

An evaluation and enhancement of
Clinical Decision Support Software for
Telephone Nurse Triage in the Out Of
Hours setting

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in partial fulfilment of the requirements for the degree of
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I declare that the work described in this dissertation is, except where otherwise stated, entirely my own work, and has not been submitted as an exercise for a degree at this or any other university.

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Summary

Background

The use of clinical decision support software (CDSS) in clinical settings has been sporadic and greeted with scepticism and frustration from users. In a society where human error is becoming more unacceptable, there is a need and motivation to computerise services. Clinical decision support is defined as providing clinicians or patients with clinical knowledge, intelligently filtered and presented at appropriate times. The successful introduction and implementation of clinical decision support software for nurse telephone triage in the out-of-hours setting would benefit other unscheduled care providers (e.g. ambulance service, A&E departments) by reducing inappropriate attendance and as a result, reducing costs.

Aim and Objectives

The aim of the research is to evaluate the CDSS and to implement enhancements towards the improvement of use. The main objectives were to evaluate if the CDSS was being used appropriately by telephone triage nurses, and how can usage be enhanced to maintain the highest standard of telephone triage nursing. The research also investigated whether the use of the software supported the patient and whether non-use of software be seen as negligent in the future.

Methodology

Both a quantitative and qualitative methodology were used in the research. The quantitative results identified themes on the usage of the CDSS. A semi-structured interview was then carried out to investigate fully the key points. The findings were presented to a focus group, and the resulting solutions were integrated into the work flow of the nurse in a controlled experiment. Once this was tested and analysed, the enhancements were integrated into the live setting. The results were quantified and analysed in comparison to the initial calls audited for the quantitative research.

Conclusion and Discussion

The results of the research were very positive. The evaluation and enhancement were successfully completed. The comparison of calls before and after the enhancements showed an improvement in the usage of the software. The overall findings indicated the nurses are extremely happy with using the CDSS, with all interviewees rating the software fantastic or successful.

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Abbreviations:

Clinical Decision Support Software (CDSS)

Nurse Telephone Triage (NTT)

Out-Of-Hours (OOH)

General Practitioner (GP)

Chapter 1 Introduction

1.1 Introduction

Patient expectations for the delivery of health care are increasing. The desire to limit human errors is one of the leading drivers for the introduction of computerisation of services to ensure consistency for processes. This research will evaluate the use of clinical decision support software and will endeavour to enhance current use of the software.

Clinical decision support software (CDSS) for out of hours (OOH) General Practitioner (GP) Co-operative nurse telephone triage services is a relatively new field in the health arena. Telephone triage in Ireland has been identified as a “key point-of-entry tool for patient’s accessing the health system”. [1] Nurse telephone triage (NTT) was integrated into the strategy for primary care by the Irish Department of Health. The strategy emphasises the important role the nurse plays as a key professional in implementing telephone triage services. The strategy also highlights the need to enhance the existing OOH GP Co-operative services available throughout the country and to ensure their further development by investing in the infrastructure and the medical cover available.[1] This will lead to a further investment in computerised software which will thus enhance the role of a telephone triage nurse within unscheduled care.

Clinical decision support is defined as providing clinicians or patients with clinical knowledge and patient related information, intelligently filtered and presented at appropriate times, to enhance patient care. [2] Clinical decision support tools

available at present are not diagnostic. They are designed specifically to support the clinician.

The need for clinical decision support has always been recognised and studies of medical literature have documented those specific needs. A clinician must at all times make safe and effective decisions for a patient. These decisions may not always be consistent as human error will always be a factor, particularly with clinicians who have a wide variety of diverse tasks to complete on a daily basis. A CDSS system can help to reduce these errors and achieve high-quality medical practice. [3]

A clinical decision support system links health observations with health knowledge to influence choices for improved healthcare. [3] CDSS are designed to;

- support the decision maker
- be patient and symptom specific
- be provider specific (developed for clinicians, however GP and nurse scope of practice will be different)
- affect decisions.

The CDSS should combine the knowledge of the user with the context specific data presented.

1.2 Motivation

This research was undertaken to evaluate the use of CDSS for telephone triage nursing in an Out of Hours (OOH) GP Co-operative and the benefits to the nurse and patient. The out-of-hours primary care infrastructure is underdeveloped and fragmented in Ireland; liaising between primary and secondary care is not effective

with many hospital services inappropriately providing primary care services. [1] The introduction of effective out-of-hours cooperatives and the development of nurse telephone triage can help prevent inappropriate attendances to other unscheduled care providers (e.g. Ambulance and hospital A&E units).

The successful introduction and implementation of a CDSS in the out of hours setting would help to improve nurse telephone triage and ensure patients received the best evidence based advice and education. This would also benefit other unscheduled care providers by reducing inappropriate attendances, and reducing the already overburden hospital system, and as a result reduce costs.

1.3 Objectives and methodology

The objectives of the research are to analyse the benefit of CDSS to the nurse telephone triage process and the resulting benefit to patient care. The research investigated the benefits / problems encountered using CDSS, and the impact on nurse telephone triage.

The research explored 4 key areas;

- 1) Are the nurses using the clinical decision support appropriately?
- 2) How can the use of the CDSS be improved to maintain the highest standard of telephone triage nursing?
- 3) Does the CDSS support the patient scenario?
- 4) Could non-use of CDSS be negligent in the future?

Both a quantitative and qualitative approach were used in the research. The quantitative approach identified emerging themes by analysing calls where the CDSS

was used. A semi-structured interview was then compiled to investigate the key points pertaining to the use of the CDSS. The interviewees were all qualified telephone triage nurses' currently using CDSS to triage patients in the OOH GP Co-operative setting. After the initial findings and analysis of the interviews the information was presented to a focus group and proposed solutions were considered for integration into the telephone triage nurse assessment and the CDSS.

These solutions were implemented in a controlled experiment by integrating them into the training environment of the telephone triage nurse workflow. The training system was tested extensively by a focus group. Once the system was tested and the results analysed, any amendments and corrections were integrated with the live telephone nurse triage assessment.

In the live environment, the solutions were tested by a small group of nurses before full roll out to the rest of the telephone triage nurses commenced. The results of this were reported back to quantify and analyse if there had been a benefit to the CDSS.

The research completed prior to this research on CDSS for nurse telephone triage, particularly in Ireland, is limited. A research piece conducted in the UK by O'Cathain et al explored "Nurses' views of using computerised decision support software in NHS Direct". [4] The research focused on how the nurse interacted with the software and opinions on how each nurse felt about the software. It did not evaluate the software itself, and while some findings were similar to those found in this research, identifying the reasons behind the nurse's views or how the use of the CDSS could be improve were not investigated.

The evaluation of a CDSS for nurse telephone triage in Ireland therefore provided a unique opportunity to explore and further develop a new area of Health Informatics. OOH GP Co-operatives are expanding and developing constantly with remote assessment widely used as a point of access for patients to health care. Clinical decision support software and information and communications technology is pivotal in delivering this remote assessment. Cases finished by nurse advice alone account for approximately 1/3 of all calls to an out of hours service. [5] This demonstrates the necessity for a complete and functional evidenced based CDSS that supports the telephone triage nurse and the patient moving forward.

1.4 Summary

This research explored the use of CDSS and identified areas to improve usage, training, monitoring and future adaptation and developments. The areas identified for improvement were taken forward and implemented to further enhance the use of the CDSS and support the role of the nurse.

1.5 Thesis Outline

Chapter 2, state-of-the-art and domain description explains what CDSS and nurse telephone triage are and what the role of both are in the area of health. This chapter also describes what is currently available in Ireland for CDSS and what research has been done to date in the area. The chapter then gives a description of the research domain and defines the CDSS used in this research.

Chapter 3 describes the main objectives of the research and the background and context in which the CDSS will be assessed. The chapter describes in detail the call

assessment process and how the CDSS integrates with the telephone triage nurses working environment. The chapter then describes the call selection process for the research and the quantitative and qualitative methodology used.

Chapter 4 summarises the findings of the quantitative audits and qualitative interview results. From these results themes emerged that highlighted how the CDSS was used by the telephone triage nurse.

Chapter 5 evaluates the major findings of the interviews and the proposals put forward to enhance the use of the CDSS. The chapter discusses the proposals put forward to a focus group. The chapter follows the progress of the focus group and evaluates the final proposals agreed upon.

Chapter 6 describes the integration of the proposed solutions presented to the focus group. This chapter details the results and findings of how the solutions integrated into the work environment, and the benefit and improvement to the use of CDSS.

Chapter 7 summarises the research carried out and the most important findings. The chapter goes on to describe the limitations of the study and possible future work.

Chapter 2 State-of-the-art and domain description

2.1 Introduction

This chapter investigates current understanding and uses of clinical decision support software as it pertains to nurse telephone triage. It also describes the research domain for this thesis.

2.2 Nurse Telephone Triage

Nurse telephone triage is a process that requires a nurse to prioritise the callers' health problems according to their urgency. The nurse must make safe, effective and appropriate decisions by telephone and must educate and advise the caller. Telephone triage is not face to face and therefore it is not diagnostic. The basic aims of nurse triage are to establish,

- does the patient need to be seen,
 - and if so
 - by whom
 - where
 - and how urgently?

If the patient can be advised, the nurse needs to ensure that the advice given is consistent and evidence based.

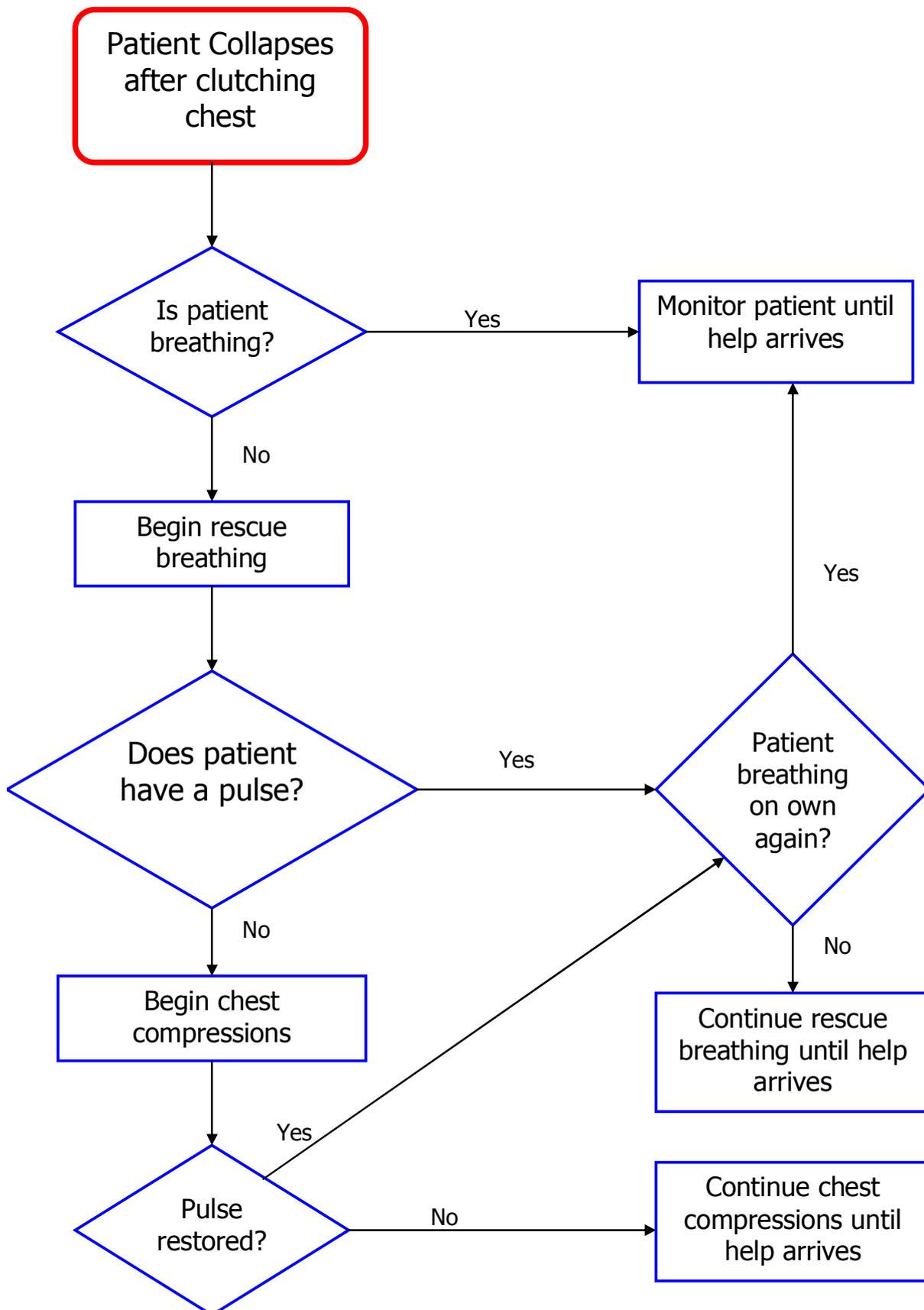
2.3 Computerised Clinical Decision Support

Computerised clinical decision support systems are designed to support clinical decision making about individual patients at a point in time. CDSS are patient specific and affect decisions regarding the patient's well being. Computerised CDSS appear in different forms. Four examples are

- 1) the use of algorithms with a predetermined set of questions to assess the patients' symptoms and provide a triage recommendation for the nurse
- 2) the use of guidelines, based on a decision tree principle, to provide triage recommendation for a nurse
- 3) the use of guidelines, that prompt questions to draw attention to critical symptoms, but do not impose a fixed triage recommendation for the nurse
- 4) the use of a specific algorithm or guideline, where the nurse asks a series of set questions, enters the patients' answer, and considers the recommendation of the software [4]

The chosen software for this research uses a trinary logic structure to eliminate and out rule the most emergent symptoms of a patients' condition. The algorithm automatically triggers a specific follow-up question response from the answer given by the patient (yes, no, unsure) to reach an appropriate level of care. [Appendix 1] The CDSS provides context specific knowledge and evidenced based advice for nurse telephone triage in the OOH setting. The CDSS facilitates the application of clinical knowledge for over the phone triage of patient symptoms. By following the structured sequence of the algorithm questions, the possibility of missing an aspect of an illness is reduced and therefore minimises errors. The very basic sample algorithm below is indicative of the structured logic used in the CDSS. [Figure 1]

Approach to the unconscious heart attack victim



[Figure 1] Basic Sample Algorithm

Sheridan et al “Degrees of Computerisation” suggest a scale ranging from the computer offering no assistance (Level 1) to where the computer acts autonomously and decides everything for the human (Level 10). [6] Clinical decision support is generally acceptable at level 5 when it is achievable, as it is most effective at this stage. The computer executes the selection if the human approves. [6, 7]

The chosen clinical decision support software is at a level 3. The computer narrows the selection down to a few. Most systems that are currently in use are at level 1 stage, with some at level 3. In the health arena different levels will be appropriate for different situations.

