch S. and Horton J. P., 2001].

Though the information was at times contradictory the common goals that appeared were clarity of purpose, consistency and predictability [National Cancer Institute, 2005], [Nielson J, 2002], [Bailey B, 2000]. [Woods B., 2005]. Clarity of purpose, consistency and predictability were used as guidelines throughout the development of the site.

6.1.1 PAGE LAYOUT

Each page followed the template of the St. James's Hospital Website; this was provided automatically by the Site Manager. The only exception to this was the page that required altering to assist with navigation (see 5.3.2.3 Results of Usability Evaluation). Where possible tables were used to provide a consistent pattern throughout the site this being in keeping with the hospital website and also research by [The National Cancer Institute, 2005] found very strong evidence to show that users prefer rows and columns on a page to be aligned and that this led to ease of reading the text. Frames were avoided as the Website felt that they were difficult to print and that users often inadvertently print the incorrect frame, leading to user frustration.

The main menu of the Hospital Website is placed in the left column; the banner containing the title is across the top. The information for the page is provided in the

centre column. Links to current news and items of interest are provided in the right hand column. See figure 19.

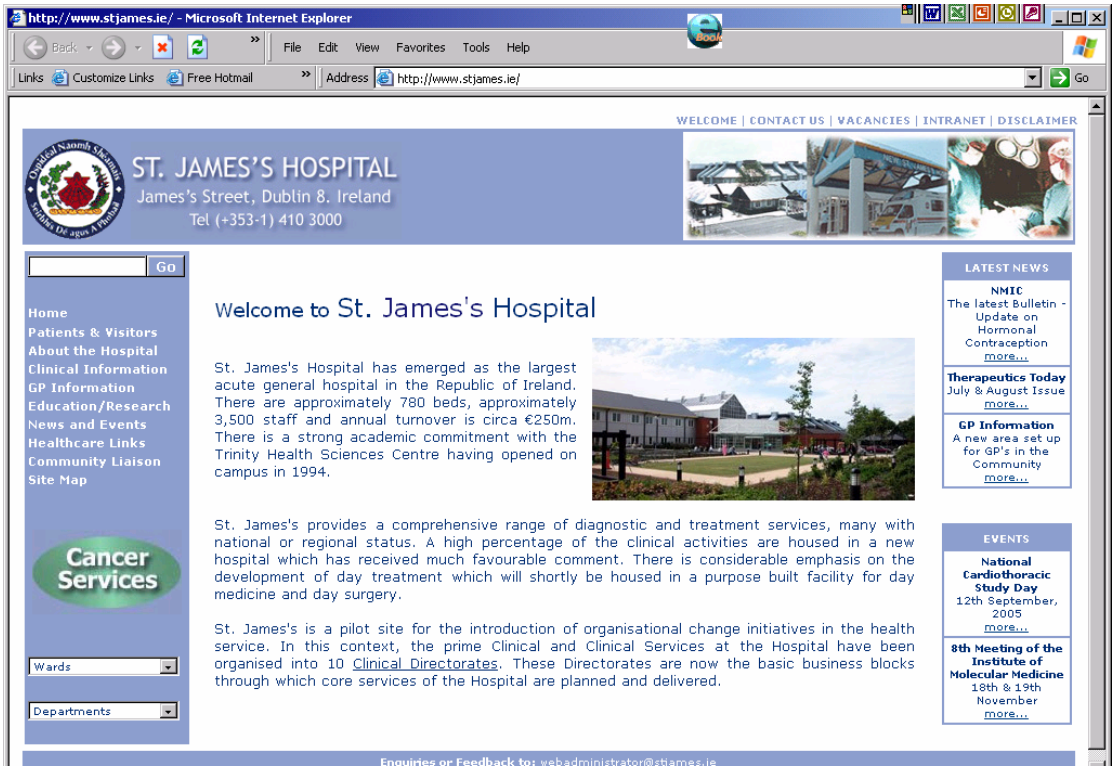

Figure 19 St. James's Hospital Website Home Page

6.1.2 LINKS

The home page and main navigation links of the website are found in the main menu on the left column of the site. See figure 19.This remains consistent throughout the site ensuring the user never feels lost or isolated within the site.

The research suggests that this is where the users would expect to find them. [Adkisson, 2002] when researching 75 top ecommerce sites found that 97% of sites provided links to a sites first-level pages on every page and that these links were most commonly positioned at the top of the page (87%) and that all sites provided a global link to home. **[**Bernard, 2002] found that most users of commercial sites expected the "back to home page" link to be located at the top-left and bottom-centre of the screen.

Thus keeping the site familiar and easily navigated by the user. [Lynch & Horton, 2001] felt that users should always be able to return easily to the home page and to other major navigation points in the site.

[The National Cancer Institute, 2005] found that users missed links because they are not evident and that they must be clearly designated so that there is little (or no) uncertainty on the part of the users as they click on a link. Their research also showed that when users were given visual cues to locate links as opposed to using the pointer to search for links, they were able to find the information seven times faster.
Links to various new items and events are provided in the right hand column of each page. See figure 19.

6.1.3 PAGE LENGTH

[Lynch S. and Horton J. P., 2001] and [The National Cancer Institute, 2005] advocated the use of short pages for the home page and pages with large graphics. They felt however that long pages simplified page maintenance, matched the structure of a paper counterpart and made pages more convenient to download and print.
The pages of the elearning tool were kept short and the decision was made not to place any documents on the web pages but to provide links to them in document form so that they may be easily printed.

6.1.4 FONT/TEXT SIZE

Font size 11 was used for the text areas within the website and font size 12 (bold) was used for the headings. Font style Verdana was used throughout the site. This is again consistent with the intranet. Research by [The National Cancer Institute, 2005] has shown that fonts smaller than 10-point elicited slower performance from users and that for people over 65, it may be better to use a larger font size, at least 12 or 14 point.
[Bailey, 2000] recommended not wasting time trying to find better fonts to increase reading speed or user acceptance – use commonly used and available fonts.

6.1.5 HIERARCHY

The St. James's Hospital Website is laid out in a hierarchical tree structure with no more than four levels. Level 1 consisting of the home page which contains a menu consisting of links downwards to child pages either containing further menus or ending in information pages. Each page contains links to the children of that page to the parents of that page or directly to the top-level home page.

The National Cancer Institute (2005) recommended using the same navigation aids (navigation scheme) on all pages as this ensures that users can use the web site navigation effectively. [Lynch S, Horton J. P., 2001] saw the importance of designing an efficient hierarchy of information to minimise steps through menu pages. They found that studies have shown users prefer menus that present at least five to seven links and that they prefer a few very dense screens of choices to many layers of simplified menus to incorporate lots of choices.

The elearning tool has incorporated this research and as a result requires maximum four clicks to reach the required information.

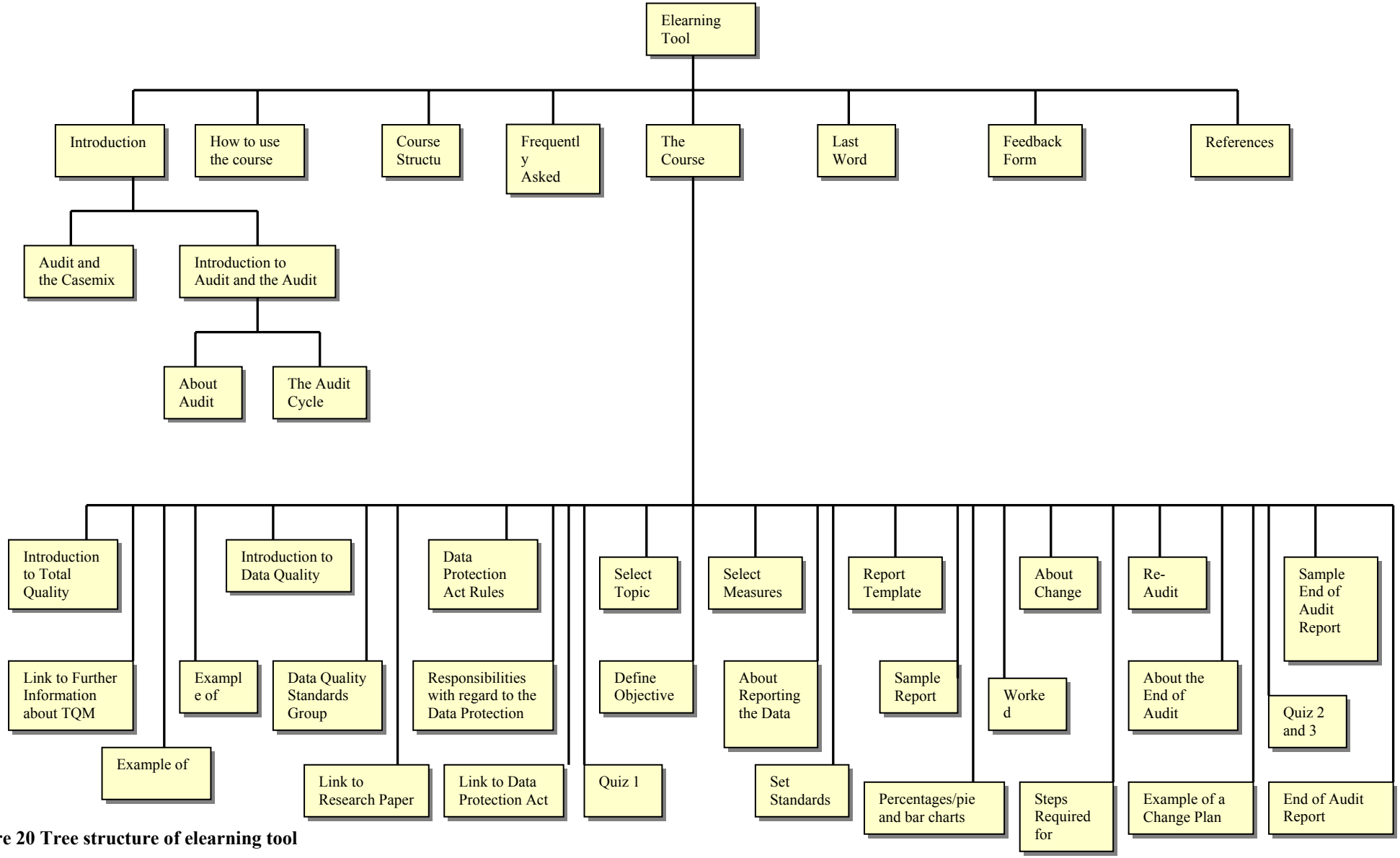

Figure 20 Tree structure of elearning tool

6.1.6 BREADCRUMB NAVIGATION

Breadcrumb paths give location information and links in a backward linear manner. See figure 21.