2.4 Current Climate for telephone nurse triage and CDSS in out-of-hours GP Co-operatives

The introduction of CDSS for out-of-hours Co-operatives has been inconsistent across the world and as a result their usage is not always greeted with confidence. Clinical guidelines are in general a problem as they are difficult to integrate into a best practice clinical working environment. Knape et al state that the guidelines “are in a narrative format on paper or electronic file and therefore difficult to incorporate into clinical practice”. Knape et al also state “their usage in clinical environments has been disappointing”. [8] The CDSS endeavours to enhance the use of guidelines for nurse telephone triage.

The safety and effectiveness of nurse telephone triage in an out-of-hours co-operative was investigated in the U.K. in 1998 by Lattimar et al. The outcome was extremely positive. Patients were increasingly accepting of telephone triage consultations as access to medical advice and satisfied with the information given. General

practitioners had decreased their workload by 50%, which reduced their overall workload, by leading to reductions in home visits and surgery attendances, without any adverse affects to the patient. [9] This paper makes reference to specially trained, experienced nurses dealing with the consultations, but does not make reference to any CDSS in use.

A later study carried out by Lattimar et al, at the same co-operative in the U.K. over the period of a year (January 1997 – January 1998) evaluated the economic viability of nurse telephone triage. The study took into account every patient that made contact with this one particular out-of-hours co-operative. The result was that the intervention of telephone triage had helped to reduce admission to A&E departments and thus reduced the long term costs to the NHS. Patients were also less likely to be admitted to hospital, and if they were, it was a short stay of 1-3 days. Therefore nurse telephone triage is cost effective and beneficial to the health system. [10] This cost analysis defines that nurse telephone triage consultations were carried out by experienced, specially trained nurses using decision support software. Unfortunately this does not give any indication of the increase / decrease in workload to GP's to compare to the previous study. It also does not investigate fully if the CDSS benefited the nurse telephone triage.

A similar study was carried out for nurse telephone consultations in hours by Pinnock et al in a general practitioner surgery for patients suffering with asthma. The general principle of the nurse telephone triage differs as the patient has not requested the consultation, it is a routine review. However, the perceptions of nurse telephone triage were the equivalent to response given in previous studies; patients are satisfied with

telephone consultations, and general practitioners time can be used more efficiently.

[11]

In contrast, a study completed in-hours, in a general practice for same day appointments, found that while the same day appointments were reduced, routine surgeries were busier. It also found that the triage was more costly because of an increase in nursing triage time, and an increase in patient attendance to out-of-hours services and emergency departments. [12] The triage system specified here does not give a complete picture, as it would appear all calls that were triaged were eventually seen no matter what. There is also no mention of a specific CDSS but of protocols that were developed by the practice and computerised.

A study carried out in Dutch out-of-hours primary care identifies that telephone nurse advice alone (no referral to A&E / GP etc) varies considerably between each co-operative. [13] A criticism of this paper is that it is not an accurate view of the telephone triage alone as further in the paper it is reported that not all Dutch GP co-operatives use computerised systems or CDSS. Most make use of broad written guidelines that were developed by the Dutch College of General Practitioners; and even these protocols only cover more acute medical problems. [13] Consequently, as a rule triage assessments for routine advice calls have no set guidelines and therefore no consistent outcome can be measured.

The variation in decision making by telephone triage nurses using CDSS has been investigated but the reasons are still unexplained. Nurses' attitude to risk was put forward as an explanatory factor, but regardless of experience or personal assessment

of risk, no common factor could be found. [14] This further supports the need for a CDSS that is structured and clear and underpins a nurses' clinical knowledge; that will help support the nurse regardless of their background and allows the nurse to work safely within their scope of practice as determined by An Bord Altranais, to ensure all vital questions pertaining to a medical complaint are asked and prevent important questions being missed or over-emphasis being placed on other presenting symptoms.

In Australia, trials were sponsored by the government to address problems with out of hours care in different parts of the country. The main aim was to improve the quality of service by incorporating patient satisfaction and accessibility to the service. The trial concluded that there was both patient satisfaction and GP satisfaction with the use of nurse telephone triage and advice. [15] This finding is in agreement with a survey carried out by an Irish out-of-hours GP Co-operative where 98.1% of people were happy with accessibility and 100% of patients were happy with nurse telephone triage. [16] Again however, as with the study for Dutch out-of-hours, both the trial and survey do not specify when and where CDSS was in use but give a vague description of 3 categorical possibilities;

- 1) Paper-based system, no computer used
- 2) Computer used, with a paper based system
- 3) Computer and CDSS utilized.

No definite impact on the out-of-hours services can therefore be obtained from these research pieces.

The resulting widespread use of many nurse telephone triage models causes the evaluation of triage to become very difficult. Paper guidelines and protocols may steer a nurse in the right direction, but are not embedded into their work flow, which leaves room for error and can be seen as a nuisance that obstructs rather than enhances the work. Guidelines are unstructured and there is no algorithmic flow, which leaves them prone to incorrect interpretation.

NHS Direct began in 1998 as a 24 hour help line to assess the needs of the patient using CDSS to determine if the patient needed to be seen, and if so, by whom, and how urgently. Uncertainty surrounded nurse triage at this time, and it was argued that NHS Direct had been started without adequate evaluation. NHS Direct used the CDSS – Plain software telephone advice system (TAS). TAS CDSS offers the patient home care advice or the option for referral to another health care agency (hospital, A&E etc). [17] TAS is broad based software that takes into account many different medical complaints and is not very specific. TAS software is in use in various primary care settings including ambulance services, health advice lines, emergency care settings and GP out-of-hours services. [18] As indicated above, the software, while it can be used in out-of-hours GP Co-operatives, is not specifically designed for this.

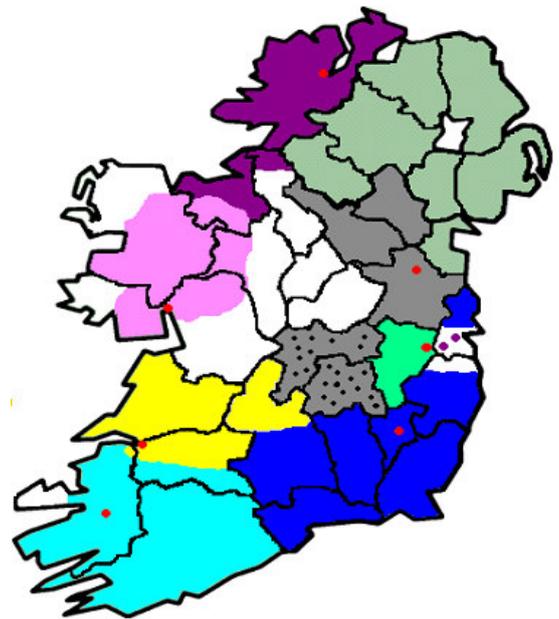
In June 2001, NHS Direct carried out an evaluation of the TAS software and opted to change over to the CAS system. The CAS CDSS is algorithmic and evidence based and includes clinical content that is consistently updated to reflect best clinical practice within the U.K. [19] The CAS CDSS, like TAS, is not specifically designed for out-of-hours services however and can be time consuming and meandering as they

are not designed to interpret and meet the immediate needs of patients calling out-of-hours GP Co-operatives.

2.5 Nurse Telephone Triage and Clinical Decision Support Software in the Out-of-hours Irish Setting

There are currently 11 Out Of Hours GP co-operatives in the Republic of Ireland [Figure 2]. 3 co-operatives are using a CDSS system. For the purpose of this research Caredoc, the co-operative in the south east of Ireland, was chosen. Caredoc provides nurse triage for approximately 1,200,000 people living in counties Carlow, Kilkenny, South Tipperary, Wexford, Waterford, South Wicklow and North Dublin.

- Caredoc – Blue
- Ddoc- Blue (North Dublin)
- Southdoc – turquoise
- Nowdoc – Purple
- Westdoc – Pink
- K-Doc – Green
- Shannondoc – Yellow
- North East Doc – Grey
- Middoc – Grey Polka dot
- DL / DUB Doc (Dublin) – White with purple dots (South Dublin)



[Figure 2] Map of GP Co-operatives in Ireland

2.5.1 Description of an out-of-hours GP co-operative using the chosen software

Caredoc is an Out Of Hours GP co-operative, established in 1999, to provide a high quality easy accessible family doctor service for urgent medical problems outside of normal surgery hours. Caredoc has 290 member doctors with 23 doctors on duty at any one time. The service operates from 6pm to 8am Monday to Friday and on a twenty four hour basis at weekends and Bank Holidays.

All calls to the service are triaged. The service handles an average of 4,500 – 5,000 calls per week, with an increasing volume at busy periods throughout the year.

Caredoc has handled over 1,000,000 calls since June 1999. Since the introduction of the CDSS in May 2004, all calls are triaged by the telephone triage nurse using the clinical decision support system.

The Caredoc call centre comprises 34 work stations that run a client application from a main cluster server. Each call made by a patient to the Caredoc service is logged and monitored by a call handling software system, Adastra Software Limited. [20] The patient record is uniquely identified within the software and stored in a central database. The CDSS is embedded into this software. Each clinician who interacts with the patient can access this record. After each consultation in the out-of-hours service, a report is automatically generated and delivered to the patients own GP for the next day of surgery.

2.6 Defining the Clinical Decision Support Software System used in the Research

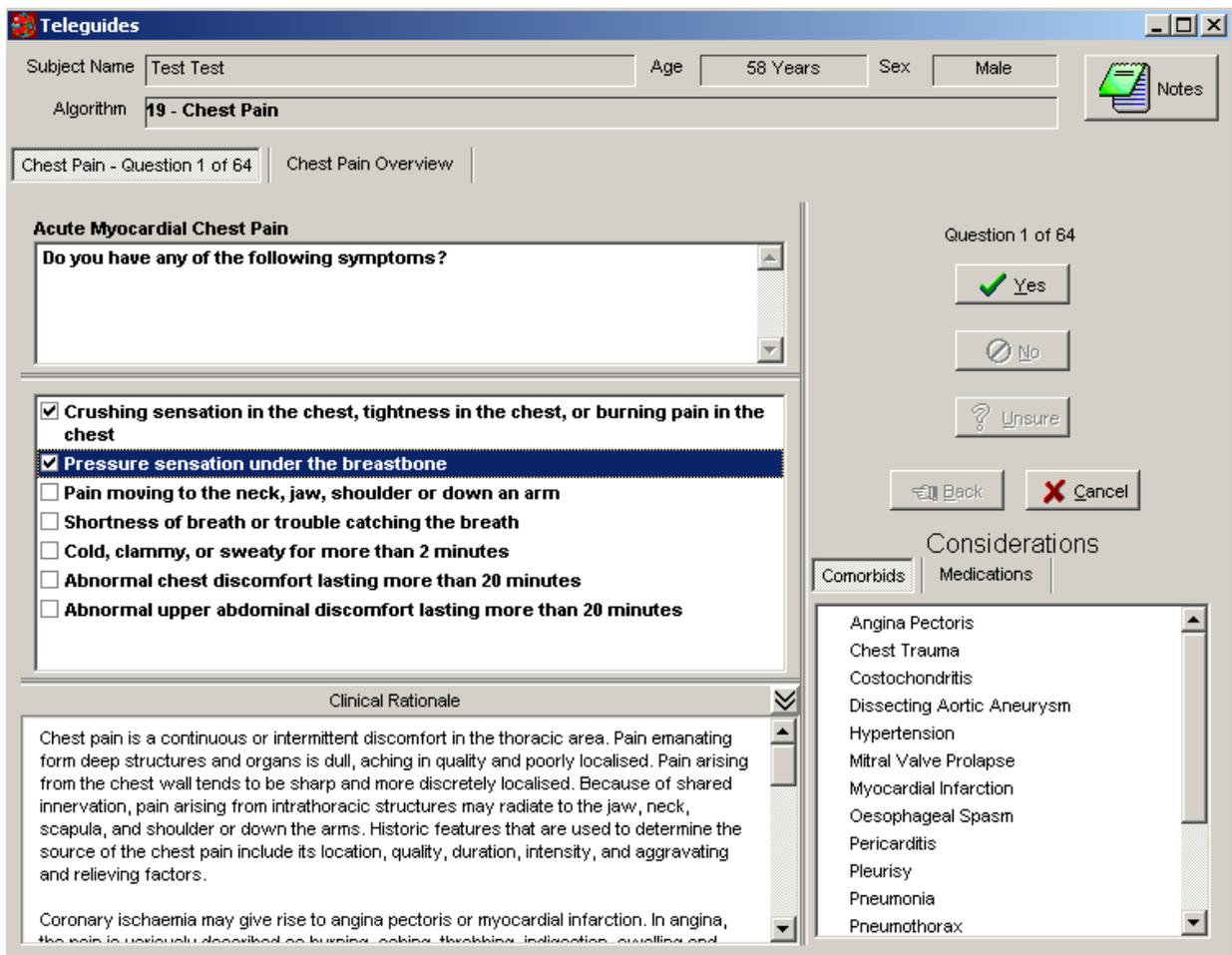
The clinical decision support software began development in 2002 and was designed specifically for nurse telephone triage in out-of-hours services. The first 30 teleguide algorithms were piloted in Caredoc in May 2004. Full roll out commenced in

November 2004. The CDSS provides over 200 algorithms to telephone triage nurses.

[Figure 3] The software was developed to support telephone triage nurses in making safe and effective decisions, reaching appropriate levels of care and educating patients by telephone. [21]

While it is recognised by out-of-hours care providers that nurse telephone triage has an important role in the development of the service and any introduction of CDSS will improve the consistency of decision making by nurses, [1, 15] thought must also be given to the embedding of the CDSS into either existing software or as a standalone model. The CDSS must complement the clinician and their workflow, not hinder or be perceived as an annoyance.

The chosen software is embedded into the nurses work flow which promotes ease of access and does not allow the CDSS to become a nuisance. [22][Figure 3] In 1999 it was obvious that effective and efficient access to evidence-based medicine had become the standard for quality medical practice. [23] This is promoted by the clinical decision support software system.



[Figure 3] CDSS embedded into the call software management system

Research carried out in 2005 also demonstrated that health care delivery often falls short of optimal, evidence based care. [24] The TTN must also adhere to their code of professional practice in providing evidence based care to all patients requiring services. [25] The CDSS adheres to this and endeavours to achieve the highest standard in clinical practices. The CDSS provides features such as;

- a clinical rationale to explain why a question is being asked
- symptoms overviews to focus on the differential diagnosis of the medical complaint
- pharmacologic considerations
- Co-morbid and medication considerations [26]

McGowan et al (1999) states “Current clinical decision support software programs vary both in content and in logic algorithms”. [23] The CDSS has established a thorough and constructed set of trinary logic algorithms that improve greatly on this. A telephone triage nurse asks a patient a question relevant to their condition; each question branches into 3 answers depending on the patients response (Yes, No, Unsure). The answer triggers an automatic specific follow-up question and so forth until there is enough information gathered on the patients’ condition to enable the nurse to reach an informed and safe level of care / disposition.

2.7 Summary

As has been highlighted from the above research, nurse telephone triage is a now widely accepted by patients and patients are happy to receive advice. CDSS is also extremely beneficial to clinicians, yet no evaluation of the performance of the software has been completed to date. Subsequently it has become apparent that there is no clearly defined and well supported evaluation of the use of CDSS for nurse telephone triage in the out of hours setting. Reports are conflicting and diverse, as any evaluations carried out have involved telephone triage guidelines and protocols which are open to interpretation and errors, and the research has not specified exactly what type of triage has taken place.

Chapter 3 Context background and methodology

3.1 Introduction

This chapter describes the main objectives of the research and the background and context in which the CDSS will be assessed. The chapter describes in detail the call assessment process and how the CDSS integrates with the telephone triage nurse work environment. The chapter then describes the call selection process for the research and the quantitative and qualitative methodology used.

3.2 Objectives of research

The objectives of the research are to analyse the benefit of CDSS to the telephone triage nursing process as it pertains to patient care. In evaluating the CDSS and to achieve maximum benefit from the resources and information available, both a qualitative and quantitative methodology was applied in this research. The results from these studies were then formulated into a working plan towards enhancement of the CDSS.

The study group consisted of telephone triage nurses working in the Caredoc out of hours GP Co-operative.

3.3 GP Co-operative background and nurse telephone triage call flow and process

The Caredoc service operates for 120 hours every week. During these times, a patient rings a central number and their call is logged by a trained call handler on to an expert call centre management system. [20] The call management system, the Aداstra Software System, was developed specifically for managing patient records in the out-of-hours setting and provides a complete picture for each clinician (nurse or doctor) involved in the patients treatment. A call handler takes the demographic details of the

patient and their main presenting symptoms. The call is then prioritised according to the patients' symptoms and given a priority of emergency, urgent or routine.

In the case of an emergency, the caller is put directly through to speak with the nurse, who immediately triages the call and organises the appropriate level of care for the patient. For non emergency calls a telephone triage nurse will ring the patient back. The triage nurse carries out a full assessment of the patient's symptoms and reaches an appropriate level of care / disposition.

3.3.1 Nurse Telephone Triage Assessment Process

The telephone triage nurse is the manager of care in Caredoc and all calls to the GP OOH service are triaged. Telephone triage is a process that requires the nurse to speak with the patient or caller and to:

- Prioritise the callers' health problems according to their urgency
- Make safe, effective and appropriate decisions by telephone
- Educate and advise the caller

Telephone triage assessment is:

- Not face to face
- Not Diagnostic

The basic aim of nurse telephone triage is to establish –

- Does the patient need to be seen by a duty doctor or advised by a telephone triage nurse:

- If the patient needs to be seen - Where, by whom & how urgently
- If the patient needs advice - that it is evidence based advice

100% of calls received by the service are triaged by specialist trained telephone triage nurses. Approximately 33% to 34% of calls are completed with self care advice.

The triage nursing service consistently receives a satisfaction rating by patients in excess of 95%. [16]

The nurse has the following levels of care available for use:

1. 999
2. A & E and Hospital Referral
3. Calls passed to Duty Doctor
 - I. Emergency Doctor Consultation
 - II. Urgent Doctor Consultation
 - III. Routine Doctor Consultation
 - IV. Doctor Advice
4. Patient to made appointment with own GP within 4 hours
5. Patient to make appointment with own GP within 1 to 3 days
6. Nurse Advice according to documented home care treatment

3.3.2 Nurse Telephone Triage Training Process

Each telephone triage nurse undergoes intensive training which involves orientation, CDSS training, observation and listening skills, demographic training supervision, ongoing monitoring and evaluation.

The CDSS aspect of the training has several learning outcomes and involves thorough laboratory time and practical training. The main aspects are:

Learning outcome:

- To understand the role of the algorithms in triage settings
- To understand the legal issues regarding telephone triage nursing and apply the principles of confidentiality and documentation standards when processing a call using the CDSS
- To navigate the CDSS correctly
- To use the CDSS system competently

CDSS training includes:

- Background to the CDSS
- Principles of effective triage
- Exploring essential skills necessary
- Getting to know the CDSS
- Scenarios workshop using CDSS
- Laboratory time
- Legal aspects
- Exploration of Clinical Rationale

- Overriding Dispositions
- Symptom based triage
- Choosing an Algorithm scenarios
- Role Play

The extensive training continues throughout the nurses' career with constant updating and evaluation. Each nurse must work a minimum number of hours each week to keep themselves up skilled and attend training courses and workshops throughout the year. Yearly "refresher" training courses are held, and any upgrades to the CDSS involve extra training.

3.4 Call Selection Process for Research

Calls were selected on a random basis and consisted of routine, urgent and emergency calls with varying degrees of outcomes. Calls were ended after triage by nurse advice, doctor advice, treatment centre visit, home visit or referral to hospital. The calls were selected from busy and quiet periods of the day and night.

All calls were triaged by nurses from different clinical backgrounds and with different triage experience, both in length of time triaging, and type of triaging (i.e. nurses who had triaged patients over the phone using a paper basis, nurses who had triaged patient over the phone using paper and eventually CDSS, and nurses who had only ever triaged patients over the phone using CDSS). A multitude of patient symptoms were triaged in the calls selected, and each nurse had their own relevant knowledge and experience.

3.5 Quantitative analysis

As part of the quantitative analysis for the research, two assessment techniques were used to evaluate the use of the CDSS by the nurses; a clinical audit review and a reflective practice session review. From both these reviews, comprehensive information was attained to document the use of the software by the nurse and identify emerging themes. As both assessments review the full nurse triage and not specifically the use of the CDSS, it was necessary to combine both results to identify a preliminary list of topics to investigate.

3.5.1 Clinical Audit

The calls were clinically audited by a qualified CDSS trainer using an internationally accepted standard that supports best practice and learning. The assessment involved listening to the call between the nurse and the patient, following the call on a hard copy of the patient record which shows how each question and sub question of the algorithm was answered by the nurse and what direction and decisions the nurse made with the CDSS. ^[Figure 4] The call is then graded using a “Clinical Audit Sheet” ^[Appendix 2] with commentary relating to how the call was handled by the nurse and how correct and effective the use of the CDSS was.

As can be seen from Figure 4; the demographics of each patient are shown. Under the demographics the tab “Teleguide Assessment” contains the clinician name (i.e. the telephone triage nurse), the nurse assessment notes and the “Assessment details” of the triage. The nurse assessment notes contain an initial “pre-triage assessment” which must be completed by each nurse to help identify the chief complaint and as a result select the correct CDSS algorithm. The “Assessment details” of the triage

contains the output of the CDSS algorithm used by the nurse. This is a list of all questions asked by the nurse pertaining to the algorithm.

In conjunction with the patient and nurse voice data the CDSS trainer follows the flow of the call to assess the use of the software and to identify the strengths' and weakness' in each interaction between the patient and the nurse. It is clearly identifiable from the notes if a nurse has followed the CDSS correctly or what aspects have been missed / misinterpreted. Each review takes approximately 30 – 40 minutes.

Case # 51842 No locked cases Current Location test test test test

Patient: Test J Test 27-Feb-84 (24 years) Only show status for cases at this location

Phone: Return No: 00441233722700 Waiting for Triage 0

Database Search

Patient Details Event List Previous Encounters **Teleguide Assessment**

Clinician: [] 07-Aug-08 17:00:26 BST 07-Aug-08 17:02:13 BST

Notes
Patient fell while walking the dog. Patient happy with advice.

Assessment details

- Arm Injury [07-Aug-08 17:00:37]
 - Do you have any of the following symptoms? [07-Aug-08 17:00:37]
 - Part of a limb obviously deformed or going in a different angle than normal
 - Joint seems to be out of its socket
 - Large bulge formed in one of the muscles
 - Did the injury involve any of the following factors? [07-Aug-08 17:00:37]
 - Fall from a significant height (more than 5 feet or 2 meters)
 - Involved in motor vehicle accident or crash
 - Blunt trauma or force
 - Hit as a pedestrian by a motor vehicle
 - Has the skin been cut or torn? [07-Aug-08 17:00:37]
 - No
 - Do you have any pain or swelling over a bone? [07-Aug-08 17:00:37]
 - No
 - Did you pull or yank the arm or fall on the arm in the past 48 hours? [07-Aug-08 17:00:37]
 - Yes
 - Has the swelling or bruising been increasing over the past 24 hours? [07-Aug-08 17:00:37]
 - No
 - Do you have pain that is getting worse in the area of the injury? [07-Aug-08 17:00:37]
 - No
 - Is there pain in the arm or hand only with movement? [07-Aug-08 17:00:37]
 - No
 - Have you tried to control the pain or symptoms with analgesic medications and other physical measures and have the measures n
 - No
 - Give Appropriate Self Care Advice and Inform the Caller that they must Contact their Own Surgery to be Seen over the Next
 - Self Care - Injury-Muscle Sprain
 - Give Appropriate Self Care Advice and Inform the Caller that they must Contact their Own Surgery to be Seen over the Next 1-3 Da
 - Self Care - Injury-Muscle Sprain
 - Rest the affected limb.
 - Elevate the injured area to reduce swelling.
 - Try not to use the strained muscle while it is still painful.
 - Apply covered cold compresses at once. Reapply for 20 minutes every 3-4 hours for the first 24 hours. Do not apply ice direc

[Figure 4] Embedded CDSS algorithm in the call management software

The clinical audit sheet assesses the call under 3 main headings;

- 1) Introduction,
- 2) Evaluation / assessment
- 3) Level of care reached and closure of call

Within each section there contains a number of clear criteria to measure how effective the nurse was in the overall management of the call; taking into account how the nurse deals with the patient, listening skills etc. Each criterion is scored (0 = Criteria not met, 1 = Criteria partially met or 2 = Satisfactory standard; If a criterion is not applicable to a scenario, full marks of 2 are awarded). An overall mark is then given to the call with a mark of 38 needed in order to achieve a pass score. A maximum score of 50 marks can be attained.