According to [Lida B. et al, 2003] breadcrumbs in general serve two purposes: 1) they provide information to the user as to where they are located within the site, and 2) they offer shortcut links for users to "jump" to previous categories in the sequence without using the Back key, other navigation bars, or the search engine.

[Instone, 2002] defined three types of breadcrumbs;

- Location breadcrumbs indicate the position of the current page within a site's hierarchy regardless of the path taken to arrive there.
- Path breadcrumbs show the path the user has taken within a site to get to the current page. The same content from the site can be presented with different breadcrumbs because users can take different routes.
- Attribute breadcrumbs convey product meta-information, such as subject, price, category, style and brand.

The St. James's Website provides location breadcrumb navigation. This is situated on the right of its pages underneath the banner above the central information column of the page.

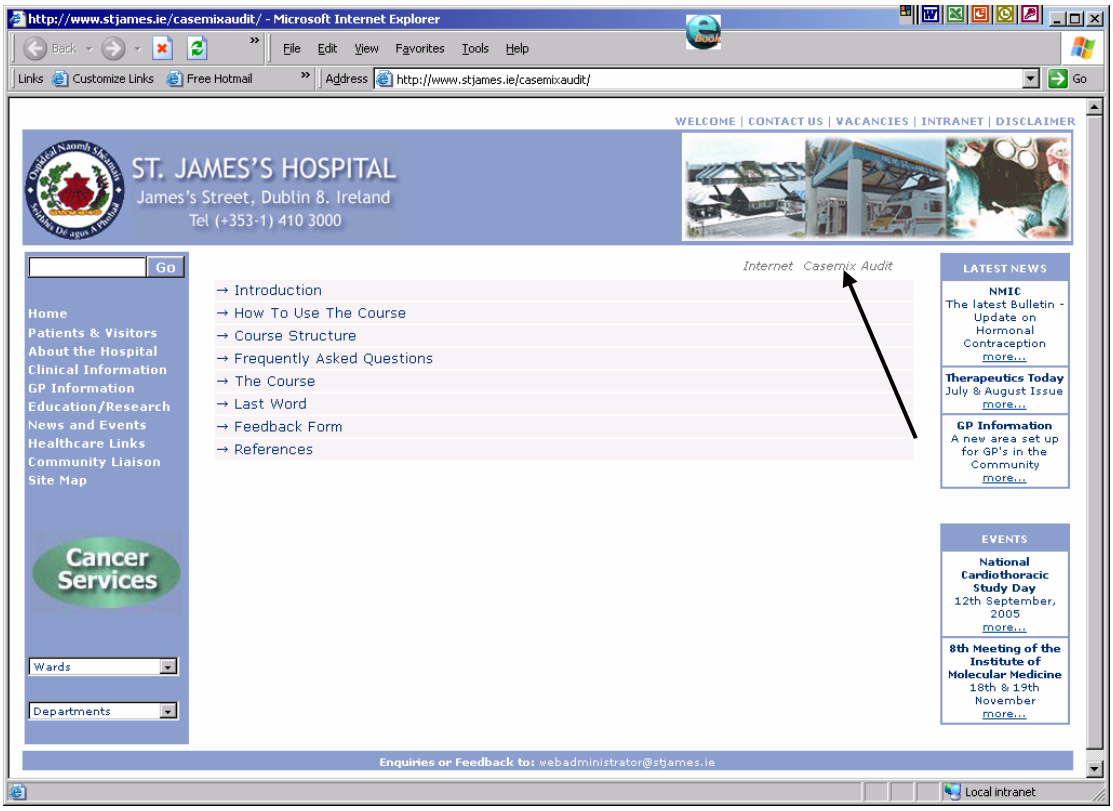

Figure 21 Web page featuring breadcrumbs

6.1.7 ONLINE QUIZES AND FEEDBACK FORM

ASP, a server-side scripting technology was used for the development of online quizzes and for the feedback form. This allowed for both HTML and a scripting language to be interspersed in a Web page. The scripting language allows for generation of HTML code 'on the fly' to make web sites dynamic and user-specific. When a browser requests an ASP, the Web server generates a page with HTML code and sends it back to the browser.

Both the online Feedback Form and online quizzes were created with HTML and ASP with the scripting language as VB. For the online quizzes users input information into the HTML form and the ASP code checks the answers inputted against the answers stored in the ASP page see figures 22 and 23. It then generates an output informing the user whether they answered correctly or not.

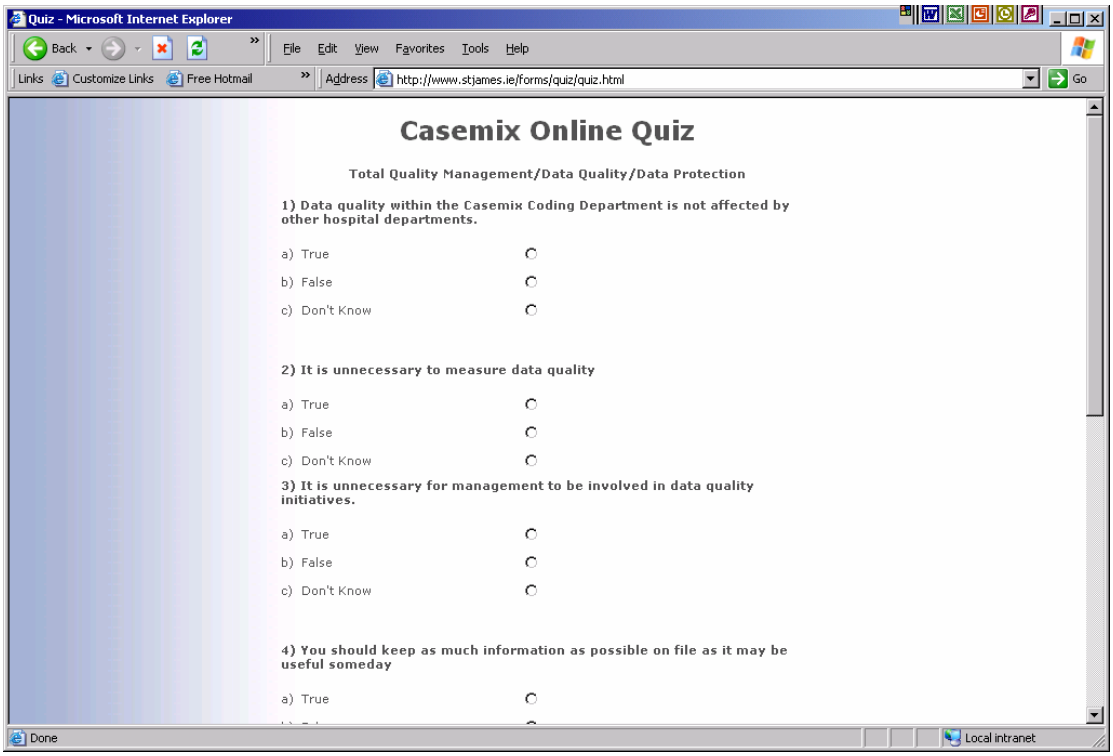

Figure 22 Casemix Online Quiz

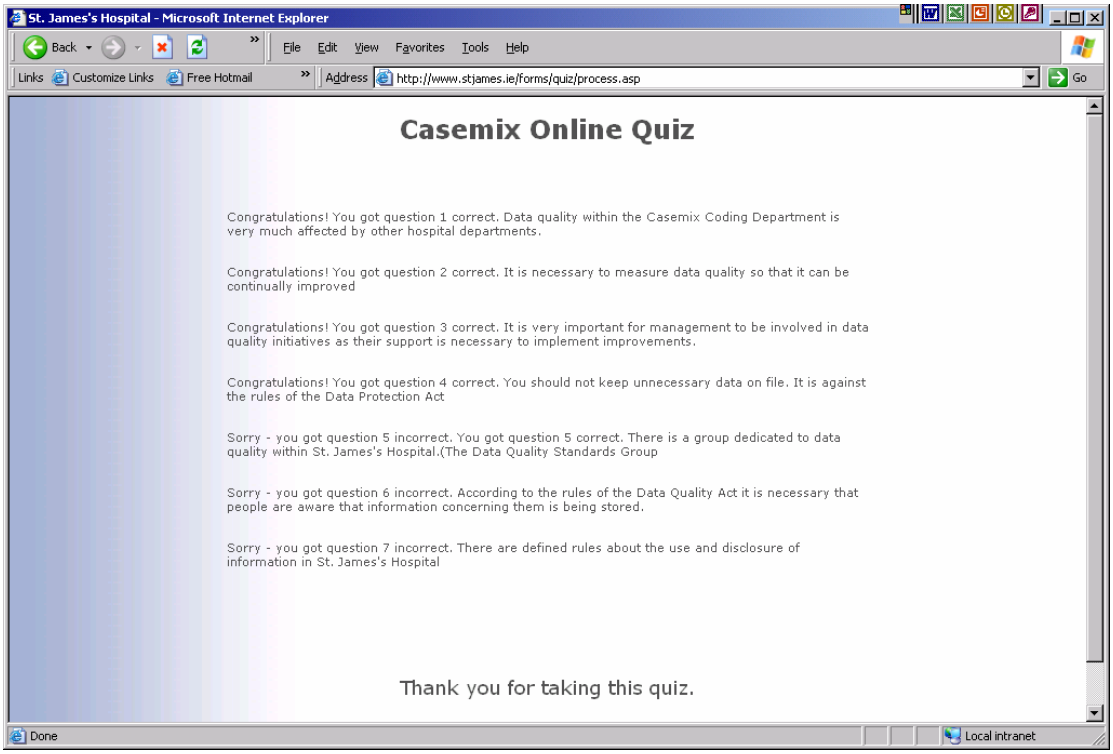

Figure 23 Casemix online quiz answers

A feed back form was included on the website as reviews of the literature [Lynch S, Horton J. P., 2001], [Woods, B., 2005] showed the importance of feedback to the success of a website.