The main evaluation criteria relating to the CDSS are assessed as follows:

Introduction

- Age Check
- Pre Triage assessment
 - Duration/Location/Severity
 - Relevant Past medical history / Allergies (relevant)
- Identify the chief symptom(s)
- Selection of the most appropriate Teleguide

Evaluation/Assessment

- Use of Teleguide questions and sub-questions

- Appropriate use of open and closed questions “Do not answer the questions for the patient”
- Critical thinking
 - “Chooses yes/no/unsure appropriately”
- Pertinent information only documented (Notepad)
- Arrival at appropriate level of care
- If overriding level of care reason must be documented

Level of care reached and closure of call

- Home Care Instructions given
- Worsening instructions given / call back
- Length of Consultation acceptable

40 nurses took part in the clinical audit. Each nurse had varying degrees of experience in the out of hours setting; nurses who have triaged using paper based guidelines before CDSS, nurse who had only triaged using a CDSS . The length of time each nurse had spent using the software varied between 5 months to 4 years. A total of 102 calls were audited. The most common emerging themes applicable to the use of the CDSS were identified.

3.5.2 Reflective practice session

Reflective practice sessions were used to further help categorize the common themes arising from the use of the CDSS. For this research 22 calls used in reflective practice sessions were reviewed.

An Bord Altranais states “nurses should be competent reflective practitioners”. It is also noted that “Telephone triage nursing lends itself particularly well to reflective practice. In very few other nursing roles has the nurse got access to the entire event, as it happened as opposed to relying on call back, memory or another persons interpretation of what happened. The recording of the interaction between nurse and patient “tells it as it is” there is no need to distinguish between reflection and recollection.”

Reflective practice provided the telephone triage nurse with the opportunity to listen to their call, with their peers, and review the call critically. It creates awareness for the telephone triage nurse to help identify and learn from their strength and weakness in CDSS.

The reflective practice was carried out using the Gibbs model [Appendix 3]. This allowed the nurse to be reflective on their use of the CDSS and comment on their use of the algorithms within the CDSS. The Gibbs model reflects on how the nurse was feeling at the time and why the nurse chose to take a certain pathway within the CDSS. This helps identify where a patient has answered “Yes” to a specific question, and the nurse has replied “No” to the algorithm, what was the rationale behind it, and did the nurse explain the decision anywhere in the triage notes.

3.6 Qualitative research

From the results of the quantitative research a comprehensive semi-structured interview was composed to get the perspective of individual telephone triage nurses to help investigate fully the themes that emerged. [Appendix 4] The semi structured interview was chosen and developed to investigate and fully explore the most prevalent findings of the quantitative research.

A semi structured interview was conducted on a one-to-one basis. Each interview lasted approximately 30-40 minutes. A semi-structured arrangement was chosen as it allowed the interviewer to delve further into responses given to get the maximum benefit and response from the questions asked. It allowed the interviewee to elaborate freely on certain aspects, and it allowed for the interviewer to seek clarification as required.

The interview contained open and closed questions. Some questions were designed to attain basic information (length of timing using the CDSS etc) and further questions were designed to allow the interviewee to expand as necessary on opinions on using the software, and to allow for user input for recommendations on how the CDSS could integrate more smoothly with the telephone triage work flow

The interviewees were full time telephone triage nurses currently using CDSS in the OOH GP Co-operative setting. The participants were contacted by email / phone and the interview was conducted at their place of work at a time convenient to them. The purpose of the interview was explained. Any results and findings gained would be

presented to a focus group for discussion, and appropriate solutions to benefit the telephone triage work flow process would be submitted for inclusion.

3.7 Summary

Upon completion of the interviews, an evaluation of the findings from both the qualitative and quantitative research took place to analyse any consistencies that occurred in the interviews and audits. It identified emerging themes, which upon examination, impacted on the CDSS and the nurse telephone triage.

Chapter 4 Findings and results

4.1 Introduction

This chapter summarises the findings of the quantitative and qualitative results. From these results themes emerged that highlighted how the CDSS was used by the telephone triage nurse.

4.2 Quantitative Results

The combined quantitative results identified the main emerging themes that were determined by the research question to evaluate and enhance the use of clinical decision support software in the out of hours GP co-operative setting. The list of topics reflected the research question and the 4 key areas of interest;

- 1) Are the nurses using the clinical decision support appropriately?
- 2) How can the use of the CDSS be improved to maintain the highest standard of telephone triage nursing?
- 3) Does the CDSS support the patient scenario?
- 4) Could non-use of CDSS be negligent in the future?

The topics identified were categorised and listed in order of frequency. [Table 1]

List of Problems encountered in order of frequency	
No complete pre-triage	(most frequent)
No confirmation of patients age	
Negative questioning / answering the questions for the patient	
Not following algorithms correctly / not asking all questions and sub questions / Question not fully explored before answering yes\no	
Not using the over ride facility correctly	
Not giving worsening instructions / home care advice	

[Table 1] List of themes emerging from the quantitative and qualitative research

4.2.1 Pre-Triage

The pre-triage questions are not part of the software, but are part of the training in the use of the CDSS. The pre-triage helps identify the correct algorithm for the nurse to triage the patients' symptoms.

The pre-triage involves ascertaining the length of time the patient has the complaint, the location of the complaint and the severity of the presenting symptoms. The relevant medical history, allergies and medication information is also documented.

The pre-triage must be short and very specific. If a patient begins to meander the nurse must focus back on the main presenting symptoms. For example; if a patient has an underlying medical illness like chronic asthma, but is calling the service with a sore finger, the asthma is secondary or not related to this particular call. The pre-triage helps to focus the caller to the specific problem that they are calling with, and helps the nurse chose the most appropriate algorithm to deliver a suitable level of care.

4.2.2 Patient age verification

The second major finding related to the nurse not confirming the patient age. This is vital as the algorithms are age specific and the logic of the algorithms will apply a different level of care to an age category. For example, patients presenting with the exact same symptoms may have different appropriate levels of care; a one week old baby with vomiting and diarrhoea will reach a different level of care to an adult with vomiting and diarrhoea.

4.2.3 Home care advice and worsening instructions

An interesting finding throughout the clinical audit was that even though a nurse had given “worsening instructions” and “home care advice” to a patient during the phone call, this was not recorded in the software. The worsening instructions were given to a patient in the event that their symptoms deteriorated (e.g. if the pain worsens, call us back straight away). Home care advice was given to patients who have had their symptoms fully assessed by the TTN and could potentially treat their symptoms at home without needing an appointment with the doctor on duty. At the point where a nurse gives the advice, the option is available to tick a box showing that you have given the appropriate advice. If however, where the patient is being referred to the doctor, a nurse has finished the algorithm, given the advice and proceeded to make an appointment the nurse has left the CDSS software. There is no way to return to the screen displaying the option to confirm you have given the advice.

4.2.4 Negative questioning or answering the questions for the patient

“Negative questioning” or “answering the question” for the patient was also prevalent throughout the calls. This is discouraged and part of the nurse training is centred on questioning the patient correctly. The nurse is not expected to ask the algorithm questions verbatim, but must not use phrases such as “you’re not coughing today” or “you have a temp”. This is a difficult area to investigate, as it does differ from a nurse confirming what a patient has already told them. It is hard to distinguish between the two in a quantitative manner.

4.2.5 Not following the CDSS correctly

The incorrect use of the CDSS was also highlighted by nurses not following the algorithms correctly.

These issues were categorised by three main comments spread through the clinical audit and reflective practice;

- not following algorithm correctly
- not asking all questions and sub questions
- not fully exploring the question before answering yes / no / unsure.

Although not all 3 are present in all the calls audited, different aspects and partial variations of each have appeared throughout 40% of the calls.

4.2.6 Override facility

The override functionality is used to change the level of care reached at the end of the call. Each nurse uses their clinical judgement to decide the appropriate level of care for a patient. Over riding the call is not incorrect or a misuse of the CDSS but if a level of care is over ridden the nurse must specify why. There are a list of reasons the nurse can choose from (e.g. too high a level of care / too low a level of care etc), or “Specify” which allows the nurse to give a specific reason as to why the level of care was changed. In some circumstances, certain nurses never changed the level of care reached by the CDSS. This does not cause an inappropriate or dangerous level of care as the CDSS will always take the safest path to reach a level of care.

The semi – structured interview was designed with these main themes in mind to investigate more fully what the underlying reasons for these findings were. The

subsequent interviews were compiled to thoroughly investigate the impact of CDSS on the work of a telephone triage nurse, and the resulting impact on patient care.

4.3 Interview findings

12 telephone triage nurses currently using CDSS took part in the interviews. The nurses had a combination of previous clinical experience and of telephone triage experience. The length of time using the CDSS ranged between 8 months to 4 years, the mean length of time using and triaging with the CDSS was 34 months. 10 nurses had not used CDSS before triaging in the out of hours service. The other two nurses had used CDSS software before in different environments. The CDSS used by the two nurses did not offer the same flexibility to use clinical judgement or offer evidence based advice to the patient. Response to questions further in the interview (Questions 11, 17 and 18) highlight that the use of critical judgement and having evidence based advice available is critical to the triage process.

11 out of 12 nurses had triaged using paper based guidelines and the 11 nurses agreed that it was safer and more efficient to use CDSS. One nurse who had triaged using a CDSS before triaging in the OOH setting in Ireland, then returned to work on paper guidelines before the implementation of the CDSS said it was a “shock to return to a paper base; this interviewee also felt “It is essential that a nurse hired to work as a telephone triage nurse is well qualified and has the appropriate experience”. This is attributed to the fact the telephone triage is extremely varied work with many conditions being presented to the nurse.

The main issue suggested by the nurses in their initial use or misuse of the CDSS was an understanding of the package. The way of thinking around how the CDSS works must be clearly explained and defined. If not, this can lead to a misinterpretation of how to best benefit from the software.

In the initial weeks of using the software the nurse must contend with navigating the software, speaking to the patient and typing at the same time. This can lead to the software becoming the central focus as opposed to the patients. One interviewee commented that the assessment is “too robotic, not natural and flowing”. There is also the worry that the nurse has to “keep the patient interested in the call” if they feel that it takes too long to navigate around the CDSS.

After the early period of use however, confidence is built up and the nurse is more at ease with the computer, the CDSS and the telephony. Familiarity with the algorithms is a necessity and the nurse must understand and select the correct algorithm for a presenting symptoms. The nurse must take into account what symptoms the algorithm is ruling out / looking for, and the clinical rationale behind the questioning. This is gained through use of the algorithms in laboratory time using test calls.

The CDSS guidelines are very comprehensive with all nurses agreeing that there is an algorithm for medical symptoms as presented. Social problems or very vague descriptions of medical conditions (e.g. patient is “just off tonight”) can be harder to identify. This is where the pre-triage is a necessity to identify the chief complaint for the specific call.

4.3.1 Pre-Triage

The pre-triage is of paramount importance to establish what chief symptom the patient is calling with, and to choose the correct algorithm. Each nurse agreed it was extremely important to have a complete pre-triage to each call. However, the results from the quantitative research identified that the pre-triage was not completed correctly in 56% of cases audited. This was very significant, as the pre-triage is vital in choosing the correct algorithm to assess a patient. When this was highlighted in the interview each nurse stressed the importance of the pre-triage and how it was vital to find a way to ensure nurses carried out the full pre-triage completely. Interviewee's commented that pre-triage was “essential”, “100% completely important, no pre-triage means algorithm is not correctly selected” and “paramount”.

When asked, what would they feel would be appropriate for ensuring / enforcing pre-triage, interviewee's suggested “reminders in the software”, “cue cards”, “not being able to pass a point without completing the pre-triage”.

4.3.2 Patient age verification

The patient age was also identified as hugely important. But from the results of the clinical audit and reflective practice this was not being carried out by 34% of nurses. The CDSS is age specific, with each algorithm tailored to be age and gender specific. If a question is asked that is inappropriate to the patient (i.e. pregnancy in an infant or male) it will lose the confidence of the patient / caller.

4.3.3 Not following the CDSS correctly; the need for critical thinking

The research found that if the questions and sub-questions of each algorithm are not asked, this may result in a symptom or condition being missed. All areas pertaining to a specific question must be explored to ensure that nothing has been omitted from the triage. While the questions do not have to be asked verbatim it is important to ascertain the full extent of the patients' complaint. The initial lack of understanding on the nurses' behalf can occasionally cause confusion at the outset. Through experience and skill development this is quickly rectified.

It was unanimously agreed that in the experience of each nurse, if the CDSS is not followed correctly, there may be aspects of the patients reported condition that could be missed out. The CDSS are clinical guidelines that incorporate best practice and evidence based advice. If followed correctly, each nurse is covered medico legally and no adverse outcomes for patients will be recorded. Potential relevant symptoms could be missed by omitting a question that would help identify a problem.

Across the board, each nurse was in agreement that after using the CDSS for a certain length of time, the telephone triage nurse will anticipate the sequence of questions. Nevertheless, the nurse will not alter the order in which the questions are asked, relative to the way they are displayed by the software. The nurse may incorporate the anticipated question into another question, or manipulate the question slightly, but the actual flow of assessment guidelines will not be changed. This happens with the most common algorithms where the knowledge of the nurse and the software merge to a great degree.

If a nurse has altered the questions, or answered no to a specific question, when a patient has said yes, this can be documented on a separate notepad, consequently when a call is being evaluated, the reason is explained clearly. If a patient is answering all the nurses' questions with a "Yes" response, it may indicate that the patient is not listening to the nurse, or is answering "Yes" to speed the call along. At this juncture, the nurse must take control of the call and engage the patient to answer correctly.

The CDSS is developed specifically for clinicians. Following on from this, the strict adherence to the algorithms will impact great on the final level of care reached by the nurse if appropriate clinical judgement is not used. The nurse must use critical thinking at all times. The CDSS will err on the side of caution, and as a result, if clinical rationale and critical thinking are not used, the patient will receive a higher level of care than necessary which will result in the misuse of already precious health service resources. This concurs with the finding of a study by O'Cathain et al which found "nurses feel that both the software and the nurse are essential to clinical decision-making". [4]

4.3.4 Negative questioning or answering the questions for the patient

Negative questioning and re-phrasing of the CDSS questions was brought to light in the initial reflective practice and clinical audit. It is very prevalent and can impact on the patients' final level of care as it can be interpreted as answering the question for the patient without fully investigating the symptoms (e.g. "You're not coughing" etc.) This phraseology exists for many reasons. If the patient is a difficult historian and open ended questions have been exhausted, this may be the only way of eliminating

potential symptoms. The dialect of the nurse is also a cause, thus hindering the total eradication of negative questioning. The nurse can be reminded of this in reflective practice sessions.

4.3.5 Override facility

The final level of care reached by the CDSS is altered by the nurse where necessary. The software will err on the side of caution producing a very high level of care if critical thinking is not used by the nurse. This was identified in the initial quantitative audit as an aspect of the software that was not being used correctly. The interviewees' were asked their opinion on how often they had to change the level of care overall and the reason for it. The frequency of how often the nurse felt the level of care changed is reflected in the following table.

Level of Care Changed:	Number of Nurses	Number of nurses combining their answers
Always	1	
Frequently	2	2 – vary between frequently and occasionally
Occasionally	7	
Not at all	0	

[Table 2] Level of care changed

There were no specific reasons identified for this, but a combination of many factors.

The main factors identified were

- 1) Social reasons
- 2) Medical reasons (e.g. a lower level of care was appropriate)
- 3) The caller may be concerned about the patient and wish to have them seen sooner

- 4) The caller is anxious and concerned and may not have understood the questions asked which resulted in a higher level of care
- 5) Unreliable answers from patient or caller

In most cases the call was downgraded to a lower level of care. If too high a level of care had been reached by the CDSS the nurse used clinical judgement to identify the appropriate level of care. If the level of care is downgraded / upgraded, reason for the change must be given. This is specified in part of the CDSS and the nurse cannot move forward until a reason has been given for the change. The nurse can enter a phrase / word to specify a reason for change.. This is the part of the override facility that was identified as not used correctly. The nurse does not have to specify a complete reason for the change in upgrading / downgrading. There are a list of reasons for over riding given in the system but the interviews did not feel that this was a complete list, and additions to the list may encourage the correct use of the facility.

4.3.6 Home care advice and worsening instructions

Worsening instructions are given to reassure the patient that help is at hand if needed after every triage consultation. All nurses agreed it is absolutely beneficial to give the instructions to patients as the onus of care is brought back to the patient, yet they are reassured help is still at hand if needed. The nurse must document that the worsening instructions have been given to the patient within the CDSS.

It was unanimously agreed that the home care advice provided was necessary to give to each patient regardless of the clinical outcome, even if the patient was travelling on for further care (treatment centre, home visit or A&E). As with the worsening instructions the nurse must document that the advice has been given within the CDSS

package. This gave the conflicting results from the quantitative audit. After investigation, it transpires while each nurse gave the home care advice, they did not always tick that they had given it, as with the worsening instruction. It was suggested that perhaps this functionality could be provided at a different point in the CDSS process.

The advice provided is evidenced based and updated to contain best practice and change in guidelines etc. This is extremely beneficial to the nurse and the patient and the information is best practice and is educating the patient safely. All the advice given is also standardised and consistent with each patient receiving the highest level of care which has proven to be effective. The interviewees' commented the advice "legally stands up" is "safe and effective as you may not be knowledgeable on all topics you advise" and there are "no old wives tales".

4.3.7 Background to the CDSS and each algorithm

An overview of each algorithm is contained in the CDSS package. This gives a detailed background to the teleguide and information on what symptoms the algorithm is assessing. Each nurse had read an overview of the teleguides most commonly used. Each nurse has available to them the following information while triaging a call;

- A clinical rationale
- Areas of inquiry
- Considerations; co morbid / medications.

Each nurse will occasionally use these for clarification on particular conditions or to become familiar with a specific topic if it is not a regular occurrence. They are used also when a nurse has difficulty understanding what aspect of a symptoms needs to be ruled out, or to clarify a question when it is asked.

Background reading of the information is part of the clinical decision support software training; however each individual nurse took something different from the training, with some spending lab time reading the background, while other users did not avail of this.

4.3.8 Integration into nurse workflow

It was collectively agreed that the CDSS integrates seamlessly with the nurses working environment. The self care advice given at the end of the call is the only area of concern for nurses. It is proposed that this could be accessed at a different stage throughout the call. This is of paramount importance as research from the implementation of software in other clinical areas has identified integrating in to the clinicians work flow as one of the main factors of clinicians not accepting and as a result not using the software.

The transfer of information and flow of questioning between the nurse and patient is of vital importance. The research has shown that each user of the system feels that the software allows for the flow of questioning to the patient. However, at the initial stages of use of the CDSS, this flow was hindered by getting used to the terminology used by the software, and developing the technique of speaking to the patient and typing at the same time.

4.3.9 The role of the telephone triage nurse and how it is supported by the CDSS

Each nurse agreed that the use of the CDSS enhances their role as a nurse. It allows the nurse to address all symptoms, with the back up of an expert knowledge base. It is also an excellent expert learning tool, as each algorithm has the full background and information on why each branch and question can be asked. It also provides reassurance to the nurse and supports their role and ensures that they are providing each patient with the most up-to-date evidence based advice.

The introduction of the CDSS has improved patient care compared to working with paper based guidelines. This was agreed by all of the nurses who had previously triaged on a paper basis. The software ensures that nothing has been missed by the nurse. It reduces variables and avoids repetition of questions. It is more professional and standardises the triage process. An extensive, structured assessment is carried out when using the CDSS and the nurse can be confident when completing the triage that all areas have been addressed.

Each nurse was asked about their view on the change in workload from paper based guidelines. 1 interviewee was exempt from this question as the use of CDSS was a mandatory part of the telephone triage process at the beginning of their telephone triage training.

Change in Workload	Number of Nurses
Increased workload	2
Decreased workload	6
No change in workload	3

[Table 3] Change in workload

The 2 nurses who cited an increase in their workload felt the “more typing was involved” and “more time on the computer”. This was in contrast to the 6 nurses who cited a decreased workload and felt that “not as much typing / free texting”, “reduced documentation” and “added efficiency”. This was attributed to the fact that everything within the algorithm chosen and the pathway followed, or the sub questions asked etc) is logged automatically within the system. Upon further investigation it appears that a nurses IT skills and ability to work with a computer may impact on the view of work load.

Each nurse was asked to best describe how the CDSS bests supports the role of a telephone nurse triage and impacts on the daily working, compared to using no CDSS; and to select no more than 3 answers. The overall view was very positive with 100% of nurses agreeing it was more efficient than having no clinical decision support software to support their role.

How the CDSS supports the role of the nurse	
More efficient	12
Less efficient	0
Safer	10
Less safe	0
Length of call increased	5
Length of call decreased	1
Don't know	0
None of the above	0

[Table 4] How the CDSS supports the role of the nurse

Overall, each nurse was asked how they viewed the software and its use in the out of hours setting. Each interviewee was asked to consider, if it enhanced their role as a nurse, how it benefits the patient, and the general integration into the workflow of a

telephone triage nurse. All interviewees agreed it was a successful addition to the job of a telephone triage nurse.

Overall view of the CDSS	
Absolutely fantastic	3
Successful	9
Failure	0
Waste of time and money	0
Don't know	0

[Table 5] Overall view of the CDSS

Each nurse was asked to put forward comments and suggestions for the enhancement of the clinical decision support system. The most commonly noted suggestions were:

- Constant updates and training is essential
- Pre-triage is essential; look at a way to ensure pre-triage is completed
- Evaluate the success of the evidenced base self care advice when applicable

General comments made by the interviewees:

- The clinical decision support software “is the back bone of telephone triage nursing; terrific quality resource and supports the role of a telephone triage nurse”
- “Enhances quality of patient care”
- “Greater reduction of error and risk factors”
- “Thorough & extensive assessment possible”
- “Hugely enhances the role of the nurse”

- “So many guides pool to choose from huge; rare unable to choose something don’t understand (might just be me);”

4.4 Summary

This chapter gives a detailed over view and an in-depth look at how nurses view the CDSS. It investigates thoroughly the issues surrounding the correct or incorrect use of the software and the possible adjustments that could be made to enhance the CDSS.

Chapter 5 Towards proposals for enhancements of CDSS

5.1 Introduction

Following on from the in-depth results and nurses' view on the use of the CDSS in chapter 4, this chapter evaluates the major findings of the interviews. Proposals made towards enhancing the CDSS are put forward for discussion to a focus group. The chapter follows the progress of the focus group and evaluates the final proposals agreed upon.

5.2 Evaluation of interview results

The evaluation of the interview results identified the most emerging themes that would benefit the research in evaluating and enhancing the role of CDSS supporting the nurse in the out-of-hours setting. A focus group was formed to analyse these outcomes and themes of the individual in-depth interviews.

The focus group interaction took place between the researcher and a focus group of 4 telephone triage nurses, 1 Nurse Manager and 3 Lead Triage Nurses. The interview findings and results were presented to the focus group. The results were analysed and solutions put forward to help enhance the use of the clinical decision support software. The role of the focus group was to work forward these potential solutions so that they would integrate seamlessly into the telephone triage nurse working environment to improve the use of the CDSS and as a result benefit patient care.

5.3 Interview results presented to the focus group

The focus group outcome highlighted that the pre-triage was the most important aspect of selecting an appropriate algorithm as it helped identify the chief complaint.

This would allow for the most effective and thorough triage of a patient. 100% of nurses agreed that pre triage was extremely important, yet clinical audit and reflective practice identified only 44% of nurses were conducting a pre-triage correctly (i.e. taking into account all features of pre-triage questioning).

The pre-triage is typed into the free text box “notes” section of the call management software under the “current assessment” tab. [Figure 5] The pre-triage is currently stored against the patients’ current consultation case. The nurse consultation notes (pre-triage, algorithm details, level of care etc) taken by the telephone triage nurse are stored within the software so that each consulting clinician interacting with the patient can see the relevant information. A proposed solution towards the enhancement of the pre-triage was the inclusion of a set of case questions and reminders to become part of the nurse triage workflow.

As you can see from figure 4, the call management software follows the pathway of the clinical decision support software and tracks each branch the nurse has taken, including marking each sub question the nurse has identified as part of the patients condition. The self care advice and worsening instructions are also highlighted. This information is viewable to each clinician who will have further interaction with the patient.

Patient Details | Event List | Previous Encounters | **[Current Assessment Tab]**

Clinician: **Telephone Triage Nurse Name** | Start time: **[CDSS Start time]** BST | Finish time: **CDSS Finish Time** BST

Notes
 (Teleguide nurse notes - quick text)

left sided chest pain x 6 hours
 MI 2 years ago, on GTN
 Ambulance en route

Assessment details

- Do you have any of the following symptoms? **[Time and Date CDSS started]**
 - Crushing sensation in the chest, tightness in the chest, or burning pain in the chest
 - Pressure sensation under the breastbone
 - Pain moving to the neck, jaw, shoulder or down an arm
 - Shortness of breath or trouble catching the breath
 - Cold, clammy, or sweaty for more than 2 minutes
 - Abnormal chest discomfort lasting more than 20 minutes
 - Abnormal upper abdominal discomfort lasting more than 20 minutes
- Dial for one or more of the Emergency Services Immediately **[Time and Date Level of Care reached]**
- Self Care - Cardiac Chest Pain
 - PHARMACY: Nitroglycerin, if prescribed, is taken under the tongue or as an inhaler, and can be repeated after 3-5 minutes if
 - PHARMACY: Chew one 300mg aspirin as soon as the symptoms begin provided there is no sensitivity to aspirin.
 - Keep the individual calm and quiet in a comfortable position until medical care is available.

Lock
 Finish
 Forward

[Figure 5] Call assessment management software; view of current assessment screen

5.4 Patient Age

The clinical decision support software uses age specific algorithms, as a result if a patient age has been registered incorrectly the algorithm selected will perform different actions; an infant with a cough is treated differently than an adult with a cough and therefore the level of care reached will reflect the level of medical intervention needed. It was unanimously agreed in the interviews that the patient age check was an extremely vital part of the pre-triage. In the clinical audit and reflective practice it was identified that 34% of the telephone triage nurses did not perform an age check.