The Feedback form has also a HTML front end which takes the details inputted by the user and after submitting, the Process.asp page sends the details to a designated email address by use of CDONTs. CDONTS stands for Collaborative Data Objects for NTS. It allows you to send email messages from your ASP application.

This feedback will be used to audit the website and is in keeping with promoting a culture of audit within the department. The feedback form consisted of four mandatory fields for the user to enter name, address, email address and a text area to enter comments and suggestions. See figure 24. Users are encouraged to type their feedback on to the form and press the submit button. Users are asked to use the feedback form to inform the course provider on how they found the course, its strengths and weaknesses. It is explained to them that the feedback would be very much appreciated, and that any suggestions for improvements or additions to the course are always very welcome. They are also told that these suggestions will all be considered and will be useful for the future improvements of the course

Users are also asked, if they find any part of the course to be in any way difficult to understand or lacking in information to please include this in the feedback, as this is a fault with the course and will need to be corrected.

Users are invited to use the feedback form to send any queries regarding audit, data quality, total quality management or the Data Protection Act, to the course provider who would be pleased to answer them.

Pressing the submit button activates a process which sends an email to the course administrator containing the details of the feedback. See figure 25. Pressing the submit button also activates an acknowledgement page. See figure 26. This page thanks the user for their feedback and provides a ‘click’ to return to the main menu.

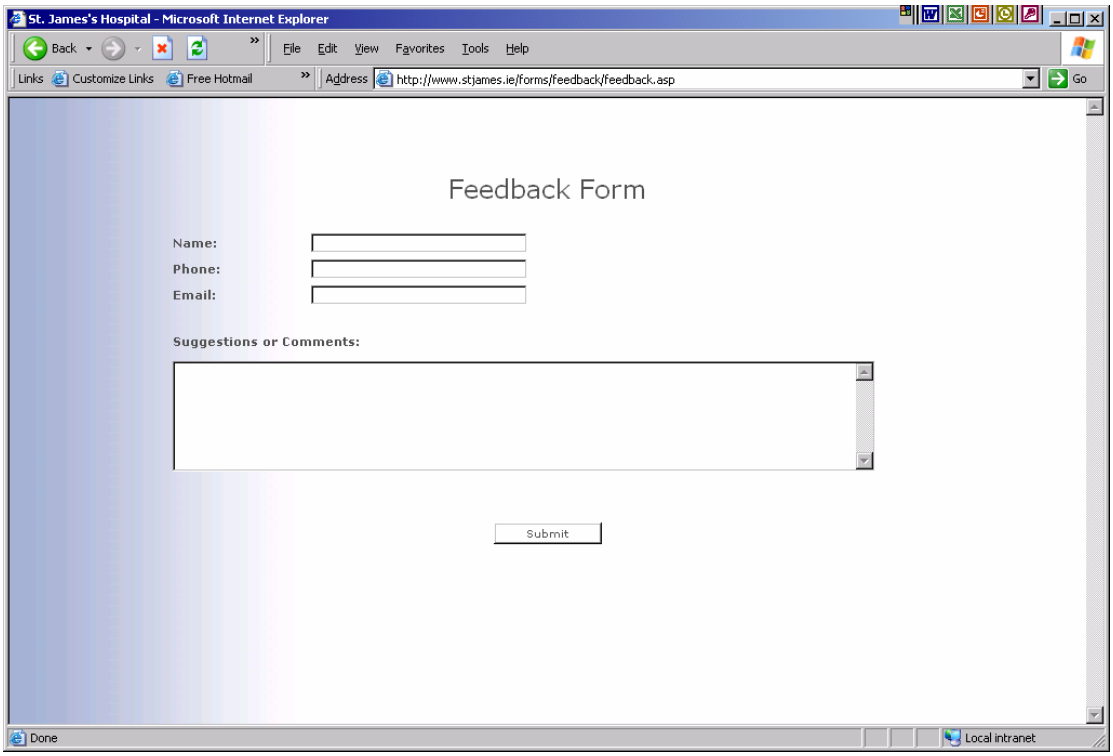

Figure 24 Feed back form

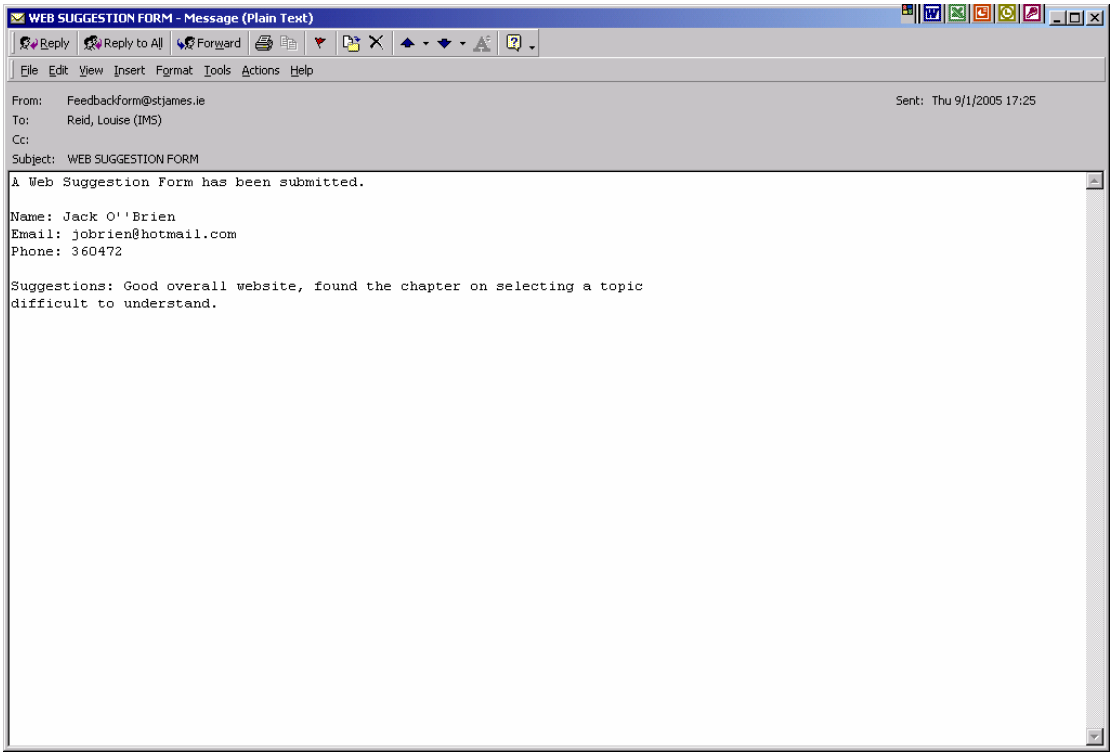

Figure 25 Email generated by feedback form

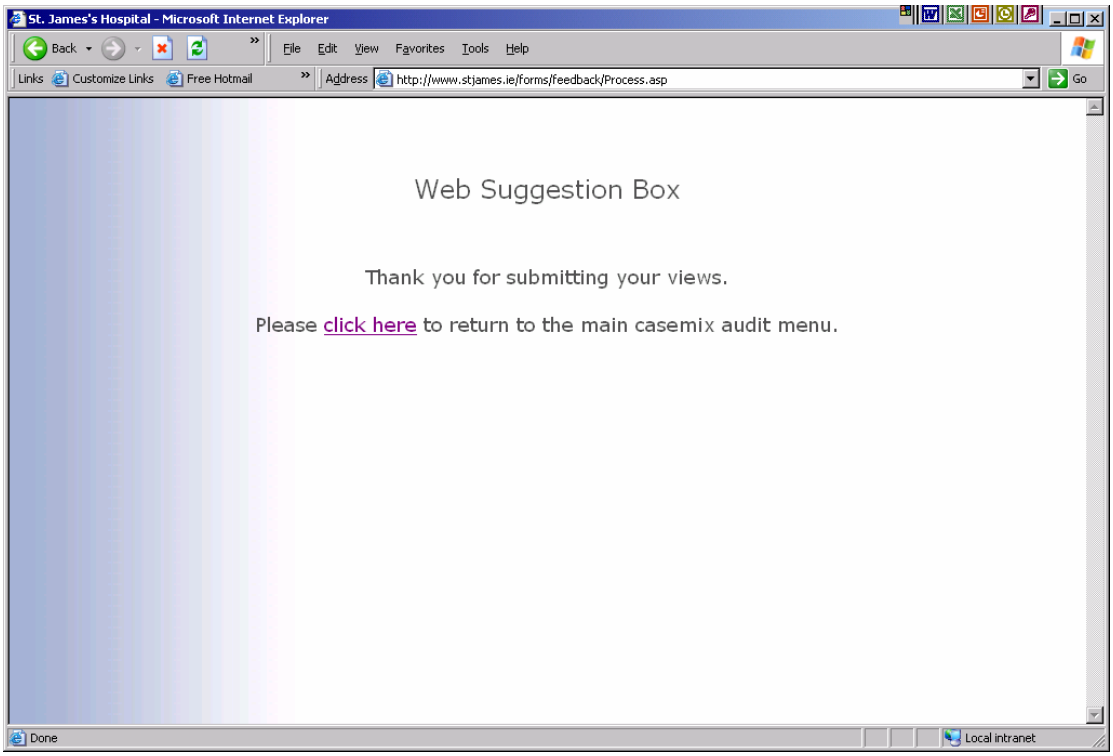

Figure 26 Feedback form acknowledgement page

6.1.8 REFERENCES

There was a page of the elearning tool dedicated to providing the references used throughout the site. See figure 27