5.5 Proposed solution towards enhancement

To address these most common emerging topics, no pre-triage and the checking of the patient age, the author has suggested an inclusion of a set of pre-triage questions to prompt and remind the telephone triage nurse. The questions must not be easily ignored by the user, but must integrate successfully into the working environment. The issue of using compulsory boxes was discussed initially; if case questions or reminders are used, should each question be mandatory before allowing the user to proceed to the next stage of triage? This however was not feasible, as in an emergent case information is not always available and therefore the CDSS could not support this action.

3 case question reminders were identified by the focus group as the most relevant and important to the pre-triage process. These were the most important to focus on to evaluate the use of the CDSS and the impact these changes would have, if any? This

new feature for case questions are reminders that would allow the nurse to type in specific details into the fields provided.

The 3 case questions and reminders identified for discussion were:

- 1) Age Check (Tick box – not mandatory)
- 2) Duration, Location and Severity of Symptoms (Free text box – mandatory)
- 3) Relevant Medical History, Allergies and Medication (Free text box – not mandatory)

It was agreed these questions and reminders were the most important to correctly identify the algorithm needed for a successful triage. The age check is not a mandatory field, it is vital in the selection of the correct algorithm, however in the case of an emergency the age of the patient may not be known (e.g. collapsed patient, neighbour or passer calling the service). At this point an estimated age is entered to select the most appropriate algorithm.

Duration, location and severity of symptoms is a mandatory field. This establishes the chief complaint of the patient and in the event of an emergency the most basic symptoms can be identified (e.g. collapse x 10 minutes, head bleeding).

Relevant medical history, allergies and medication are a free text box that is not mandatory. In the event of an emergency this information may not be available.

5.6 Technical integration

A discussion took place with the focus group and the clinical decision support software company (GMPS) [27] and the call management software company (Adastra). [20] The discussion took place to identify the best way to incorporate the case questions and reminders. It was identified that the best way to proceed was to integrate them within the Adastra call management software system. This would be the most affective and speedy way to accomplish the integration. As with the CDSS, the case questions must integrate easily with the nurses working environment and not hinder / slow down the triage process, or be perceived as extra work or a nuisance.

The case questions were then integrated into the training version at the call management software at the point before the nurse accessed the “Assessment details” screen of the consultation and the CDSS. It was decided it was preferable to access the case questions at this juncture as it is the starting point of the nurse consultation.

5.7 Changes to the nurse telephone triage process as a result of the case questions and reminders

The nurse selects the call for consultation from a triage pool as normal. Emergency and urgent calls are prioritised above routine calls. Routine cases are triaged on a first in first out bases.

The telephone triage nurse accesses the call and is presented with the patients’ demographic details and symptoms. [Figure 6] The nurse can then click into each tab on the top of the screen to view the patient history with the out-of-hours service. The

“Event list” will show who has accessed the patients’ record in this current consultation (call handler etc) and the “Previous encounters” tab will show a summary of the patients’ previous consultations and their outcomes.

Case # 10293 No locked cases Current Location Only show status for cases at this location

Patient: Test Patient 04-May-65 (43 years) Main Street Ireland

Phone: Return No: 01 2359867

Clinical Solutions' Teleguide Assessment

Patient Details | Event List | Previous Encounters | Case Questions | Current assessment

10293 **Test Patient** Male **04-May-65** 43 years 2 last week

Active date BST Entry date BST

Contact 01 2359867 Dial Home: 01 2359867 Dial Mobile: Dial Cur. loc: Dial Other: Dial

Status Nurse Assess/Advice Waiting for Triage On reception **Emergency** Cover

PPSN Number

Current Location Main Street Ireland Postcode Map Reference Directions Map

Doctor Unregistered (INT) Dr Doctor Surgery

Case Summary Symptoms: Chest Pain Edit

[Figure 6] Call assessment management software; view of patient demographic screen

5.8 Detailed breakdown of case questions

Age check is a tick box to remind the nurse to confirm the patients age. As part of the triage process the nurse will endeavour to speak to the patient whenever possible or appropriate. In the case of infants or patients who are incapacitated this is not possible.

The nurse confirms the patient's age as it has already been recorded by the call handler in the "Patient details" tab. [Figure 6] In the case of an emergency call, an approximate age is taken as this could affect the triage process and the final level of care. The level of care will differ for children, adults or elderly patients.

Duration location and severity of symptoms is the only mandatory field. The field is necessary as it is always vital to find out the;

- Duration; length of time the patient has the complaint
- Location: What part of the body is affected?
- Severity: How severe is the patients' injury / symptoms.

Once this is identified the nurse can choose the most appropriate algorithm to assess the patient. Relevant past history, medication and allergies help give a clinician a more in-depth knowledge and background about a patients' condition. If a patient phones the service with a heart complaint, it is not necessary to know that the patient broke their arm years ago, however if they have an under lying chronic heart condition and are taking medication, this is relevant.

The nurse must click on the "Case Questions" tab to access the pre-triage questions.

[Figure 7]

The screenshot displays a web-based interface for a teleguide assessment. At the top, there is a 'Heading' section. Below it, a form contains patient information: Case # 10293, Patient: Test Patient 04-May-65 (43 years), and Phone: Return No: 01 2359867. A 'Current Location' dropdown menu is set to 'Main Street Ireland'. A blue banner below the form reads 'Clinical Solutions' Teleguide Assessment'. Below the banner are five tabs: 'Patient Details', 'Event List', 'Previous Encounters', 'Case Questions' (which is selected and highlighted in orange), and 'Current assessment'. The 'Case Questions' tab contains the following content:

Case Questions for Nurse Triage

Have you checked the patients age? Yes No

Duration, Location and Severity of

Relevant Medical History, Allergies and Medication

[Figure 7] Call assessment management software; “Case Questions” screen

The nurse is presented with the 3 main case questions and triage reminders.

- 1) Age Check (Tick box – not mandatory)
- 2) Duration, Location and Severity of Symptoms (Free text box – mandatory)
- 3) Relevant Medical History, Allergies and Medication (Free text box – not mandatory)

The “age check” and the “relevant past medical history, allergies and” are not mandatory fields. This is to avoid any delays in the case of an emergency as that information may not be available.

Duration, location and severity of symptoms is a mandatory field as even in the case of an emergency the nurse will always need to know this about these. (E.g. Patient collapsed x 5 minutes, head bleeding +++).

5.9 Going forward with testing

It was agreed by the focus group that a pilot phase period using the case questions and reminders in conjunction with the CDSS should be conducted. The case questions were integrated into the training version of the call management software first. 8 nurses agreed to participate in the pilot and testing phase. 6 nurses who had taken part in the interviews and 2 other telephone triage nurses agreed to test and evaluate the case questions and reminders.

Each nurse in the pilot phase was given a background to the case questions and reminders and an outline as to why they were being integrated into part of the working environment. Each nurse also received instructions on how to use the software.

The initial testing was completed solely in the training version of the call management software. Test calls were entered and completed by the nurses to see if the case questions and reminders were viable. The feedback was extremely positive.

The questions were then moved to a live setting, where the 8 nurses completed consultation calls for the live pilot phase. A brief interview and questionnaire was then completed with each participant. The semi-structured interview and questionnaire were conducted to examine the integration of the case questions. The interview focused on; benefits, understanding, problems encountered, recommendations and most importantly, should the case questions be entered on to the live system and rolled out to all nurses.

5.10 Summary of pilot phase

The answers from the questionnaire and semi structured interview were compiled and the main comments for enhancement noted. A summary of the results is contained in the following tables.

Do you think the case questions and reminders add more work to your telephone triage process?		
Yes	No	Unsure
	100%	

[Table 6] Case questions and reminders

Sample interviewee comments:

“The questions have to be answered by the patient anyway”

“This is a more structured format”

“Does not impact on the nurses’ workflow”

“It is the same work the nurse has to do anyway. Now it is done in a structured efficient manner.”

Do you think it will benefit the pre-triage and as a result the triage process and patient outcome		
Yes	No	Unsure
100%		

[Table 7] Benefit of pre-triage

Sample interviewee comments:

“The case questions help you to critically analyse what is going on at the minute”

“They help achieve the main aim of the pre-triage in a structured manner”

“In any call where you do a good pre-triage it will benefit the patient”

Has it benefitted you in the consultations you have completed this shift? Yes? Why? No Why??		
Yes	No	Unsure
100%		

[Table 8] Immediate benefits of pre-triage

Sample interviewee comments:

“It assisted in the selection of the correct algorithm”

“I am confident I completed a correct pre-triage for all my calls”

“Strive to get most pertinent information before launching algorithm”

Should the case questions and reminders be rolled out to the live system for use by the rest of the telephone triage nurses		
Yes	No	Unsure
100%		

[Table 9] Roll out to live system

Sample interviewee comments:

“Easy to use”

“Very beneficial”

“Works well with the call flow”

5.11 Queries and recommendations to be completed before roll out to live system

Upon completion of the pilot phase, some recommendations and queries for clarification arose before the roll out could be completed successfully to live system.

5.11.1 Case questions free text box

A couple of nurses noted that the free text box was a certain size and as a result only a certain number of characters could fit (50 characters). This was discussed and it was agreed that the text box should not be made larger. The information inputted is supposed to be specific and any additional information should be recorded in the “notes” field under the “current assessment” tab. This situation will be monitored and the size of the text field can be adjusted accordingly.

5.11.2 Recording of case questions in the patient record

As the nurse process previously involved the pre-triage being recorded in the “notes” field, it was proposed that the case questions free text could also be shown there. This stemmed from a query as to where the case question results would be viewed by other consulting clinicians interacting with the patient consultation; e.g. if the patient was sent to a treatment centre, would the case question information be available to the duty doctor? It was explained that the case questions and reminders would be presented as normal under the same field as the nurse triage notes to other consulting clinicians.

5.11.3 Case questions and reminder events occurring in the software

The case questions and reminder events are a separate tab that the nurse must click in to before the launch of the CDSS to benefit the pre-triage. The tab is not mandatory however and the nurse may choose to ignore it until the assessment is complete. Currently there is no way of “forcing” the nurse to answer the questions. If this becomes necessary in the future this will be looked at. After the event reporting will highlight if individual nurses are not completing this correctly.

5.12 Pilot phase outcome

The pilot phase was extremely successful with the recommendation of immediate rollout to the live call assessment management system. Once the focus group were satisfied with the success of the questions, and any queries had been addressed the case questions and reminders were integrated to the live system, training commenced and the roll out began to the rest of the telephone triage staff.

5.13 Summary

The results of the interviews identified target areas for improving the use of CDSS.

The case questions and reminders had accomplished the required enhancements needed to advance the use of the CDSS. The next step was to integrate them to the live setting and assess their impact on nurse telephone triage and CDSS.

Chapter 6 – Implementation of proposed solutions

6.1 Introduction

The successful trial of the solutions proposed in chapter 5 led to the decision to integrate them into the live system. This chapter describes the integration of the proposed solutions (case questions and reminders) into the call assessment management software system for use with the CDSS to compliment the pre-triage process.

6.2 Integration of proposals into live software

The integration into the live call assessment management software took place successfully. The case questions were designed to display within the call management software before the nurse accessed the CDSS. This was not a mandatory process, and it was possible that the nurse could launch the CDSS before completing the case questions. This was explained to the nurses, as there was no way of making the tab mandatory. It will however be monitored through a report and highlighted to anyone who is not complying. This is something that could be looked at for future releases.

The “case questions” tab is accessible for a second time when the nurse had completed the triage assessment using the CDSS software. There was no way to prevent a nurse from clicking on the tab and entering the information as required. If a nurse has not completed the pre-triage questions and tries to complete the call, the mandatory field “Duration, Location and Severity of symptoms” will pop up with a

note saying you cannot proceed until this field is complete. As it is redundant whether or not the field is completed at the stage of the process, a report was designed to analyse if this was happening.

6.3 New telephone nurse triage process

The telephone triage nurse process changed slightly with the implementation of the case questions and reminders. The new process was explained in detail to the other telephone triage nurses and a hand out was given out with a full explanation of the case questions and reminders. The reasons for their implementation and the procedure for use to achieve the optimum benefit were explained.

The case questions and reminders were well received as they do not add additional work or interrupt the work flow of the nurse. Their integration was solely intended to add benefit and enhance the telephone triage. On site support was provided for the nursing staff to answer any queries or help with teething problems for the first few duty shifts that the case questions were implemented. The triage process did not differ greatly from what already was in place. Instead of the nurse relying on memory to ensure the pre-triage questions were in place the “case questions” tab allowed the information to be recorded in a structured efficient manner.

6.4 Assessing the new CDSS structure – Does it work?

While the case questions and reminders were a success in the pilot phase, in the live setting the additions had yet to be tested. A report was designed to extract the information for the call assessment management system to assess their success under the following headings:

- 1) Usage of the case questions and reminders; were they used at the correct point of the call to augment the CDSS
- 2) Was the information entered into the free text boxes correctly, or was there a way to by pass the information
- 3) Was the pre-triage completion rate significantly improved in comparison with the figures obtained from the quantitative research
- 4) Did the incidence of nurses checking the patient age increase significantly in comparison with the quantitative research.

Sample Report: [Figure 8]

The report designed to analyse the use of the case questions had the following information:

- Call number identifier
- Telephone triage nurse name
- Were the case questions asked before or after the CDSS was started
- Reported condition
- Summary of nurse triage assessment
- Information entered into the case questions

Sample case question report

Name Case Received Questions Report
Description Display the case entry questions and answers
Produced By IT Michelle Kearns
Date Range 01 August 2008 00:00 to 01 September 2008 00:00
Filters Set No Filters

Case No 10292 **User** Triage Nurse Name **Questions Before Teleguides** Yes
Receive Summary Symptoms: Chest Pain
Tele Summary Refer to A&E, ambulance en route
 Have you checked the patients age? Yes
 Duration, Location and Severity of Symptoms Left sided Chest Pain x 6 hours
 Relevant Medical History, Allergies and Medication MI 2 years ago, on GTN

Case No 10289 **User** Triage Nurse Name **Questions Before Teleguides** Yes
Receive Summary Symptoms: Patient called with sore throat

Tele Summary Appointment arranged
 Have you checked the patients age? Yes
 Duration, Location and Severity of Symptoms Sore Throat x 5 days, cannot swallow
 Relevant Medical History, Allergies and Medication No Meds

Case No 10288 **User** Triage Nurse Name **Questions Before Teleguides** No
Receive Summary Symptoms: Head ache
Tele Summary Advice given - happy with same
 Have you checked the patients age? Yes
 Duration, Location and Severity of Symptoms Head ache x 2 days
 Relevant Medical History, Allergies and Medication nkda

[Figure 8] Sample Report

6.5 Report findings

The report findings were very positive and demonstrated an improvement in the important areas; use of the pre-triage and age check features. The report was run over a 4 evenings (approximately 900 calls). The findings were compared to the initial quantitative audit. [Table 10] [Table11]

Before	After
Pre-Triage completed successfully by nurses before case questions and reminders	Pre-Triage completed successfully by nurses after case questions and reminders
44%	88%

[Table 10] Pre-Triage comparison

Before	After
Age check completed successfully by nurses before case questions and reminders	Age check completed successfully by nurses after case questions and reminders
66%	92%

[Table 11] Age check comparison

An improvement of over 50% was noted for the pre-triage case questions with the number of nurses completing the pre-triage rising from 44% to a massive 88%. An improvement was also registered for the patient age check with the age check rising from 66% to 92%. This is a very significant rise. These findings indicated that there was a massive improvement in the completion of the pre-triage and the age check over all.

The case questions and reminders pop up before the user has finished the call, at which point additions or changes can be made. This is in place as the user cannot proceed until the one mandatory field (duration, location and severity) is completed. However, it is possible for this to be manipulated by the telephone triage nurse. As mentioned before, this will be monitored and the nurses have been made aware of this. However, in the initial period, nurses felt they needed a period to adjust to the new habit of using the case questions tab. This was reflected in the report as 12% of nurses still did not use the pre-triage case questions correctly. Only 8% of nurses' did not now confirm the patient age. The general opinion of why there was still a percentage not complying was that an introduction period was necessary, as some practices were very routine and the pattern of clicking straight into the "current assessment" tab must be broken.

6.5.1 General feedback and comments

General feedback about the case questions and reminders were very positive. It is not from an unwillingness that the pre-triage is not completely fully, or the patient's age confirmed. There is an element of change as sometimes they can simply be forgotten when dealing with certain patients. Examples given were: Caller who is very anxious about a patient and as soon as the nurse introduces themselves, the caller launches straight into the patients' symptoms without taking heed of the nurse. The telephone triage nurse is trained to take control of the call, but in particular cases where a caller or patient is irate and unwillingly to cooperate; it can be off putting and distracting. With the pre-triage questions and reminders now in place, the nurse can focus her energy on ensuring these specific details are recorded.

6.6 Summary

The introduction of the case questions and reminder has been received successfully. Usage of pre-triage and age check have benefitted greatly from their introduction. This is extremely positive and encouraging as there are other themes identified in the evaluation of the CDSS that could benefit from investigation; and leading on from that, proposals towards enhancing the CDSS further were noted.

Chapter 7 Conclusion and future work

7.1 Introduction

The role of computerised services in the area of health is growing. Clinicians and health care workers are constantly searching for efficient and safe practices to minimise errors and improve patient care. Clinical decision support software is one of many key areas that can be used to achieve this goal. This research set out to evaluate and enhance the use of CDSS for nurse telephone triage in the GP Co-operative out of hours setting towards improving services.

7.2 Key findings of research

The key elements of this research were to examine:

- 5) Are the nurses using the CDSS correctly to its full potential?
- 6) How can the use of the CDSS be enhanced to maintain the highest standard of telephone triage nursing?
- 7) Does the CDSS support the patient scenario?
- 8) Could non-use of CDSS be negligent in the future?

The combination of the quantitative and qualitative results found that some of the telephone triage nurses were not using the CDSS to correctly achieve maximum benefit from the software for it to reach its full potential. The results established a list of themes that could help evaluate the CDSS and help to create proposals to enhance the use of the software.

The main themes that were identified were:

- No complete pre-triage
- No confirmation of patient age
- Negative questioning or answering the questions for the patient

- Home care advice and worsening instructions (conflicting results on the advice been given or not given)
- Not using the over ride facility correctly

After a set of in-depth interviews a complete picture was constructed to investigate the reasons why these themes emerged and what could be done in the future to develop the CDSS further. Due to time constraints within the research the most important aspects of these findings were tackled to test how the CDSS could be enhanced to improve and maintain the highest standard of telephone triage.

7.2.1 Pre-triage and age verification

The pre-triage and age check were identified as the most relevant to choosing the correct algorithm in the CDSS. The full pre-triage was only completed successfully by 44% of nurses. However after the research and the successful introduction of case questions to the software, the figure doubled to 88% of nurses successfully completing the pre-triage. This figure could be improved on again, as the evaluation was carried out when the case questions were only in the system a short period, and some interviewees after the introduction of them cited that a period of adjustment was needed to ensure that they were used correctly.

The period of adjustment applied to the introduction of the age verification process also. This improved greatly, from 66% before the use of age check reminders, to 92% after, but has the potential to increase even more.

7.2.2 Summary of results

A summary of the results were presented to a group of 15 nurses. At the end of the presentation the nurses were asked the other two main research focus points:

- 1) Does the CDSS support the patient scenario?
- 2) Could non-use of CDSS be negligent in the future?

100% of nurses felt the use of CDSS does support the patient scenario, echoing the findings of the research. The patient is offered the most up-to-date advice. The nurse can educate and advise the patient confidently knowing that the advice offered is the most up-to-date evidence based advice available at present.

100 % of nurses felt that going forward not using CDSS could be considered negligent. As was found in the research, the nurse can confidently offer relevant and appropriate advice to patients that will be consistent and cover a wide variety of topics. The use of CDSS helps support the nurse and helps the nurse to provide a thorough and complete triage assessment over the phone, without the worry that anything has been missed or over looked.

7.3 Limitations of research

The extremely successful implementation of the case questions to enhance the correct use of the CDSS while accomplishing the results required, may not have been 100% accurate. They had just been introduced and each nurse had been trained in their use and it is at the forefront of their minds. This may not be the case after a prolonged period of use. As with all software programs, people begin to manipulate them to suit themselves and to address their needs.

The study was carried out in one nurse led GP out-of-hours co-operative service in Ireland using one particular CDSS package. To perform a more robust evaluation a

bigger group of participants should be involved. Even within the Irish, Northern Ireland and English setting, the evaluation of the same software could yield interestingly different results, as the scope of practice for telephone triage nurses differs from each region. Unscheduled care providers have dramatic regional differences with a variety of support services available for each area. This can range from local social services to psychiatric units.

Time constraints meant that not all of the interesting areas that the research explored were fully investigated and carried forward to use with the CDSS.

7.4 Future work and recommendations

It would be extremely interesting to investigate the case questions and reminders in the future to see to what extent they are affecting the user and the CDSS. Over an extended period of time people may get lackadaisical and begin to find ways to by pass the pre-triage. These short term enhancements made to the CDSS may not be sustainable long term. This behaviour change in work pattern is currently functioning however in the future it would be vital to monitor its use after six months, then again after a year. If it was found that the case questions and reminders were being used incorrectly, alternative answers would have to be investigated. Clarification would also need to be sought on why the solutions became ineffective. It would be very important to explore in detail why telephone triage nurses stopped following the solutions.

The worsening conditions and home care advice generate conflicting reports when investigated. Although the nurse may impart the advice and information on to the

patient, this is not always recorded on hard copy within the CDSS. A future recommendation would be to generate a second reminder outside of the clinical decision support software that will remind the nurse to indicate if home care advice or worsening instructions have been given.

The area of not fully exploring the CDSS algorithm and sub questions, also poses an interesting question. While the algorithm is not asked verbatim, all pertinent questions should be asked to rule out patient conditions. The research found that when interviewed there were contradictory evidence given by nurses who felt the software should be followed correctly, yet not all questions must be asked to rule out a condition. A thorough investigation should be completed in the future to examine why these conflicting views exist.

“Negative questioning” and “answering for the patient” by all accounts do not seem to be a problem that is easily solved. The general trend was that this phraseology was attributed to the nurses’ accent. It may also be used as a questioning technique to rule out conditions for patients who are difficult historians, or to confirm that the nurse has remember what the patient has said before. The only way to highlight this would be in reflective practice or to hold workshops to identify how this is happening and create awareness to lessen the effect.

7.5 What was known

Nurses attitudes to software vary; some nurses felt that both the software and the nurse are essential to the decision making process, while other nurses felt that the software impedes their decision making process. (O’Cathain 2003)

The influence of the nurse and software merge as a nurse combines their own knowledge with that of the software which makes it difficult to determine if the recommendations are that of the nurse or the software (O’Cathain 2003)

CDSS is sometimes perceived as a hindrance and an annoyance to clinician as it disrupts their work flow as in apparent in this study. It is not always welcome and previous introductions have been disappointing.

7.5.1 What is known now

Nurses would not go back to telephone triage without the software as the CDSS enhances their knowledge to allow them make safe, effective decisions complete with evidence based advice. 100% of telephone triage nurse interviewees felt that the use of the CDSS software enhanced patient care, was more efficient, and safer than triaging with paper based guidelines.

Though the nurse may anticipate the branches of the algorithm within the CDSS, this will not alter how the questions are asked. While not asked verbatim, it is essential to keep the structure of the triage assessment, and although the software may reach a level of care, critical thinking and judgement on the nurses’ behalf is essential to the process to provide the best level of patient care.

The CDSS was successfully integrated into the nurses’ workflow without causing hindrance or annoyance. The addition of the case questions, once explained correctly, and integrated into the nurses working environment easily were not perceived as extra work or time consuming as they benefited the nurse triage process. This highlights

that the involvement of users in the design phase or when changing a system is critical to its success. This contradicts the 2003 findings of Knape et al which state the usage of clinical guidelines “in clinical environment has been disappointing”. One reason the research of Knape et al gives for the disappointing usage is the difficulty incorporating CDSS into work practice. [8] The successful integration of the CDSS was achieved with the nurse telephone triage work flow process and directly contributed to the positive findings of this research.

7.6 Contributions

This research can contribute greatly to the telephone triage sector in Ireland and abroad. The study is the first of its kind in Ireland and draws attention to support for CDSS among nurses and the willingness to embrace health informatics to benefit patient care. As nurse telephone triage is an emerging area around the world and in the current climate for health and the economy it contributes to the knowledge that patients are receiving first rate evidence based advice and education from nurses, on queries which in previous years would denote a trip to the doctor.

The research would also benefit any out-of-hours co-operative or other health services considering investing in CDSS. This could include day time surgeries, walk in centres or minor injury units.

The quantitative and qualitative research methods could be used by other services to access their own current work practice and CDSS.

7.7 Conclusion

The research presented here indicates that overall nurses are extremely happy with the computerisation of systems and the use of CDSS. The evaluation and development of the CDSS was successful, with the implementation of the case questions and reminders, a further achievement towards the enhancement of clinical decision support software. The nurses over all deemed the CDSS to be fantastic or successful with no one rating it poor or a waste of time and money. The attitudes towards computers are changing which can only benefit and develop forward remote assessment and access to out-of-hours care by patients.