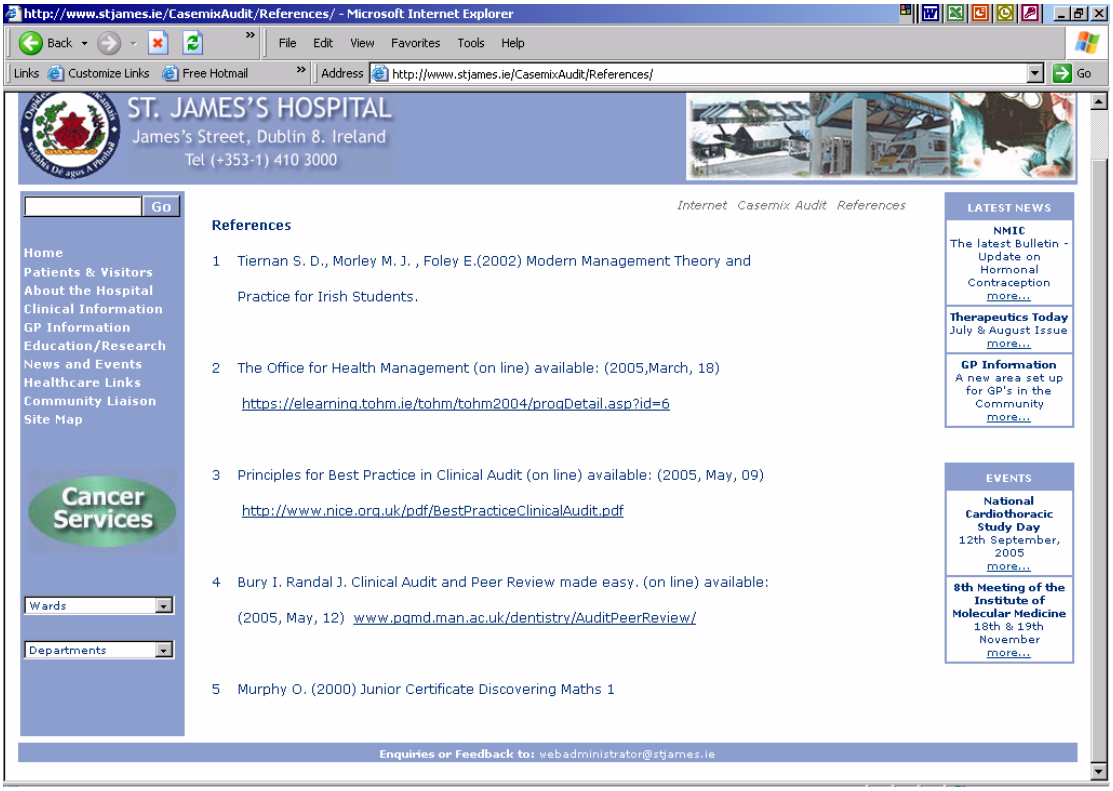

Figure 27 References

6.1.9 DISABLED USERS

Ensuring that this elearning tool is suitable for use by disabled users involves having the pages assessed by company outside of St. James's Hospital such as 'Watchfire' or 'Validator'.

On completion the author will have the tool assessed for suitability for disabled users and implement any recommendations necessary to ensure it is accessible to all. As there are currently no disabled users within the Casemix Coding Department, this remains outside the scope of this dissertation.

7 DATA COLLECTION AND ANALYSIS

Following development of the elearing tool, data was collected to evaluate whether it was a successful method for teaching the staff of the Casemix Coding Department about data quality, audit and their responsibilities with regard to the Data Protection Act, within their department.

7.1 INSTRUMENTS USED IN DATA COLLECTION

Two questionnaires were created. Questionnaire A (See appendix 5.1) collected the age of the users to provide a demographic profile. Due to the small group involved in the study it was decided to keep this information on a separate form as it was felt that this would compromise the anonymity of the users.

Questionnaire B (See appendix 5.2) consisted of 20 questions. All were closed ended questions. This questionnaire was used to evaluate users knowledge prior to and following use of the elearning tool.

Questionnaires had no distinguishing marks and therefore could not be connected to the user.

The purpose of these questionnaires was to investigate the participant's knowledge of data quality, audit and responsibilities with regard to the Data Protection Act. Participants knowledge was investigated prior to and following use of the tool.

The questionnaires were developed among the senior staff of the Casemix Department and were piloted by 4 members of staff within the IT Department.

7.2 DATA COLLECTION ENVIRONMENT

The evaluation took place in the Casemix Coding Department, the door was shut and phones were removed from the room to prevent interruptions. The room temperature was comfortable and lighting was good. An individual Dell PC with internet access was used. All six used the elearning tool simultaneously.

Immediately prior to commencement users were given a verbal description of the elearning tool, its purpose and objectives.

Users were asked to navigate through the site and were asked to inform the author if the ran into any difficulties.

7.3 DATA COLLECTION PROCESS

Two hours prior to use of the elearning tool questionnaires A and B were disseminated to the users. Users were asked the complete questionnaires A and B and they were collected by the author prior using the tool. Questionnaire B was disseminated following use of the tool and collected after completion prior to users leaving the room.

7.4 DATA ANALYSIS

Questionnaire A invited users to tick a box that indicated their age. Whether they were aged < 20, between 21 and 30, 31 and 40, 41 and 50, 51 and 60 or > than 60.

There were twenty questions on questionnaire B. Each question was equally weighted at 5%. There was only one correct answer to each question. Any user not providing this answer received 0% for that question.

7.5 RESULTS FOR QUESTIONNAIRE A

The results from questionnaire a showed that 4 of the user group were in their twenties, 1 in her thirties and 1 in her fourties.

7.6 RESULTS FOR QUESTIONNAIRE B

The results for questionnaire B prior to using the elearning tool were as follows:
25%, 35%, 30%, 25%, 25%, 40% with an average of 30%

The results for questionnaire B following use of the elearning tool were as follows:
95%, 90%, 95%, 90%, 65%, 90% with an average of 87.5 %
The results for each individual question are outlined in figure 28

Questions 2, 5 and 7 covered Data Quality and showed that the staff of the Casemix Department to have knowledge of Data Quality prior to using the tool, the question. There was a poor response to the questions on TQM, The Data Protection Act and Audit.

Following use of the elearning tool there was a significant improvement in the questionnaire results.

Prior to using elearning tool	Following use of elearning tool
1) 2 correct answers	1) 6 correct answers
2) 5 correct answers	2) 6 correct answers
3) 4 correct answers	3) 6 correct answers
4) 0 correct answers	4) 3 correct answers
5) 4 correct answers	5) 6 correct answers
6) 1 correct answer	6) 6 correct answers
7) 5 correct answers	7) 6 correct answers
8) 1 correct answer	8) 6 correct answers
9) 5 correct answers	9) 6 correct answers
10) 0 correct answers	10) 4 correct answers
11) 0 correct answers	11) 3 correct answers
12) 3 correct answers	12) 6 correct answers
13) 1 correct answer	13) 4 correct answers
14) 2 correct answers	14) 6 correct answers
15) 0 correct answers	15) 5 correct answers
16) 0 correct answers	16) 5 correct answers
17) 1 correct answer	17) 5 correct answers
18) 0 correct answers	18) 6 correct answers
19) 0 correct answers	19) 4 correct answers
20) 1 correct answer	20) 6 correct answers

Figure 28 Results for questionnaire B

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 CONCLUSIONS

This thesis describes the development and implementation of an elearning tool to provide the staff of the Casemix Coding Department in St. James's Hospital with the skills required to continually improve the quality of their data through audit.

Creating this elearning tool involved and in-depth analysis of the domain and the processes involved with coding the data. It involved reviewing the available literature on HIPE and Casemix. It involved developing an overview of data quality and data quality initiatives within the hospital. It involved an exploration of the literature on audit and the audit cycle, the instructional design process and the website design process.

When this had been completed and the website built, it was evaluated to see whether it was a successful method for teaching the staff of the Casemix Coding Department about data quality, audit and responsibilities with regard to the Data Protection Act, within their department.

It is evident from the results of this evaluation that web-based interfaces for instructional delivery should be evaluated for usability problems. The usability evaluation of Web-based instructional unit prototype resulted in recommendations for improvement to the Web site navigation and organization.

Corrections, suggested by the results of the surveys show that changes should be made and the site re-tested in an iterative fashion before continuing development of the elearning tool.

The user evaluation on the elearning tool conducted by the Casemix Coding Department proved to be a successful method for teaching the Casemix Coding

Department about data quality, audit and their responsibilities with regard to the Data Protection Act within their department.

8.2 RECOMMENDATIONS

The users found that the elearning tool contained a lot of text and they became fatigued by reading it. They felt that it would be better it they could print the information from the website and read it. The author recommends that they do this if they consider this to be the easier option.

The author recommends that the elearning tool remains on the hospital internet as this provides accessibility.

The author recommends that the Casemix Steering Committee updates the elearning tool on a yearly basis or more often as knowledge and experience is gained from performing audits.

The author recommends that the staff of the Casemix Coding Department commence auditing immediately and that the Casemix Co-ordinator assesses their success with this as a further evaluation of the usefulness of the elearning tool.

The author recommends that the website is assessed for suitability for use by disabled users and that any necessary modifications are made.

Recommendations for revision have been identified by the researcher and will be implemented by the Casemix Steering Group.

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APPENDICES

APPENDIX 1 RESPONSIBILITIES WITH REGARD TO THE DATA PROTECTION ACT

RULE 1: FAIR OBTAINING:

- At the time when we collect information about individuals, are they made aware of the uses for that information?
- Are people made aware of any disclosures of their data to third parties?
- Have we obtained people's consent for any secondary uses of their personal data, which might not be obvious to them?
- Can we describe our data-collection practices as open, transparent and up-front?

RULE 2: PURPOSE SPECIFICATION

- Are we clear about the purpose (or purposes) for which we keep personal information?
- Are the individuals on our database also clear about this purpose?
- If we are required to register with the Data Protection Commissioner, does our register entry include a proper, comprehensive statement of our purpose? *[Remember, if you are using personal data for a purpose not listed on your register entry, you may be committing an offence.]*
- Has responsibility been assigned for maintaining a list of all data sets and the purpose associated with each?

RULE 3: USE AN DISCLOSURE OF INFORMATION

- Are there defined rules about the use and disclosure of information?
- Are all staff aware of these rules?
- Are the individuals aware of the uses and disclosures of their personal data? Would they be surprised if they learned about them? Consider whether the consent of the individuals should be obtained for these uses and disclosures.

- If we are required to register with the Data Protection Commissioner, does our register entry include a full list of persons to whom we may need to disclose personal data? *[Remember, if you disclose personal data to someone not listed on your register entry, you may be committing an offence.]*

RULE 4: SECURITY

- Is there a list of security provisions in place for each data set?
- Is someone responsible for the development and review of these provisions?
- Are these provisions appropriate to the sensitivity of the personal data we keep?
- Are our computers and our databases password-protected, and encrypted if appropriate?
- Are our computers, servers, and files securely locked away from unauthorised people?

RULE 5: ADEQUATE, RELEVANT AND NOT EXCESSIVE

- Do we collect all the information we need to serve our purpose effectively, and to deal with individuals in a fair and comprehensive manner?
- Have we checked to make sure that all the information we collect is relevant, and not excessive, for our specified purpose?
- If an individual asked us to justify every piece of information we hold about him or her on computer, could we do so?
- Does a policy exist in this regard?

RULE 6: ACCURATE AND UP-TO-DATE

- Do we check our data for accuracy?
- Do we know how much of our personal data is time-sensitive, i.e. likely to become inaccurate over time unless it is updated?
- Do we take steps to ensure our databases are kept up-to-date?

RULE 7: RETENTION TIME

- Is there a clear statement on how long items of information are to be retained?
- Are we clear about any legal requirements on us to retain data for a certain period?
- Do we regularly purge our databases of data which we no longer need, such as data relating to former customers or staff members?
- Do we have a policy on deleting personal data as soon as the purpose for which we obtained the data has been completed?

RULE 8: THE RIGHT OF ACCESS

- Is a named individual responsible for handling access requests?
- Are there clear procedures in place for dealing with such requests?
- Do these procedures guarantee compliance with the Act's requirements?

REGISTRATION

- Are we clear about whether or not we need to be registered with the Data Protection Commissioner?
- If registration is required, is the registration kept up to date? Does the registration accurately reflect our practices for handling personal data? *[Remember, if your data-handling practices are out of line with the details set out in your register entry, you may be committing an offence.]*
- Is a named individual responsible for meeting our registration requirements?

TRAINING & EDUCATION

- Do we know about the levels of awareness of data protection in our organisation?
- Are our staff aware of their data protection responsibilities - including the need for confidentiality?
- Is data protection included as part of the training programme for our staff?

CO-ORDINATION AND COMPLIANCE

- Has a data protection co-ordinator and compliance person been appointed?
- Are all staff aware of his or her role?

- Are there mechanisms in place for formal review by the co-ordinator of data protection activities within our organisation?

APPENDIX 2 PUBLISHING GUIDELINES USING SITE MANAGER

- One liaison/contact person per department (Please supply name to Jo Murphy if you have not already done so)
- Content is to be sanctioned by the Dept. Head prior to submission to the IMS Dept.
- The responsibility for the content supplied for publication lies with the liaison/contact person.
- There is an administrator in IMS which looks after your own area on the site and this name will be given to you at the training session for Site Manager.
- You can add, modify & delete your own area of the site using the HTML Editor. You can upload files in the following format
- Adobe PDF
- Word
- Excel
- Powerpoint
- Images - gif or jpg
- Only upload large word document (ones that exceed 10 pages or contain numerous tables) otherwise word documents should be transferred into the html editor for formatting of text
- Images should be uploaded as a single document or sent to your administrator for placement within a document.
- When data is published your administrator receives an e-mail alert notifying them that there is content waiting for approval, if content is approved it gets published internally on the hour and externally after 8 pm. If the content is rejected an explanation is sent via e-mail.
- The content must be reviewed and updated on a regular basis by liaison/contact person at least once a month
- The current format/design of the website/intranet site must be adhered to.

APPENDIX 3 WEBSITE USABILITY ASSSESSMENT FORM

[Merlot, 2005]

	Usability	**Strongly Agree**	**Agree**	**Neither Agree or Disagree**	**Disagree**	**Strongly Disagree**	**N/A**
		5	4	3	2	1	
A	Are the labels, buttons, menus, text, and general layout of the computer interface consistent and visually distinct?						
B	Do you get trapped in the software?						
C	Do you get lost easily in the elearning tool?						
D	Does the software provide feedback about the system status and the user's responses?						
E	Does the software provide appropriate flexibility in its use?						
F	Does the software require a lot of documentation, technical support, and/or instruction for most students to successfully use the software?						
G	Does the software present information in ways that are familiar for students?						
H	Does the software present information in ways that would be attractive to students?						

APPENDIX 4 WEBSITE PAGE CONTENT

AUDIT AND THE CASEMIX DEPARTMENT

The need to demonstrate that work meets acceptable standards has become clear. It is now necessary to show that you are performing well and providing an acceptable standard of work.
St. James's hospital promotes a continuous quality improvement philosophy and also wishes to recognise the hard work, professionalism and dedication of its staff. Clinical audit is a performance indicator and is part of St. James's quality paradigm.
Though this website focuses primarily on audit the author believes that Total Quality Management (TQM) through audit is the correct approach to improving the performance of the Casemix Coding Department and ensuring that this performance is recognised.
By the end of this course you will have had an introduction to TQM and a full understanding of audit. You will see how the two are interconnected and how they relate to those who work in the Casemix Coding Department. You will also have an introduction to data quality and be given an overview of your responsibilities with regard to the Data Protection Act.

ABOUT AUDIT

Audit involves examining a part of work practice, comparing it against an agreed standard then making the necessary changes to work practice to achieve the agreed standard. Audit consists of an eight-step cycle to achieve the desired improvements.
The steps of the audit cycle are namely Select Topic, Define Objectives, Set Standards, Select Measures, Collect Data, Report, Change and Re-Audit.
It is an ongoing process whereby you continue to re-audit until you achieve the desired standard.
By the end of the course you will know what the audit cycle is. You will have a full understanding of each of the steps of the audit cycle. You will know how to select suitable areas for audit and be able to produce professional audits to the highest standards that will be highly beneficial to the department.

4.3 THE AUDIT CYCLE

The audit cycle (figure 1) is a repetitive cycle of assessment, improvement and re-assessment, consisting of eight steps. It is important to be aware that the process of audit is continual. The steps are as follows, Select Topic, Define Objectives, Set Standards, Select Measures, Collect the Data, Report, Change and finally Re-Audit, which in essence means that you start the process of audit again but using what you have learned from the first repetition of the audit cycle to improve the second repetition and so on.

A single audit cycle may not produce an improvement in work practice and therefore the spiral description may be more reflective of real life audit than the audit cycle as it portrays a more repetitive picture of audit than the audit cycle.

HOW TO USE THE COURSE

This course has been designed to be simple, short and informative. Following completion of the course you should delve into it to assist with audits, for revision purposes or to download forms.

On completion of the course feedback is invited. It would be very much appreciated if you would use the feedback form provided to contact the course provider to inform on how you found the course, its strengths and weaknesses. Any suggestions for

improvements or additions are always very welcome. These suggestions will all be considered and will be useful for the future improvements of the course.
If you find any part of it to be in any way difficult to understand or lacking in information please include this in your feedback, this is a fault with the course and will need to be corrected. If you have any questions or queries regarding audit, data quality, Total Quality Management or the Data Protection Act please use the feedback form to send them to the course provider who will be pleased to answer them.
As you progress through this course you will be asked to complete small quizzes this is to focus your attention and to ensure you fully understand the information being taught. If you do not know the answer to any question please go back over the chapter in question. On completion of the entire course you will be asked to complete a test this is to ensure that you have an understanding of the entire course content, again if you have any difficulty with the questions on this quiz it is recommended that you go back and revise the chapter in question.
Links to items of interest have been provided throughout this course so that you may delve deeper into the areas being taught if you require. Items of interest such as samples of good casemix audits performed in Britain by the NHS and samples of hospital audit experiences have also been provided.

COURSE STRUCTURE

This course has been divided into modules. The first module is Total Quality Management (TQM), which explains what TQM is and how it affects the Casemix Coding Department. The second module is on data quality, which explains what data quality is and what St. James's Hospital expects of you to improve and uphold a high standard of data quality. This module also shows what initiatives are currently in place within the hospital to improve data quality. There is also a module devoted to an explanation of your responsibilities with regard to the Data Protection Act.
There is a module focusing on the audit cycle and the end of audit report. This goes through each step of the audit cycle followed by instruction on how to complete an end of audit report. You will learn how to fill out the documentation required for a successful audit. Samples of completed documentation are provided and blank templates are provided to assist you to produce professional audits with minimal difficulty.

FREQUENTLY ASKED QUESTIONS

Why undertake an audit?

To improve the standard and quality of work

To increase knowledge in the field

To find solutions to existing problems

To increase communication within the department

To highlight your hard work

To create a culture of quality enhancement

How will audit affect me?

Recognises your hard work, professionalism and dedication

Increases your education in the field

Keeps you up to date with standards of best practice

Improves your skill base

Highlights inhibitors to best performance

Will I get blamed if audit highlights poor work performance?

No. Confidentiality of all participants is assured. Audit aims to highlight good performance and find a solution to problems. It is a tool to help staff to seek and maintain quality work performance. **Do not take audit personally.**

INTRODUCTION TO TOTAL QUALITY MANAGEMENT

TQM(Total Quality Management) involves the entire organisation working together to improve quality.

The emphasis on quality improvement needs to expand beyond the confines of the Casemix Department itself and includes all those involved in handling relevant patient data within the hospital. [Tiernan S. D., Morley M. J., Foley E. 2002] states that an important feature of the TQM approach is that the entire organisation is involved in the search for quality improvement and nothing is regarded as untouchable. W. Deming one of the founding members of the quality movement believed that by

improving quality, costs would decrease due to less reworking, fewer mistakes, fewer delays and better all round use of time. [Tiernan S. D., Morley M. J., Foley E. 2002].
To completely and accurately code all the casemix data. Nurses and doctors must record information correctly, ward clerks and medical secretaries must send charts to the department, porters must transport charts to the department, the staff of the chartroom must assist in the provision of missing charts, business managers assist with the provision of missing information, the IT department provides technical backup and statistical reports. The casemix coders must then code all relevant diagnosis and procedures.
It is now clear that the endeavour to improve data quality within the Casemix Coding Department through audit the staff of the department must look not only at their own department but beyond at many other departments.
With TQM in mind let us proceed to look at audit and see how this fits in with the Casemix Coding Department.

WORKED EXAMPLE OF TOTAL QUALITY MANAGEMENT

As part of St. James's Hospitals plan to improve the quality and completeness of the data coded by the Casemix Coding Department, meetings were set up with the manager of the IT department and the casemix co-ordinator. As a result of this meeting the decision was made to create the Casemix Steering Committee consisting of staff from the Casemix Coding Department and members of the IT department involved with data management.
The Casemix Steering Committee felt that those involved in the clinical side of things needed to be involved, therefore it was decided to meet with the business managers within the hospital as they could liase with medical and nursing staff.
The Steering Committee also felt that the finance department needed to be involved and this led to many further improvements as they were able to provide insight into prioritisation of the data from a costings point of view.
As each department involved with the data throughout the hospital became involved newer and better ideas came to light. Each department became more aware of the requirements of other departments and of the importance of completeness of the data. This led to a much more streamlined and improved data collection process.

INTRODUCTION TO DATA QUALITY

Much has been published on the topic of data quality, what is it and how to define it. There are five dimensions to data quality according to [Canadian Institute for Health Information, 2002], accuracy, comparability, timeliness, usability and relevance.
Accuracy is how well information within a database reflects what was supposed to be collected.
Comparability refers to the extent to which a database can be properly integrated within the entire health information system.
Timeliness examines whether the data is available for user needs within a reasonable time period.
Usability describes how easily the storage and documentation of data allows one to make intelligent use of the data.
Relevance incorporates all of the above dimensions to some degree, but focuses specifically on value and adaptability.

Information manuals are provided by the ESRI to the staff of the Casemix Coding Department to ensure that you know how to code correctly, accurately and completely. Training days are also provided by the Casemix Co-ordinator to ensure data quality is kept high.

DATA QUALITY STANDARDS GROUP

There is a Data Quality Standards group in existence in St. James's hospital.
This group meets on a bimonthly basis to discuss data quality issues. If you require further information on that group or if you have any data quality issues that you wish to highlight please contact Joan Stynes on extension 2514.

The aims of this group are a follows.

Identify and review selected minimum datasets, upon which key hospital management information metrics depend.
Establish the most effective procedures for capturing relevant data and ensuring quality and accuracy.

Draw up data standards and definitions where appropriate, including on-line masterfile tables, user guidelines, training requirements, supervision, and central change control.
Set up appropriate risk measurements and performance indicators to report on level of compliance with acceptable targets. (e.g. number of patients without current GP; wrong public/private status, etc).
To facilitate the implementation and bedding down of new procedures as quickly as is practicable.
This group provides information booklets that have been drawn up for staff of the hospital. These booklets are intended to show staff how to use hospital information systems, how to enter the correct information to the systems and who to contact in the event of computer related problems. There is a specific booklet related to discharge summary forms, this booklet is provided for any doctor who will be filling out a discharge summary form to make certain that they understand the importance of ensuring the discharge summary forms are complete and accurate. This booklet explains to the medical staff that the discharge summary form not only serves as a discharge letter for the G.P. but also how it is used for Casemix. The booklet gives a brief overview of Casemix and how it is used in hospital budgets.

RESPONSIBILITIES WITH REGARD TO THE DATA PROTECTION ACT

The staff of the Casemix Coding Department must maintain complete confidentiality with regard to data at all times. All requests for data should go through the casemix co-ordinator, who will assess whether it is relevant and acceptable to divulge the information in question.

The Data Protection Act of 1988 outlines 8 rules. As you begin to gather your own data for audit is important that you are aware of these rules. If you follow the rules you will have fulfilled your responsibilities with regard to the Data Protection Act.

DATA PROTECTION ACT RULES

See Appendix 1.

ABOUT SELECTING A TOPIC

Care should be taken to choose a relevant topic. It must be of value and it must be something that can be improved upon by going through the audit cycle. [Scrivener et al, 2002] asks the following questions when selecting a topic. Is the topic concerned of high cost or volume? Is there a serious quality problem? Is the problem concerned amenable to change? Is the topic a priority for the organization?
When choosing a topic you should also be aware of the clear distinction between audit and research. The object of research is to discover something new whereas the object of audit is to compare your work practice with existing best practice in the field, then put a plan in place to achieve the existing best practice.

If you can yes to all of the following you will have chosen well.

Is the topic an area of concern?
Is change achievable?
Will you achieve full support when auditing this topic?
Are there resource implications?
Is this a practical area to audit?

Examples of areas to audit

Quality, completeness, legibility of data recorded in medical records
Availability of medical records
Time of discharge to time of coding
Quality, completeness of coded data
Quantity of charts coded
Availability of staff, staff numbers, staff absence
Quality, completeness of data on HIPE and Pas databases
Inconsistencies between HIPE data and PAS data

ABOUT DEFINING OBJECTIVES

Once a topic has been chosen the objectives of the audit must be defined i.e. what do you hope to accomplish by completing the audit? What is the desired achievement?

[Scrivener et al, 2002] maintains that a project without clear objectives cannot achieve anything and that a clear sense of purpose must be established before appropriate methods for audit can be considered.

Examples of objectives

To improve the quality of data captured
To increase the volume of charts coded within one day of discharge
To change the chart journey thereby decrease the volume of charts bypassing the Coding Department after patients discharge.
To ensure all relevant patients on the PAS are downloaded to HIPE system

ABOUT SETTING STANDARDS

A standard is defined by [International Society for Telemedicine and ehealth, 2005] as an accepted or approved example or technique against which other things are judged or measured, or which sets out a set of criteria that serves as a guideline for how something should be done.
Setting standards necessitates a comprehensive review of the latest relevant literature. According to [Casemix Unit, 2005] explicit quality indicators of care are selected in advance in criterion-based audit
There is an international awareness of the importance of data completeness; quality and consistency, many journals, websites and books have been dedicated to the topic therefore it should be possible to set standards based on a literature review. In the event however of published standards being insufficient or unachievable in a particular instance, it may be necessary and is acceptable for the department to develop their own standards.
Standards must be achievable, as consistent failure will cause the participants to become discontented and disillusioned with the audit process. On the other hand it is

pointless to set standards too low as this will not achieve the desired quality improvement and will render the audit process meaningless. The aim is to constantly challenge and improve performance.

EXAMPLES OF STANDARDS

98% of charts must be available to coders within 2 days of patient's discharge.
100% of patient medical record numbers, forenames, surnames, gender and dates of birth must be recorded on Patient Administration System (PAS) on patient's admission.
90% of charts must be coded within one month of patient's discharge.
100% of Drs. must be educated on the importance of accurately completing the discharge summary form.

EXAMPLE OF A WORK PRACTICE VERSUS A STANDARD

In a particular hospital it was decided to audit the number of day case episodes coded per year by a single coder.
A review of six peer hospitals found that the average coder coded 7500 charts per year. The ESRI recommended that each coder should code 7500 daycase episodes per year.
Therefore the standard was 7500 daycase episodes per coder per year.
The hospital looked at the amount of charts coded by each coder and found that there was an average of 7000 daycase episodes coded by each coder.
Therefore the work practice was 7000 daycase episodes per year.
The objective of the audit would be to discover what was preventing these coders from achieving the standard and to make the necessary changes to work practice to achieve the standard.

ABOUT SELECTING MEASURES

Measures refer to the data required to answer the audit question. The first decision to be made is whether it is more appropriate to use new or existing data.

The three main sources of existing data within the Casemix Coding Department are the patients chart, the HIPE database and the PAS database. Much audit within the Casemix Coding Department will concern the review of the data quality of these areas. In many cases however you will have to create new data.
An example of an audit using old data would be an audit of the data quality on the PAS System.
An example of and audit of new data would be an audit of staff satisfaction.
Each data element chosen must be clearly relevant to the objectives and standards for the audit and must unambiguously measure the subject of the audit. Do not collect interesting data if it is not directly relevant to the audit question.

Always be aware of your responsibilities with regard to the Data Protection Act and the ethics of the hospital when choosing measures.

EXAMPLE OF SELECTING MEASURES

In the case of the Casemix Coding Department and depending on the audit in question the measures might be diagnosis, procedures or demographics.
Let us consider an audit of 'length of stay for ICU patients'. Data collected might include

- Diagnosis
- Procedure
- Episode number
- Date of admission
- Date of discharge

Would you include age of patient? This depends on the audit question. If you are using this data to audit bed occupancy rates, the age of the patient though it may be interesting to know would be irrelevant. If on the other hand you were assessing reasons for excessive lengths of stay, age of the patient may be very relevant.

ABOUT COLLECTING DATA

There are many existing methods of data collection. Prior to data collection the audit team must decide on the most appropriate method. The following are some examples of data collection methods.
Review of patient records
Review of computer database(s)
Prospective data collection
Interview
Staff questionnaire
Provided the data collection forms are well laid out, clear and unambiguous it should be possible to involve all team members regardless of experience in data collection. A pilot of the data collection method will quickly indicate any shortfalls or ambiguities in the forms.

EQUIPMENT REQUIRED TO COLLECT DATA

All the equipment that is necessary to collect data is a pen and paper. St. James's Hospital however has a policy of storing all data electronically, so that it is possible to re-use it.
If you contact the Casemix Analyst associated with the team you will be provided with necessary software.

ABOUT DEVELOPING QUESTIONNAIRES

Questionnaires are highly structured forms of data collection and are a very useful method of collecting data for audit. The design of a questionnaire is a time consuming task and requires much consideration as to the type of questions to include. A poorly designed questionnaire may seriously affect the quality of the data collected. A pilot of the questionnaire will quickly show up any problems or ambiguities with the questionnaire.

A questionnaire consists of a series of questions that may be open ended or closed ended. When auditing all questions should be closed ended as the audit is not looking

for opinions but seeking a very definite measurement of work practice. It is necessary however to have an understanding of open ended questions, as a further questionnaire may be required to investigate shortcomings uncovered by the audit. There are pros and cons with each type of question.

Closed ended questions are more structured and may vary from a simple yes/no response to a series of answers that the user must chose. They are generally more difficult to construct but far easier to analyse. A closed ended question that does not fully reflect the opinion of the respondent may lead to it being unanswered.

Open questions are less structured making them easier to construct but more difficult to analyse. They may take longer to fill out but may often throw a new perspective on a problem. Many questionnaires contain a mixture of open and closed ended questions.

EXAMPLES OF DIFFERENT QUESTION TYPES

Closed ended questions

Is the age of the patient recorded in the chart?

YES [ ]

NO [ ]

What age category does the patient fall into?

<= 20 [ ]

21 - 30 [ ]

31 - 40 [ ]

41 - 50 [ ]

61 - 70 [ ]

>= 71 [ ]

Rating Question

On a scale of 1 to 10 rate your job satisfaction in the coding department.

Extremely dissatisfied Extremely Satisfied

0 [ ], 1[ ], 2 [ ], 3 [ ], 4 [ ], 5 [ ], 6 [ ], 7 [ ], 8 [ ], 9 [ ], 10 [ ]

Rank order question

Please rate the following in order of importance with 1 beside the most important and 2 beside the next most important and so on.

What is the biggest contributor to a backlog of charts in the coding department?

[ ] Increased volume of charts

[ ] Inadequate training

[ ] Lack of experience in the department

[ ] Computer down time

[ ] Time spent looking for charts

[ ] Illegibility of physicians handwriting

EXAMPLES OF WELL LAID OUT DATA COLLECTION FORMS

Example 1:

AUDIT TITLE: AUDIT DATE:												
	Primary Diagnosis			Secondary Diagnosis			Primary Procedure			Secondary Procedure		
No	Hipe Code	Audit Code	Error Type	Hipe Code	Audit Code	Error Type	Hipe Code	Audit Code	Error Code	Hipe Code	Audit Code	Error Code
1	R104	R104										
2	T391	T391										
3	J050	J050										
4	J22X	J22X										
5	N390	N390										
6	D823	D823		D696	1B		X298	X298			X352	1B
7	R568	R560	2C	Q891	Q891							
8	J069	J069		B349	B978	3A						
9	C910	C910		R509	D70X	1B		A559	1B		W365	1B
10	J219	J069	1a		B978	1A						

Example 2

Audit Title: Audit Date:							
Episode Number: Specialty: Episode Start Date: Episode End Date:							
Primary Diagnosis		Error Code		Primary Procedure		Error Code	
Diagnosis 2				Procedure 2			
Diagnosis 3				Procedure			
Diagnosis 4				Procedure			
Diagnosis 5				Procedure			
Diagnosis 6				Procedure			
Diagnosis 7				Procedure			
Diagnosis 8				Procedure			
Diagnosis 9				Procedure			

Example 3

Audit Title: Audit Date:			
Medical Record Number	Forename recorded in notes Y/N	Surname recorded in notes Y/N	Date of birth recorded in notes Y/N

ABOUT REPORTING THE DATA

The key to successfully reporting the data is for it to be simple and easily read. Bear in mind that the people who will be involved in audit come from a variety of areas and may not be statistically minded.

Data should be reported in a systematic fashion. Use all of the data. If data is missing be sure and mention it.

Percentages, pie charts and bar charts are useful tools for representing data and are understood by most people.

When reporting data look for consistencies in the discrepancies.

The report of the audit should include the title, aims, objectives, methodology, standards and findings. This report will be used to develop an action plan for improvement.

Any shortcomings in the data must be highlighted and reasons perceived for shortcomings.

REPORT TEMPLATE

Title of Audit

Aim

Overall aim of the audit

Objectives

List the objectives of the audit

Methodology

Method of Data Collection

Data analysis with details of sample size

Standards

The standard set

Details of source/material references

Findings

Simple Statistics

Bar charts/pie charts

Include missing data

Report consistencies in the discrepancies

SAMPLE REPORT

Title

Establish a baseline for monitoring time from discharge of patient to chart arrival in Coding Department.

Aim

The overall aim of this audit is to establish a baseline for monitoring chart journey times from discharge to Coding Department.

Objectives

To assess the chart journey times from discharge to Coding Department.

To identify the source of delays.

To put practices in place to increase the percentage of charts reaching the coding department within one day of discharge.

Methodology

This audit was conducted by providing the coding department with a list containing the name, medical record number and date of discharge of each patient discharged from the hospital. This list was generated from the PAS on a daily basis. As each chart was received in the Coding Department, the date of receipt was placed on the list beside the relevant patient. This survey was recorded over a period of 14 days.

Standard

80 percent of charts to reach the Coding Department within one day of discharge.

Findings

Of a total of 846 charts, 36 reached the target of 1 day from discharge to Coding Department a further 50 reached the department within the first week, 1 during the second week and 757 did not reach the department within the two week period. These figures are shown in a table (figure 1) and a pie chart (figure 2) below and are available further broken down by directorate and consultant on request

Number of days to coding dept	Number of Charts	Percentage of charts
1 day	36/846	4.25%
2 days	13/846	1.50%
3 days	10/846	1.20%
4 days	9/846	1.10%
5 days	11/846	1.30%
6 days	5/846	0.60%
7 days	2/846	0.20%
> 7 days	1/846	0.10%
> 14 days	757/846	89%

Figure 1: Breakdown of chart times from discharge to coding department.

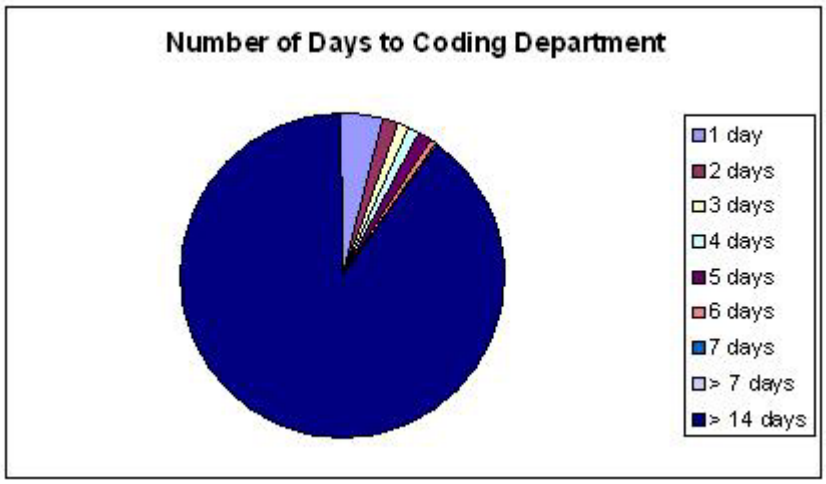


Figure 2: Pie chart representing break down of chart times from discharge to coding department.

Action Plan

The audit team plans to meet with those involved with the chart journey to discover why charts are failing to reach coding department. An improvement strategy will be developed using feedback from this meeting.

Business managers

Medical records department

Ward clerks

Nursing staff

Medical Secretaries

PERCENTAGES, PIE CHARTS AND BAR CHARTS

This page was completely adapted from [Murphy O., 2000] and is not the authors own work. The author made slight changes to the examples given by [Murphy O., 2000] to make them more relevant to the Casemix Coding Department otherwise no changes have been made to [Murphy O., 2000].

Percentages

The word 'percent' means 'per hundred', and is denoted by the symbol %. So 50% of a population means 50 out of every 100, i.e. half the population.

Examples

75% = 75/100 = 3/4

36% = 36/100 = 9/25

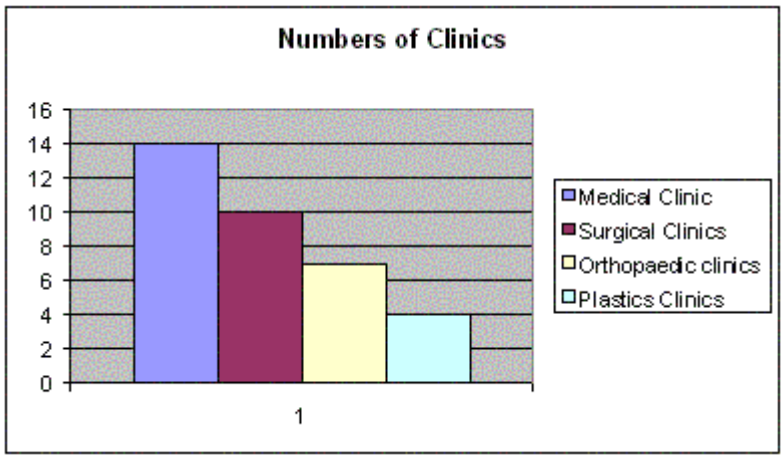
7.5% = 15/100 = 3/40

Bar Chart

A bar chart is a picture used to illustrate statistical data. The height of each bar represents a number. The bigger the number, the higher the bar. The bars may or may not be separated by gaps.

Example

In an outpatient department there are 14 medical clinics, 10 surgical clinics, 7 orthopaedic clinics and 4 plastics clinics.

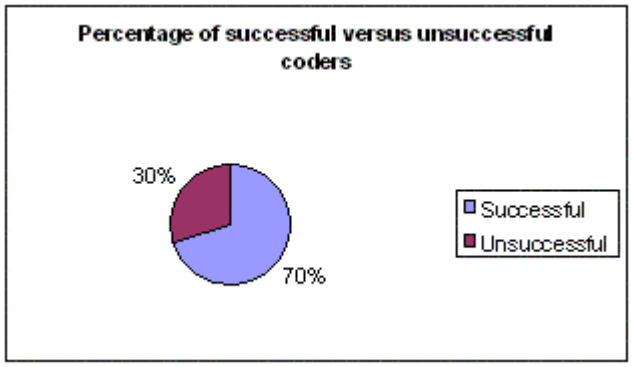


Pie Chart

A pie-chart is used to show, for example, how a population breaks up into subgroups. The bigger the subgroup the bigger the slice of the pie.

Example

This pie chart shows those who successfully code a months data on time and those who don't. 70% code successfully and 30% don't.



EXAMPLE OF A CONSISTENCY IN A DISCREPANCY

An audit was performed by the Casemix Coding Department to discover reasons why charts were not reaching the department. It was discovered that a large proportion of these charts belonged to patients who had died in hospital, thus providing a consistency. This was highlighted in the report. Further investigation found that unlike the majority of discharges these charts were not sent directly to the Coding Department due to the fact that a Death Certificate was required. The office that organised the death certificates were not aware that the charts should go the Coding Department but once alerted to the problem organised for them to be transported directly from their office to the Coding Department, thus solving the problem.

ABOUT CHANGE

The difficulties associated with change have been recognised as far back as the sixteenth century when Machiavelli (1496-1527) is quoted as saying that "There is nothing more difficult to take in hand, more perilous to conduct or more uncertain in its success than to initiate a new order of things. For the reformer has enemies in all those who profit from the old order and only lukewarm support of those who will profit from the new."

Indeed change is often the most difficult part of the audit. When the measures have been reported, the audit team will sit down and identify the required changes and make the necessary recommendations. Decisions will be made on how to introduce and monitor the changes. The actions for change need to be practical and clearly defined. In order to change and improve performance the modern employee needs to think laterally or 'outside the box' and that this involves opening the mind to new possibilities and eventualities, which would previously have been incomprehensible. [Adapted from Tierney et al, 2002]

Resistance to change is almost inevitable, as a hospital by its very nature requires organisational stability. Education and communication are key factors in overcoming this. The reasons and benefits of the proposed changes must be made clear to those affected by the change. A supportive environment must be provided so that those affected are clearly encouraged to voice any concerns that they may have. These concerns must be taken seriously and all attempts made to allay them through a process of education an communication.
A full commitment to change is required. To successfully change work practice a change plan must be put in place.

STEPS REQUIRED FOR CHANGE

The steps for a change plan are as follows

- Establish action required
- Place person or persons in charge of change
- Decide on a date of commencement
- Choose a method of monitoring change
- Decide on a date for re-audit to assess the impact of the change

EXAMPLE OF A CHANGE PLAN

Title of audit - Reduce chart time from discharge to coding office

Action Required

Educate all staff in charge of charts from time of discharge to Coding Department on the importance of Casemix and the importance of sending charts directly to coding office.

Examples of staff involved

Ward Clerks

Secretaries

Porters

Chartroom Staff

Person in charge of change

Jane Smith

Date of Commencement

25 April 2005

Method of Monitoring Change

Daily print out from the PAS showing chart times from Discharge to Coding Department. This report to be shown by department and consultant

Date for re-audit to assess the impact of change

25 August 2005

ABOUR RE-AUDIT

Re-audit is the final step of the audit cycle. It involves going through the steps of the audit cycle again.

Re-audit is a must to establish whether the changes have resulted in an improvement in work practice. It is possible that the audit cycle has resulted in little or no improvement. The cycle must continue until the required standards are met.

This vital step of the audit cycle is often overlooked and the importance of re-audit cannot be over emphasized. Unless re-audit is performed it is impossible to fully

assess whether further changes are required to work practices to achieve the required standards.

If improvements are obvious the stakeholders will be motivated to continue but if none are apparent, apathy or discontent with the audit process may set in. It is the role of the audit leader to motivate, lead and to remain enthusiastic.

END OF AUDIT REPORT TEMPLATE

Title of audit

Introduction

Subject to be audited

Design of project including details of discussions with facilitator

The standard set and details of source/material references

Aim

Overall aim of the audit

Objectives

List the objectives of the audit

Methodology

Method of data collection

Data analysis with details of sample size

Standards

The standard set

Details of source/material references

Conclusions

How did the audit meet its aims and objectives?

How did the results compare to the standards set in the original bid?

What problems were identified?

What educational needs were identified?

A detailed timetable of activity (to assess impact of auditing on department)

Recommendations

How will change be planned in the future as a result of the audit?

What steps will be taken to address educational needs?

Time scale for revisiting the audit cycle.

SAMPLE END OF AUDIT REPORT

Title - Establish a baseline for monitoring data quality (Orthopaedics)

Introduction

This clinical coding audit was carried out to establish a baseline for monitering data quality within the coding office and to establish how data quality compared with national standards. The Coding Department currently consists of 6 clinical coders and 1 co_ordinator. Coding is centralized with all coders assigned to the coding office. Source documents are patient medical records, discharge letters, discharge summaries, histology, etc. There is currently a backlog of charts to be coded, due to illness and until recently under staffing.

AIM

The overall aim of this audit is to establish a baseline for monitoring data quality.

Objectives

The objectives of the audit are as follows:

To assess the accuracy of clinical coding.

To identify the sources of coding errors.

To assess adherence to national standards pertaining to clinical coding.

To create a baseline study of data quality against which the department can be monitored.

To compare accuracy with national standard.

Methodology

This audit was conducted extracting data from patient case notes and comparing with data coded on HIPE system. A selection of 23 completed episodes out of a possible 62 (Orthopaedics) from the month of february 2004 were chosen as the sample size for the purpose of comparing HIPE information to patient case notes.

Standards

Fields	Accurately Coded
Main Diagnosis	75.1%
Secondary Diagnosis	40.6%
Main Procedure	80.6%
Secondary Procedure	89.1%

Findings

Fields	Accurately Coded
Main Diagnosis	65.1%
Secondary Diagnosis	33.6%
Main Procedure	71.6%
Secondary Procedure	76.1%

Conclusions

1. Due to the shortage of staff (long-term sickness, personnel levels below establishment) coders are rushed in attempts to meet coding deadlines. This can be attributed to both self and administrative pressure.
2. The personnel work structure has been adjusted in the last 10 months to accommodate 3 full time coders. The impact will be greater consistency and continuity, and a movement in real time completion date towards the suggested completion date.
3. Until recently, there has been a lack of consistent formal training in the coding department.
4. This is a team of highly motivated clinical coders, although the error rate would appear high in the secondary procedures this can be attributed to one set of notes. Therefore, the image for this area does not reflect the true value of the coding department.
5. Coding efficiency is hindered with the lack of computers with access to all available coding information.

Recommendations

Recommend adjustment in coding pay scale to move more in line with knowledge requirements, job complexity, personnel commitment, and to aid in maintaining morale in department.

Recommend every effort be made to maintain current formal training levels.

Recommend additional computers be procured for the department, with capabilities to perform all functions associated with coding processes.

Signature _____

Date_____

FINAL WORD

Thank you for completing this course. I hope that it has been beneficial and that you now feel confident to participate in your own audits. Audit should become a part of everyday work in the Casemix Coding Department and each member of the team should now be able to distinguish areas requiring improvement and be able to initiate their own audits.

Please click here to provide feedback on the strengths and weaknesses of the course. Your feedback is appreciated and will be used to improve the course on an ongoing basis.

The benefits of audit are proven. A culture of quality enhancement leads to an improved standard of work and results in better use of time and resources.

REFERENCES

1 Tiernan S. D., Morley M. J. , Foley E.(2002) Modern Management Theory and Practice for Irish Students.

2 The Office for Health Management (on line) available: (2005,March, 18) https://elearning.tohm.ie/tohm/tohm2004/progDetail.asp?id=6

3 Principles for Best Practice in Clinical Audit (on line) available: (2005, May, 09) http://www.nice.org.uk/pdf/BestPracticeClinicalAudit.pdf

4 Bury I. Randal J. Clinical Audit and Peer Review made easy. (on line) available: (2005, May, 12) www.pgmd.man.ac.uk/dentistry/AuditPeerReview/

5 Murphy O. (2000) Junior Certificate Discovering Maths 1

APPENDIX 5

5.1 QUESTIONNAIRE A

Please tick one of the boxes to indicate your age category.

< 20 ☐

21 – 30 ☐

31 – 40 ☐

41 – 50 ☐

51 – 60 ☐

> 60 ☐

5.2 QUESTIONNAIRE B

1) Data Quality within the Casemix Coding Department is affected by other hospital departments.

   True ☐ False ☐ Don't Know ☐

2) It is necessary to measure data quality

   True ☐ False ☐ Don't Know ☐

3) It is necessary for management to be involved in data quality initiatives

   True ☐ False ☐ Don't Know ☐

4) You should keep as much information as possible on file as it may be useful someday

True ☐ False ☐ Don't Know ☐

5) There is a group dedicated to data quality within St. James's Hospital

True ☐ False ☐ Don't Know ☐

6) It is necessary that people are aware that information concerning them is being stored

True ☐ False ☐ Don't Know ☐

7) There are defined rules about the use and disclosure of information in St. James's Hospital

True ☐ False ☐ Don't Know ☐

8) You will get blamed if audit highlights poor results
9) The object of audit is to constantly challenge and improve work performance
10) Audit is a form of research
11) When auditing, standards should be kept as high as possible at all times.
12) Which of the following is a good reason to choose and audit topic.

☐ You intend to do some research in the field

☐ You are concerned about a work practice

☐ You are interested in the area

13) It is necessary to perform a literature review before you set an audit standard
14) You can sometimes create your own standards.
15) When auditing it is a good idea to collect extra data as it will save you collecting it at a later date
16) Experience is required when collecting data.
17) The only equipment necessary when collecting data is pen and paper.
18) Name two steps of the audit cycle

a. _____

b. _____

19) Who do you contact if you want to join the Data Quality Standards Group

_____

20) When selecting a topic for audit, change should be achievable