References

1. Leanai, D.o.H.a.C.-A.R.S.a., *Primary Care - A New Direction: Quality and Fairness - A Health System for you*. 2001.
2. Osheroff, J., E Pifer, J Teich, D. Sittig, R Jenders, , *Improving Outcomes with Clinical Decision Support: An Implementer's Guide*. HiMSS, 2005.
3. Hayward Robert, *Clinical Decision Support Tools: Do they support clinicians?*, in *Centre for Health Evidence* Univeristy of Alberta: Canada.
4. Alicia O'Cathain, F.C.S.J.F.M.K.J.T.J.P.N., *Nurses' views of using computerized decision support software in NHS Direct*. *Journal of Advanced Nursing*, 2004. **45**(3): p. 280-286.
5. Primary Community & Continuing Care., *National Out-of-hours GP Co-operative statistics*, O.o.A.N. Director, Editor. 2008, Office of Assistant National Director: Meath.
6. Sheridan Thomas B, T.J.M., *People Vs Computers In Medicine*, in *Human Error in Medicine*, B.M. Sue, Editor. 1994, Lawrence Erlbaum Associates: Hillsdale, NJ. p. 141.
7. Scherpbier Harm MD. *Clinical Workflow Management: Strategy for next-generation Healthcare IT*. 2001 [cited 2008 7th March]; Presentation]. Available from: http://arkiv.idg.se/cstjanster/seminars/uploaded_pdfs/pdf_20059169359.pdf.
8. Knape T., H.L., Wade V.P., Gargan M., Harris C., Rahman Y., *A UML Approach to Process Modelling of Clinical Practice Guideline for Enactment* *The New Navigators: from Professionals to Patients*, 2003: p. 635 - 640.
9. Lattimer, V., et al., *Safety and effectiveness of nurse telephone consultation in out of hours primary care: randomised controlled trial*. *BMJ*, 1998. **317**(7165): p. 1054-1059.
10. Lattimer, V., et al., *Cost analysis of nurse telephone consultation in out of hours primary care: evidence from a randomised controlled trial*. *BMJ*, 2000. **320**(7241): p. 1053-1057.
11. Pinnock, H., et al., *Accessibility, acceptability, and effectiveness in primary care of routine telephone review of asthma: pragmatic, randomised controlled trial*. *BMJ*, 2003. **326**(7387): p. 477-479.
12. Richards, D.A., et al., *Nurse telephone triage for same day appointments in general practice: multiple interrupted time series trial of effect on workload and costs*. *BMJ*, 2002. **325**(7374): p. 1214-.
13. Moll van Charante, E., et al., *Nurse telephone triage in out-of-hours GP practice: determinants of independent advice and return consultation*. *BMC Family Practice*, 2006. **7**(1): p. 74.
14. O'Cathain, A., et al., *The effect of attitude to risk on decisions made by nurses using computerised decision support software in telephone clinical assessment: an observational study*. *BMC Medical Informatics and Decision Making*, 2007. **7**(1): p. 39.
15. Dunt, D., et al., *Impact of telephone triage on emergency after hours GP Medicare usage: a time-series analysis*. *Australia and New Zealand Health Policy*, 2007. **4**(1): p. 21.
16. McCarron P., C.M., Collier D.,, *Patient Satisfaction Survey - West Waterford Area*. 2006 March Carlow Emergency Doctors On Call Carlow.

17. Monaghan, R., C. Clifford, and P. McDonald, *Seeking advice from NHS direct on common childhood complaints: does it matter who answers the phone?* Journal of Advanced Nursing, 2003. **42**(2): p. 209-216.
18. Software, P. *Plain Healthcare clinical decision support*. 2005 [cited 2008 6th March]; TAS Odyssey is Plain Healthcare's original Telephone Assessment System.].
19. Baker, M., B. Robson, and J. Shears, *Clinical decision support in the NHS -- the clinical element*. Journal of Clinical Governance, 2002. **10**(2): p. 77-82.
20. Adastra. *Adastra Software Limited* 2008 01/07/2008 [cited 2008 05th March]; Adastra Software Limited main website].
21. Services, G.P.M. *Nightingale Teleguides - Algorithm- Based Decision Support Specifically Tailored For Out Of Hours Service Providers*. 2005 [cited 2008 5th March].
22. McCarron P., C.M., Collier D., *Background to the development of Nightingale Teleguides*. January 2008, Carlow Emergency Doctors On Call Carlow.
23. McGowan, J.J. and P. Winstead-Fry, *Problem knowledge couplers: reengineering evidence-based medicine through interdisciplinary development, decision support, and research*. Bulletin of the Medical Library Association, 1999. **87**(4): p. 462-470.
24. Kawamoto, K., et al., *Improving clinical practice using clinical decision support systems: a systematic review of trials to identify features critical to success*. BMJ, 2005: p. bmj.38398.500764.8F.
25. An Bord Altranais. *Irish Nursing Board, An Board Altranais*. 2008 20/05/2008 [cited 2008 05th March]; Home page of Irish Nursing Board].
26. Clinical Solutions, L., *Teleguide Triage Algorithm - Chest Pain (19)*, in *Review and Comtomisation Guide*. 2003.
27. General Practitioner Management Services Limited. *Nightingale Teleguides*. 2008 [cited 2008 25th January]; Nightingale Teleguides - Algorithm-Based Decision Support Specifically Tailored For Out Of Hours Service Providers]. Available from: <http://www.nightingaleteleguides.ie/>.

Appendix 1 Background to the development of CDSS

The Teleguide Algorithm base set was developed in 1997 by a multi-disciplinary clinical team using a comprehensive evidence base and where necessary, sophisticated consensus-development techniques.

The Teleguide Algorithms contain embedded text-based clinical reference content in two places; in the Symptom Overviews for each Algorithm and in the Clinical Rationale for each question (contained in each Algorithm). Both reference sources can be displayed by the clinical telephone advisor with a simple keystroke. Reference materials contained in these locations is evidence-based and updated at least once annually during Priority Solutions' internal continuous improvement process.

The Clinical Rationales explain why the question is being asked. Explanations usually include a discussion of how each answer to the question helps in the assessment of the caller's underlying disease (or injury) severity. They also include discussions of the impact of co-morbid conditions, complicating factors (such as immunodeficiency states) and drug side effects as they impact the question and related responses.

The Symptom Overviews focus on the differential diagnosis for the symptom as well as recent advances in medical, nursing and triage practice as they relate to the caller's symptom. The differential diagnoses provide a summary of definitions for rare or unusual illnesses that are pertinent to the question being asked.

Although both forms of clinical information are always readily available, clinical telephone advisors are not required to access the information during the triage process.

The triage content is structured like a branching chain. This means that answers to each question in the algorithm (captured as yes, no or uncertain) automatically and reproducibly trigger a specific follow-up question. The answer to the follow-up question in turn triggers another specific question, and so forth until the amount of information collected becomes sufficient to enable a disposition to be provided.

Importantly, not all triage content is structured this way. Some triage content (known as guidelines, or guideline-based products) simply list possibly pertinent questions in a menu and invite the clinical telephone advisor to ask some or all of them, in any order he or she chooses.

When the algorithmic approach to organizing triage content is compared with the guidelines approach, the former offers clear benefits. In particular, the structured question sequence inherent to the Teleguide Algorithms minimises errors caused by forgetting to ask questions, not accounting for a caller's underlying illness, changing the order of questions (which can result in incorrect inferences about illness severity), or the presence of bias or simple poor judgment on the part of the triage nurse. The structured question sequence inherent to algorithms also assures excellent triage performance and facilitates process improvement efforts by simplifying and codifying the triage process itself.

Appendix 2 – Clinical Audit Sheet



Nightingale Teleguides

Nurse: _____

Date: _____

	0	1	2	Comments
1. Introduction/Consent				
2. Confirm patient's age				
3. Establish Rapport "Open and Professional"				
4. Tone/Moderate "Empathetic"				
5. Direct contact with patient where possible				
6. Good Quality telephony				
7. Takes control of the call				
8. <u>Pre Triage assessment</u> Duration/Location/Severity Past medical history / Allergies (relevant)				
9. Identify the chief symptom(s)				
10. Selection of the most appropriate Teleguide				
11. Demonstrates effective listening skills				
12. Use of Teleguide questions and sub-questions				
13. Appropriate use of open and closed questions "Do not answer the questions for the patient"				
14. Avoidance of Medical Jargon / language				
15. Demonstrates critical thinking "Chooses yes/no/unsure appropriately"				
16. Recognition and confirmation of patients understanding of questions				
17. Document pertinent Information Only (Notepad)				
18. Arrival at Appropriate Level of Care				
19. If overriding Level Of Care reason must be documented				
20. Mutually agreed outcome				
21. Management plan clear and appropriate				
22. Home Care Instructions given				
23. Worsening instructions given / call back				
24. Was call closed professionally? Did patient sound satisfied?				
25. Length of Consultation acceptable				
OVERALL SCORE				

Call Number _____

0 = Criteria NOT MET 1 = Criteria partially met 2 = Satisfactory Standard

If a criterion is not applicable to a particular call a score of 2 should be given.

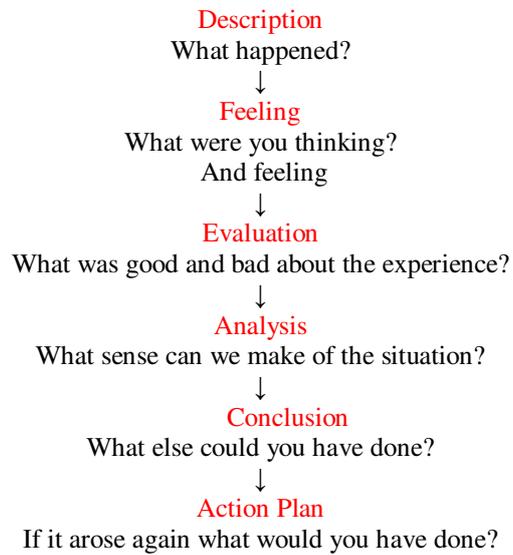
Maximum score 50 marks. Please note that in order to achieve a pass a score above 38 must be achieved.

Date of Audit _____

Name of Auditor _____

Appendix 3 – Gibbs Model

Reflective practice using the Gibbs model (1998):



Appendix 4 – Nurse Interview

An evaluation of Clinical Decision Support Software for Nurse Telephone Triage in the Out of Hours setting for General Practitioner Co-operatives - Nightingale Teleguides

Nurse: _____

Date of Interview: _____

- 1) Have you used a CDSS package before?
Yes: In what setting? What differences exist?
- 2) Did you triage in the OOH's setting on a paper basis before using CDSS?
- 3) Length of time using the Nightingale Teleguides:
- 4) What do you believe are the main issues arising from the use / misuse of the CDSS package?
Understanding
Training
Appropriate selection of algorithm
- 5) What area's / patient conditions, if any, do you feel that the CDSS are inappropriate for NTT in the OOH's setting?
- 6) How important is the pre-triage in the use of the teleguides (past medications, history etc)? Is there a way to enforce pre-triage?
- 7) A) How important is the age check of the patient before starting a Teleguide?

B) Should a reminder be set to prompt nurses to confirm age?
(Reminder as start button is clicked etc)
- 8) Questions and sub questions of each teleguide algorithm are not always asked.
A) Do you feel it is necessary to ask ALL questions pertaining to a teleguide algorithm?

B) Is there a way to ensure / enforce that all questions are asked?
- 9) In your experience, by not following the CDSS fully, are there aspects of the patients reported condition that could be missed?

- 10) After using CDSS for a certain length of time;
- A) Does a TTN anticipate the questions and
 - B) therefore change the order in which questions are asked (relative to the way they are displayed by the CDSS)?

If yes; is this documented anywhere?

- 11) Does the strict adherence to the Nightingale teleguide algorithms impact on your final level of care if appropriate clinical judgement is not used?

- 12) A) Do you feel negative questioning (re-phrasing) towards the patient while using the Nightingale teleguide algorithms exist? (e.g. "You're not coughing" etc) If yes, why?

B) What could be done to rectify this?

- 13) A) Do you feel it is necessary to over ride the level of care reached by the CDSS?

Always

Frequently

Occasionally

Not at all

None of the above: Please specify_____

B) Are the causes of this;

A failing in the CDSS

Or

Leaving out a question / sub question (not exploring patient's condition correctly)

Or

A medical issue: (E.g. Urgent to Emergency etc)

Or

A social issue: (no transport, social reasons etc)

- C) What are the most common reasons for over riding calls that you have encountered?

- D) How do you document this aspect of the call?

- 14) A) Have you read the overview of the Nightingale teleguide algorithms provided within the system?

B) When triaging a call and using the CDSS do you read:

Clinical Rationale

Areas of Inquiry

Considerations; Co morbid / Medications

C) Does any of the Nightingale teleguide training involve background reading of this information?

15) Do you give worsening instructions?

Yes / No Why?

16) Do you think it is beneficial to give home worsening instructions?

17) Do you use the evidenced based home care advice provided?

Yes / No Why?

18) What are the benefits of evidenced based home care advice?

19) Do you feel the CDSS integrates with your working environment?

Yes / No Why?

20) Does it allow for the free flow of information and questioning for the patient?

Yes / No Why?

21) Do you feel the use of CDSS enhances your role as a nurse?

Yes / No Why?

22) Has the introduction of CDSS improved patient care?

Yes

No

Don't know

23) Has your workload changed with the introduction of CDSS?

Increased workload

Decreased workload

No change in workload

Comments:

24) Which of the following best describe how the CDSS supports your triage (please select no more than 3 answers)

- More efficient
- Less efficient
- Safer
- Less safe
- Length of call increased
- Length of call decreased
- Don't know
- None of the above

Comments:

25) Overall, how do you view the CDSS?

- Absolutely fantastic
- Successful
- Failure
- Waste of time and money
- Don't know

Comments:

26) Would you go back to using a paper base triage system?

- Yes
- No

27) What suggestions do you have to improve the Nightingale Teleguides?

28) Any additional general comments you wish to make: