Evaluation of web-sites that contain information relating to the norovirus infection and the evaluation of generic and specific instruments deployed to evaluate web-sites

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Abstract

Background: The internet has experienced an increase of healthcare websites and there has been a rise in searchers for healthcare information. Norovirus is a very contagious virus which requires patients to stay at home and not visit their G.P. This raises the question of whether the information on websites is reliable for those who are unable to see a G.P. Many studies have assessed website quality for a variety of medical conditions. Yet, to date, no study has assessed the information quality and readability of norovirus websites.

Aims: The study aimed to locate the most commonly searched for norovirus websites on the World Wide Web and evaluate the information quality and readability of these websites.

Methods: 40 websites were selected by using various search engines. The term 'Norovirus Infection' was searched. These websites were then assessed by using two generic evaluation tools (HON and Discern), readability tests (Flesch Reading Ease and Flesch – Kincaid Grade Level), and a specific Norovirus Tool based on the perceived needs of patients suffering from norovirus. These tools were subject to evaluation themselves in regards to their feasibility, reliability, and validity.

Results: The results of this study differed to others as it was found the information quality of websites on norovirus was of a good standard. Only five websites achieved less then 50% with Discern, two with the HON tool, and two with the Norovirus tool. Yet, in common with other studies this study found that the readability of the websites was poor. No website achieved a score of 70 or higher with the reading ease, and no website scored 7 or lower with the reading grade. This study found the HON code tool took the longest time to use suggesting it may be less feasible, although the difference to other tools was minimal, but still statistically significant. The tools did not appear to correlate well which suggests they may measure different quality features of a website. The use of different tools may therefore be recommended.

Conclusion: The World Wide Web is a good resource for healthcare information on norovirus. Yet, in regards to readability the reading tests revealed the reading levels are too high for the generic public and attempts should be made to lower the reading levels. Finally, due to the changing nature of the internet website evaluations may not be up to date soon after they are published. Further research is recommended with multiple website evaluations, a larger sample of websites, and conducted by medical professionals.

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Contents

Chapter 1: Background

1.1 Introduction

Norovirus is a highly contagious virus which can cause diarrhoea, vomiting, nausea, and fever (NHS East Riding of Yorkshire 2009). The virus is a global health problem which affects people in both developed and developing countries. Norovirus starts with a sudden onset of projectile vomiting and is usually accompanied by diarrhoea and there is no treatment for the virus (NHS East Riding of Yorkshire 2009). Schnirring (2013) from CIDRAP writes that there are 21 million infections each year and as many as 800 fatal incidents. Norovirus has the potential to be fatal as it can cause complications to the elderly and the very young, and to patients with weakened immune systems. Norovirus is also the leading cause of gastroenteritis in children (Schnirring 2013). Since 1999 cases and outbreaks of norovirus have increased year on year, world wide, during the winter months. This dissertation will evaluate the quality of websites that provide healthcare information on norovirus. The next two sections will outline the importance of the World Wide Web; further sections will outline the norovirus infection in more detail and the importance of high quality information on norovirus.

1.2: The World Wide Web

The use of the internet by those living in Britain has increased and the use of the World Wide Web to locate healthcare information has also increased. The Oxford Internet Survey (OIS) will be used to outline this increase; although this dissertation will also outline other Internet Surveys. OIS is a report created by the social science division at the University of Oxford. The report was launched in 2003 by the Oxford Internet Institute and it contains around 2057 users employing a multi national probability sample. This means it is able to cover Britain as a whole.

There are now more people using portable devices such as smart phones. In 2003 only 85% of British people had a phone with 11% having internet access via the device (Dutton & Blank 2011). In 2009 97% of British people owned a phone with 24% having internet access via the device (Dutton & Blank 2011). Yet, by 2011 the OIS report suggests that 49% of users reported using a mobile device to access the internet.

The OIS report suggested that users now have many devices which consist of laptops, multiple computers, e-readers and tablets in addition to mobile smart phones. In 2011 33%

of British people who used the internet had an electronic reader (Dutton & Blank 2011). The OIS report purported that 59% of British people have access to the internet via these portable devices; not taking into account traditional desktop computers. The OIS report outlined the rise of multiple computers in households which stands at 42% in 2011; allowing different family members to own their own computer desktop. 18% reported only having one computer, and 24% reported having two computer systems, compare this to 2005 where only 15% of households had more than one computer (Dutton & Blank 2011).

In regards to health information on the internet Dutton & Blank (2011) surveyed the seeking behavior of internet users. The report found that searches for health information have risen over the last six years. In 2005 health information was sought at 37% whereas in 2011 it had risen to 71%. In regards to life style and internet usage it was reported by Dutton & Blank 2011 that 57% of students accessed the internet for health information, 74% of employed people accessed the internet for health information, and 68% of unemployed people accessed the internet for health information. Dutton & Blank (2011) in the OIS report also reported that 48% of next generation users (advance users) reported they found the health information online helpful, 37% of first generation users found health information useful and 15% of ex-users found health information useful.

1.3 Norovirus

The Health Protection Agency (2013) created a patient information leaflet (PIL) which outlines norovirus for health and social care staff; this will be employed to briefly describe norovirus. Norovirus is also known as the small round structured virus (SRSV) and the Norawalk-like virus (NLV). Regardless of its various names the virus is known to cause gastro-enteritis. The Health Protection Agency in its PIL (2012) emphasises that even though norovirus is referred to as the 'winter vomiting bug' it occurs in all seasons, and not just winter. The symptoms of the virus consist of a 'sudden onset of severe and dramatic vomiting' (Health Protection Agency PIL 2012). The nature of vomiting is so powerful it is often projectile. The virus is also known to cause diarrhoea amongst some sufferers. The Health Protection Agency (2012), states that the symptoms of the virus can last from 24 to 48 hours. A person suffering from the virus will feel 'lethargic and washed out' for a couple of days (Health Protection Agency PIL 2012). It is reported that norovirus is not considered dangerous in the long term even amongst the elderly and there are no lasting effects of the virus (Health Protection Agency PIL 2012). There is currently no treatment for norovirus; therefore, a patient suffering from the virus will simply have to wait out its symptoms. It is

also mentioned that anti-biotic treatment will have no effect on the virus and that currently there is no over the counter treatment for norovirus, as is the case with most viruses. Furthermore, it is stressed that the infected person rest for up to 48 hours and avoid school or work for the following days. The PIL on Infection Prevention and Control from the Humber NHS Foundation Trust (2011) recommends drinking plenty of water as a source of treatment as there is an increased risk of dehydration. As with any other virus it is highly recommended for a patient to isolate themselves in order to stop the spreading of the virus, and by practicing good hygiene. That is, good hygiene in the sense of washing your hands regularly and using separate towels etc. In both of the patient information leaflets it was highly stressed that no hospital or doctor treatment is required; patients are told to stay at home.

1.3.1 Importance of information relating to Norovirus on the World Wide Web

The United Kingdom over the last few years has experienced an increase in the norovirus infection. Year after year hospitals have been overrun with the virus (Health Protection Agency 2013). The 2012/2013 epidemic, at the time of writing, has been the worst epidemic of norovirus in the UK as the BBC news (2013) reported 1.1 million cases and the Health Protection Agency reported an increase of 72% from 2012 (Health Protection Agency 2013) . This is due to the fact that norovirus can be spread very fast, closed environments such as hospitals have experienced outbreaks of norovirus and it was able to spread rapidly. Significant news coverage with articles such as “Cases of the winter vomiting bug “top a million” (BBC News 2012) and “Winter vomiting cases at 1.1 million” (BBC News 2013) have warned the public of such issues.

If patients are asked to remain at home and away from work, schools, universities, and colleges etc. Then they will be likely to obtain information from elsewhere. If a patient thought they may have norovirus but they were unable to visit a local G.P they would look elsewhere for information about norovirus. One of the increasing resources of healthcare information is the internet, in the form of webpages (Dutton & Blank 2011; Forkner-Dunn 2003). Furthermore, due to the rise in modern technology the easiest way to search for information is via the World Wide Web. Searching the Web may not even need access to a computer due to the rise of smart phones and tablets. In 2010 BBC NEWS Technology published an article titled ‘Smartphone’s take world by storm’ which reported that sales of smartphones was at 54 million. This is applied to developed countries although developing countries are also catching up. Therefore, patients will be increasingly using the internet via

different platforms to access information regarding norovirus. Yet, it is unknown whether this information will meet the needs of the user or whether a website will fulfill the needs of someone suffering from norovirus. Many studies looking at the Web as a potential resource for healthcare information have highlighted the need for high quality information on websites (Eysenbach, Powell, Kuss & Sa 2002).

1.3.2 Norovirus Information needs for patients

The previous sections outlined how patients are now using the Web to find information to better their health. In most scenarios this information may be read before or after visiting a qualified doctor. In the case of norovirus patients are told to remain at home and in isolation to avoid spreading the infection. Therefore, it is important that patients gain the same information they would from a qualified doctor. That is, information on the causes of norovirus should be explained on any healthcare website; as a patient may be suffering from a different condition which appears as norovirus. The symptoms would have to be sufficient and detailed. The same can be said for the causes, treatment, prevention, and any consequences of having norovirus. Patients would most likely want to know how they can treat the virus as its symptoms can be discomforting. In addition if multiple people live in the same house hold patients would want to know how to stop the spread of the virus to others. After a patient has norovirus or has been through the symptoms they may also want information on how to prevent norovirus. Finally, and probably most important the consequences of spreading norovirus should be sufficiently explained due to the winter outbreaks outlined in the previous section(BBC News 2013). In summary any healthcare website aiming to provide a breakdown of norovirus for patients should aim to meet information that would be provided by a doctor. The websites should not only contain this information but they must be accessible to a wide range of people from educated to non-educated patients. That is, patients may in general have reading difficulties or they may suffer from a condition that impairs their reading.

1.4 Research Aims and Objectives

In reference to the above information the aim of this study is to assess the information quality of websites providing healthcare information on norovirus.

In doing so, there will be several objectives of the dissertation listed as follows:

- To locate the most commonly searched for norovirus websites on the internet and capture them in an offline environment to be evaluated.

- To develop an evaluation tool specific to norovirus based on the perceived needs of the patients such as its symptoms, causes, treatment, prevention, and the consequences of spreading norovirus. The tool will also aim to see if the information provided is similar or sufficient to that of information provided by a qualified doctor

- To select a suitable readability test in order to find out whether websites which contain norovirus information are suitable to read for the general public.

- To select suitable generic tools which are used to evaluate healthcare websites.

- To assesse norovirus websites by using generic tools, a readability test and a specific norovirus tool, mentioned above.

- To evaluate the evaluation tools in regards to their validity, reliability, and their feasibility in determining the information quality of websites that contain information related to norovirus.

1.5 Structure of Dissertation

The dissertation is comprised of seven sections:

Chapter 2 will review the literature regarding norovirus evaluations on the World Wide Web and it will provide a review on generic, specific, and readability tools to assess websites.

Chapter 3 will describe the methodology followed in the study.

Chapter 4 will present and analyse the results of the website evaluations.

Chapter 5 will discuss the overall results of the study.

Chapter 6 will draw conclusions from the results and relate back to the original aims and objectives of the study. This section will also outline the limitations of the current study and provide recommendations for further studies.

1.6 Summary

This introduction and context section has looked at the statistics on how patients are accessing the internet to find healthcare information. It was found that year on year patients are looking to the internet to locate healthcare information which has a positive effect on their health (Dutton & Blank 2011). The norovirus infection was outlined and it was found that patients are being told to remain at home and not visit their doctor If patients are being told to remain at home they will seek information from elsewhere. If the web is being accessed via different platforms to access health information; websites should be assessed for their quality, whether they meet the needs of patients, and for their readability.

Chapter 2: Literature Review

2.1 Introduction

This section will compose of several sections. The first half of the literature review will look at the advantages and disadvantages of healthcare information on the World Wide Web and the tools that are used to evaluate web pages in regards to existing studies. The second half of the literature review will look at generic, specific and readability tools used to evaluate webpages and their advantages and disadvantages.

2.2 Search Strategy

2.2.1 Scope of literature review

The sources for the literature composed of searches in in various medical and health bibliographic databases, alongside the University's Star Plus library catalogue, Google Scholar, Google, and citation analysis of relevant publications were also employed to find literature. The following bibliographic databases were searched: Medline, CINAHL, PsycInfo, Web of Knowledge, British Medical Journal, Medical Subject Headings, Scopus, BMJ Health informatics series. The other resources employed included: Google Scholar, The University of Sheffield's Star plus library catalogue and the Google search engine. Information on readability, generic tools, specific tools, and previous studies were identified via such sources. A large part of the literature review came from citation analysis, that is, finding a reference in a journal or dissertation that is relevant to this dissertation.

2.3 Health Information on the Web

2.3.1 Advantages and disadvantages of using the Web for health information

There is a vast number of health information webpages available via the World Wide Web. In 2012 it was reported that that up to 80% of the UK population used the internet and 67% used a computer every day (Office for National Statistics 2012). The problem with some of these websites is that they may be unregulated as anyone can create a webpage and provide advice with no medical qualifications. This could possibly be dangerous as wrong information provided on health could lead to serious consequences. Compare this to written information, such as a patient information leaflet, which is usually proofread and has been through various quality control mechanisms to ensure the information is correct. There are a vast number of papers published outlining possible concerns with unregulated

webpages. These concerns were raised by Richards, Colman & Hollingsworth as far back as 1998. They wrote that as the internet was unregulated users could set their own websites up with 'the potential of disseminating inaccurate and often dubious medical information and they can even take on a quasi-medical professional role as hospital 'specialists' by answering other patients e-mail medical queries without recourse to professional medical advice' (Richards, Colman & Hollingsworth 1998 p.281). Since the publication of that article over 15 years ago and as the internet has remained unregulated such concerns have appeared across journals relating to healthcare and the World Wide Web. This section will firstly outline the advantages of accessing the web for health information and outline some of the drawbacks from publications after the Richards, Colman & Hollingsworth 1998 paper.

In Chapter 1 Introduction it was mentioned that the web was being used by people to improve their health. Therefore there are some clear advantages of using the web to locate health information. In the Dutton & Blank (2011) study it was explained how patients were now using multiple devices to access healthcare information. This makes healthcare information easy to access and in some cases may act as a substitute to visiting a qualified doctor. Yet, patients are not thought to replace information from the web from a qualified doctor; but rather they are likely to supplement the information with advice from a qualified doctor (McMullan 2006). McMullan (2006) writes that one of the main advantages of the internet is that it is available widely and the example of work, the home and libraries is given. Furthermore, this information is available 24 hours a day at home and work and it can be accessed anonymously (Williams, Huntington, Nicholas 2003). The use of the web for healthcare information can also help patients understand their condition more and increase their level of self care (McMullan 2006). It can also be said that the use of the web for healthcare information will also reduce redundant visits to the doctor and decrease the burden on the NHS (Wanless 2002).

Yet there are also drawbacks of using the World Wide Web for healthcare information as outlined previously. This is because anyone can upload information on the internet with no medical qualification and it will come down to the end user to decide whether a website will hold reliable information (Rieh 2002). There are papers that also suggest that there is a sense of anonymity of online healthcare information which may lead to incorrect or insensitive comments especially on healthcare forums (Bartlett & Coulson 2010, and Barak Boniel-Nissim & Suler 2008). These papers also suggest that a lack of verbal communication, for instance, from that provided by a qualified doctor, can be easily

misunderstood. This may mean that the information on the internet may be overwhelming and confusing for some (Eysenbach 2003). Eysenbach (2003) looking at cancer on the World Wide Web reports that some patients reported that the internet confused them on what the right course of treatment should be. In addition there were a few oncologists that suggested that patient's information from the web is 'sometimes or even rarely correct' Eysenbach 2003p. 366).

2.3.2 Current methods of assessing webpages containing health information

It can be said that even though the World Wide Web has increased patients quality of health (Dutton & Blank 2011) there are still some drawbacks in the sense of low quality websites which misinform patients (Bartlett & Coulson 2010, and Barak Boniel-Nissim & Suler 2008). In order to remedy this there have been attempts to create evaluation tools. Mentioned by Surman (2010) in 1999 there were around 29 evaluation tools (Kim, et al 1999) and in 2004 this had sharply risen to 273 tools; although many of these tools were not complete and were inaccessible on websites (Bernstam et al. 2005). In order to regulate websites in the last 15 years there has been an attempt to evaluate websites by using evaluation tools. The British Medical Journal published a study which conducted a systematic review of instruments used to rate the quality of health information online. The journal is titled *'Examination of instruments used to rate quality of health information on the internet: chronicle of a voyage with an unclear destination'* (Gagliardi & Jadad 2002). This systematic review updates research from a previous review from 1998 (Jadad & Gagliardi 1998). Gagliardi and Jadad (2002) write that during the past five years 98 instruments have been used to evaluate the quality of websites online. Yet, many instruments that were identified in 1998 were no longer available. 51 new instruments were identified in the new literature review. Gagliardi and Jadad (2002) identify initiatives to organize and identify valid health information online from private organisations to governments. Gagliardi and Jadad (2002) list the following generic tools that are used by healthcare websites to validate the quality of their webpages: the information quality tool, HON code of conduct, E-health Code of Ethics, Discern, E-Health Seal, Health Website Accreditation Programme, Truste and the Council of Better Business Bureaus. Although verifying the URL's provided from 2002 provided to be futile it was found that via a Google search the for-mentioned instruments exist today either as adapted or funded by a different organisation. In searching past dissertations and relevant literature various generic tools to evaluate healthcare websites were identified; Surman and Bath (2013), for

instance, made use of the HON and Discern tools. The literature search found the 'HON', 'SPAT', 'Discern', 'Jones Evaluation Tool', and 'HSWG' tools to name a select few. In previous studies two of such generic evaluation tools were selected and then applied to each website for example: Bouchier, (2001); Harland, (2004); Hsu, (2006); Liu, (2012).

The tools mentioned above measure the quality of websites using different methods. Wilson (2002) categorizes five methods of assessing website quality used by evaluation tools. These are: the codes of conduct, quality labels, user guidance tools, filtering tools and accreditation labels. In order to qualify for accreditation or to use a filtering tool the researcher would require extensive knowledge on the subject area, an oncologist for assessing breast cancer, for example. Whereas the codes of conduct as employed by the HON code can be placed on a website and it is possible to become HON certified. That is, by stating the webpage is certified by the HON code and that it abides by the HON code principles (Health on the Net Foundation, 2013). The Discern tool on the other hand is in the form of a checklist allowing patients to evaluate the quality and reliability of the website (Wilson, 2002).

2.3.3 Existing studies assessing healthcare information on the Web

Bouchier, (2001); Harland, (2004); Surman, (2010); Hsu, (2006); and Liu, (2012); to name a few, have produced dissertations assessing healthcare information on the internet. Three of these dissertations have been published as journal articles: Bouchier & Bath (2003); Harland & Bath (2007); Surman & Bath (2013).

Surman (2010) investigated the quality and readability for those who have suffered a stroke and their speech and language difficulties. In this study 51 websites were selected to be evaluated by using two generic evaluation tools; the Discern tool and the HON code. The time taken to evaluate each website was recorded. This provided useful as it allowed the researched to evaluate the feasibility of the tools. The order of the tools used was also rotated to avoid any researcher bias. Furthermore, as those who suffer from stroke will likely to have reading difficulties the websites were tested for their readability. This was achieved by using the Flesch Reading Ease and Flesch-Kincaid Grade Level readability tests. Surman (2010) also created a specific evaluation tool based on reports from the needs of patients suffering from speech and language difficulties following a stroke. The study found that the information quality of the websites varied considerably as 59% achieved a score of 50% with HON, 37% with Discern, and 49% for the stroke evaluation tool. Readability was

found to be poor with only 6% of websites scoring below the recommended grade of 7. It was also found that the stroke tool was less feasible compared to the generic tools.

Harland (2004) looked at Multiple Sclerosis. The aims and methodology were fairly similar to the studies above. Three generic tools: the HON code, Hi-Quality Guidelines, and the Information Quality Tool (IQT) were selected. A specific tool for Multiple Sclerosis was also developed. 17 websites were selected from varying search engines. In line with previous studies the results of each tool was statistically different. In the Cronbach's Alpha, a coefficient of internal consistency, the benchmark was set between 0.7 and 0.8. The IQ tool had 0.842, Hi-Quality Guidelines 0.746, HON Code 0.537, and the specific Multiple Sclerosis tool achieved a score of 0.930.

Hsu (2006) looked at breast cancer. The aims and methodology were similar to previous studies. The HON code, Discern, and the Information Quality tools were selected. A specific breast cancer tool was also developed. The results of this study are different to that of other studies as Hsu (2006) found scores of the tools to be 'dependable'. In the Cronbach's Alpha the HON code achieved 0.817, IQ Tool 0.766, Discern 0.816 and the specific breast cancer tool achieved 0.876.

Ademiluyi (2003) looked at smoking cessation and the paper was published in a peer reviewed journal. The aims were to assess the reliability of three generic evaluation tools, the IQT tool, QS (quality scale), and the Discern tool. A total of 89 unique websites were evaluated from an initial sample of 370, the IQT tool is based on 21 questions, the QS tool is based on seven questions, and the Discern tool is based on 16 questions. Ademiluyi (2003) found the internal consistency of the IQT with Cronbach's Alpha was 0.634, the QS was 0.413, and discern was 0.759. Overall, Ademiluyi (2003) found that each tool had correlated significantly with each other with the exception of the IQT total score and the Discern overall quality rating.

2.3.4 Studies that employed generic tools

The use of generic evaluation tools is widespread. The HI Quality tool has been used for multiple sclerosis (Harland and Bath, 2007). The Jones evaluation tool, the eAccess health, and the Health Summit Working Group tool have been used to evaluate the Alzheimer's disease (Bouchier and Bath, 2003). The use of HON is extensive as a generic evaluation and it was outlined as one of the generic tools to be used as back as 2002 (Gagliardi and Jadad 2002) and is still in use today. The tool has been used on conditions such as stroke (Surman,

2010), breast cancer (Hsu, 2006), Alzheimer's disease (Bouchier and Bath, 2003), and Multiple Sclerosis (Harland and Bath, 2007). Selections of these studies were outlined in the previous section, 2.3.3. The use of Discern is extensive and it was outlined as one of the generic tools to be used as back as 2002 (Gagliardi and Jadad 2002) and is still used today. Discern has been used on conditions such as stroke (Surman, 2010), breast cancer (Hsu, 2006). The Information Quality Tool (IQT) has been also been used on conditions such as stroke (Hsu, 2006, Harland and Bath 2007). Selections of these studies were outlined in the previous section, 2.3.3.

The advantages of generic tools are that they are in most cases (Surman 2010; Harland 2004; Hsu 2006; Liu 2012) more feasible then specific tools in that they are quicker to evaluate websites. Furthermore, generic tools allow organisations and healthcare websites to state they meet the HON principles, or the Discern guidelines, for instance, as mentioned by Gagliardi and Jadad (2002).There are some disadvantages of using generic tools. Surman (2010) notes that even if the quality of the website measured by a generic tool rates is as high the website may still not contain information that patients are seeking. Furthermore, websites that do contain information that patients are seeking may be ranked as low quality websites. Bouchier and Bath (2003) and Harland and Bath (2007) found similar problems in using generic tools as it was also found that the generic tools do not measure how well the website reflect the information needs of patients.

2.3.5 Studies that employed specific tools

The use of generic tools is usually supplemented with specific evaluation tools. This section will briefly outline how two previous studies created a specific tool for a health condition. Surman (2010) conducted a literature review into the information needs of parents, carers and family of those suffering from speech and language difficulties after a stroke. The information was then classified into two sections. The first section composing of 23 questions based on information needs on stroke and the second section based on speech and language difficulties with 7 questions. There were 30 questions in total. It was found that the stroke tool was less feasible and took longer to use compared to the generic evaluation tools Discern and HON. Surman (2010) also writes that 'the stroke tool needed some further revision if it were to be used, as some of the fields were found to be repetitive

and potentially not cover all needs, according to the subjects covered by the websites.'(p.73).

Harland (2004) based the multiple sclerosis tool on the self reported information needs of those suffering from multiple sclerosis. This was achieved by exploring previous studies, and tools looking at multiple sclerosis. The tool contained 48 questions and it was split into four sections. The first three sections questioned whether a piece of information was present in the website with yes or no answers. The final sections were more objective with 'not sure' or 'nor applicable' answers. Harland (2004) also found, as Surman (2010) above did, that the specific tool was not feasible in the sense that it contained far too many questions. It was also suggested by Harland (2004) that the questions asked by the tool may have overlapped with the generic evaluation tools and it could have been reduced to include only the key components. Although, Harland suggests the tool is useful if used carefully for end user use, but may not be suitable to organisations or those working with people who suffer from multiple sclerosis.

Potential disadvantages of specific tools, therefore, are that they can be too broad or they may cover too many questions which may overlap with generic tools. Yet, the inclusion of a specific tool is important as it allows a comparison between generic and specific tools. Furthermore, as Harland (2004) mentions the inclusion of a specific tool may also allow end users to evaluate webpages themselves. Moreover, specific tools measure the extent to which a website reflects the information needs of patients; note that this was a disadvantage of generic tools noted in section 2.3.4.

2.3.6 Studies assessing Norovirus healthcare information on the web

Searches were conducted on bibliographic databases, mentioned earlier, for 'Norovirus on the internet', 'Norovirus on the web', 'Norovirus health information' and even 'Norovirus'. Yet, these searches, at the time of writing, did not yield any current studies looking at norovirus health information quality on the internet. This affected the literature review as other medical conditions were discussed in place of studies assessing norovirus on the internet. Secondly, as no studies have been published on the patients information needs for norovirus any specific tool that will be developed will suffer as the tool will be unable to state the needs of the patient fully. It can be deduced from the above sections on generic and specific tools that it is important to include a specific tool as generic tools may measure the quality of the website rather than the information patients would need. Therefore, any

specific tool on norovirus will focus on the perceived needs of a patient who is suffering from norovirus. The researcher developing the tool, having suffered from norovirus, and having the virus spread within the family both to young children and the elderly may be able to record the information needs of a patient with a specific tool. Degerliyurt, Gunsolley, and Laskin, (2010) gave 212 patients, aging 18 to 50, visiting an oral surgery a questionnaire about how much information they would like about the visit. The study found that there was a considerable difference in what information patients would want. Therefore, any specific tool on norovirus would have to mimic a range of possible information a qualified doctor would give that is: symptoms, causes, treatment, prevention, consequences, and any other information that would be specific to norovirus.

2.3.7 Studies employing readability tests

There are certain studies which have evaluated the readability of a website to see if it is accessible to patients with different reading abilities. The tool used most to conduct this evaluation is the Flesch tool. This has been used to evaluate breast cancer health information (Surman & Bath 2013), genetic information (Shedlodsky-Shoemaker et al 2009), Parkinson's disease (Hulley et al 2010), geriatric health information (Fitzsimmons, 2010), social phobia (Khazaal et al 2008) and pediatric neuro-oncology (Hargrave et al., 2006). This is mentioned in Surman (2010) who also used the Flesch tool in regards to breast cancer the dissertation was subsequently published as a journal (Surman & Bath, 2013). The Flesch tool composes of a 'reading ease' score and a 'grade level value and it is said to be fairly easy to use (Aleligay et al., 2008). Yet, Aleligay et al (2008) write that as the Flesch tool may return lower scores compared to other reading tests it should be used with some care. The SMOG reading tool is another reading tool which can be used to evaluate healthcare websites and has been used to evaluate healthcare websites in the past (Aleligay et al., 2008; Shedlodsky-Shoemaker et al., 2009). Aleligay et al (2008) suggests that Fry is also a good readability tool the third most popular, yet the Flesch tool is found to be more widely used than that of SMOG or Fry. Research (Hargrave et al., 2006; Khazaal et al., 2008; Hulley et al., 2010; Fitzsimmons, 2010) has suggested that the majority of healthcare websites, as mentioned by Surman (2010), are not at the reading level recommended for the general public. The reading level of websites that contain information on norovirus is very important as patients are asked to remain at home and in isolation. This will mean that people with reading difficulties in general or those who suffer

from other conditions, such as speech and language difficulties, may not be able to read and understand the information webpages provide. This may also be the case for younger sufferers of norovirus who have access to the internet as their reading ability may be below the required standard.

4. Summary

The literature review has further outlined the importance of norovirus healthcare information on the internet. A review of the literature has identified current tools which were listed above. There are many generic tools to choose from and the methodology in the next section will outline which tools will be selected out of the above studies conducted previously. In addition the reading ability of those seeking healthcare information was also outlined and a reading tool will also be selected in the methodology section. Finally, the literature review outlined some of the issues concerning the development of a specific norovirus tool, and the general needs of patients seeking healthcare information. These justifications of selecting each tool will be outlined in Chapter 3 Methodology.

Chapter 3: Methodology

3.1 Introduction

The literature review in Chapter 2 has outlined current research into health information on the internet and has outlined the importance of evaluating the quality of healthcare websites. Several generic tools were outlined from a literature review and previous studies alongside more disease specific tools. It was found that the generic tools supplemented with a specific tool were important as the generic tools may not look at the content of the websites but only the quality, whereas the specific tools would focus more on the content. There were also issues concerning the importance of the reading level of websites and how this may affect sufferers of norovirus. The methodology employed by Bouchier (2001) Harland (2004) and Surman (2010) will be used in this study; with some minor changes. This decision was taken by the researcher as the three dissertations, respectively, were published in journals. That is, this study will make use of a selection strategy for the websites, the selection and development of tools, and the statistical analysis of the results.

3.2 Research approach

The same approach in regards to evaluating the websites employed by Surman (2010), Harland (2004), and Bouchier (2001) will be used. That is, the researcher will attempt to evaluate websites containing information on norovirus from an end-user or patient's point of view. The researcher has suffered from norovirus, and has had norovirus spread in the family from the young to the elderly. Yet, the researcher does not possess complete knowledge of norovirus from a medical perspective. Therefore evaluating the websites for the correctness of the medical information provided is not possible. This dissertation involves no human participants and therefore is classed as 'no risk'; Appendix 8 contains the departmental ethical approval letter.

In reference to Chapter 1 – Introduction there were several objectives to the study. These objectives will be completed in the following phases:

3.3 Phase one – selection of norovirus websites

The first step was to identify the top three search engines used in the United Kingdom; Surman (2010) found Google, Bing and Yahoo to be the most widely used search engines. This has remained the same (Soames 2012) but with Google increasing its user base. In the UK it has been reported that in 2011 85.11% of web searches were performed using

Google, 4.19%, using Bing, and 2.94% using Yahoo (Soames 2012). Therefore, this study will place more emphasis on Google's search results. Originally the term' Norovirus' was to be typed into the search engines but this was later modified to 'Norovirus Infection' as this search produced more results. 21 websites were selected from Google, in line with the criteria below, 13 websites were selected from Yahoo, and 11 from Bing; a total of 45 websites. The researcher found considerable overlap from the different websites therefore websites were captured from pages 1 to 4. Research (Jansen and Spink 2005) has suggested that users are not likely to venture past the first page of results, yet in order to have a good sample size web results to page 4 were captured. Moreover, due to the changing nature of page ranking a website on page 4 could appear on the first page if it gains many of views. This could occur if many patients entered 'I have norovirus', for instance, with the page appearing normally on page 4 appearing on page 1 and gaining more page hits (Karch 2013). The websites had to meet the following criteria:

- The content had to be based on norovirus.
- The website would likely be clicked on by people looking for information on norovirus i.e. it would contain or pertain to claim it contains information on the norovirus infection.
- The website would be in English as the research is mainly aimed at the UK population but more so because the researcher is not multi-lingual.
- The website would not require registration or a password and could be accessed by anyone.
- The websites chosen would not only be healthcare websites for example the NHS website, or information provided by organisations, for example a website by Imodium. Instead the searches would select a range of websites ranging from organisational advice, healthcare websites, and charity funded organisations.

After the websites were selected they were captured offline due to the changing nature of the internet. The websites were then evaluated on using an offline Google Chrome browser running on a Windows 7 computer system.

3.4 Phase two - selection of generic evaluation tools

In the literature review a variety of tools developed by various organisations were identified to assess the quality of information on websites. Furthermore, generic tools used to assess healthcare information in previous studies were also identified. These tools have been used to assess healthcare information by various bodies, for instance, the Discern tool by the NHS (Gagliardi & Jadad 2002). Although, they are still known as generic tools as they seek to assess the general information quality on a website and not on its content. Specific tools are those which look at the information quality for a specific condition. The stroke tool Surman (2010), for instance, aimed to look at patients needs and investigate the information quality provided on stroke.

In pervious studies identified in the literature review three generic tools alongside a specific tool were used to evaluate healthcare websites, for instance, Harland (2004). Yet, this study has chosen to select two generic evaluation tools, a specific tool, and a readability test due to the word limit. Overall four tools will be used in this study; two generic tools, a specific norovirus tool and a readability test.

3.4.1 Phase two - justification of selected generic tools

The Discern tool has been selected as it has been used successfully in the past to evaluate healthcare websites, for instance, Surman and Bath (2013), Harland and Bath (2007) and Bouchier and Bath (2003). The HON code was selected for the same reason as it has also been used successfully, but more so, as it has been used previously in combination with the Discern tool. That is, the HON code and Discern tool have been used by Hsu (2006) who used this combination to investigate breast cancer websites, Surman 2010 used this to investigate stroke websites, and Liu (2012) used this to investigate anemia websites. The Discern tool and HON code are clearly established and have been freely available as far back as 2002 (Gagliardi & Jadad 2002). The Discern tool is composed of 16 questions, 8 based on the reliability of the information on the website, 7 on the quality of the websites treatment information and one final question which questions the overall rating of the website. The Discern handbook questionnaire can be located in Appendix 1. The questions are rated on a Likert scale of 1 to 5, where 1 is ‘No’ and 5 is ‘Yes’ and 2, 3 and 4 are considered as partly or not sure. This allows the end user who is evaluating a website who is not sure whether a website is a ‘Yes’ or a ‘No’ to give a score of 2, 3 and 4. The HON code is a website evaluation tool based on a set of principles rather than questions which a

website must adhere to. Yet, the HON code has previously been modified in studies such as Surman (2010), Harland (2004), and Hsu (2006). Due to time constraints the models used in such studies were adapted. Surman's HON code questionnaire was selected and further modified to fit a 1 to 5 Likert scale to match that of the Discern tool. The modified HON code is composed of 15 questions and the questions ensure that the 8 principles of the HON code are covered. The adapted HON code used in this study can be found in Appendix 2.

3.5 Phase three - justification for a new norovirus tool

The literature review found that generic tools would evaluate the webpages quality but not its information content as found by Bouchier and Bath (2003), Harland and Bath (2007), and Surman (2010). Therefore all of the studies outlined in the literature review used a specific tool to also look at the specific information quality for a disease, for instance, Surman (2010) developed a stroke tool. The stroke evaluation tool was developed by looking at the needs of people who have suffered stroke and their family and carers, and drawing on previous research on stroke. This tool provided to be important as it allowed discussion between generic and specific tools, and allowed the researcher to measure websites that had high quality stroke information but were rated low by the generic tools. Therefore, it is important to include a specific tool when evaluating webpages for health information. Yet, in the case of norovirus it was found in the literature review that there have been no previous studies evaluating websites that contain information related to norovirus. It was also found that the information needs of patients who suffer from norovirus were nonexistent on the internet. Henceforth any new norovirus tool would need to outline the perceived needs of patients who suffer from norovirus. The development of the tool can be found below.

3.5.1 Phase three – development of a new norovirus tool

The norovirus tool went through several drafts until it was decided that it was sufficient for this study. In previous studies it was found that a specific tool was considered not to be feasible as it asked far too many questions which overlapped with the generic tools. That is, Harland (2004) and Surman (2010) found that the specific tool was not feasible in the sense that it contained far too many questions. It was also suggested by Harland (2004) that the questions asked by the tool may have overlapped with the generic evaluation tools and it could have been reduced to include only the key components. Therefore, the norovirus tool

will consist of six sections with 23 questions mainly based on the perceived diagnosis of a qualified doctor; this perceived diagnoses will be based on other infections a doctor may diagnose. The six sections include: symptoms, causes, treatment, prevention, consequences of spreading the virus, and an overall section specific to norovirus. The overall section, for example, will ask questions such as whether the website has sufficiently informed the patient not to visit their local G.P or a qualified doctor. The full norovirus tool can be found within Appendix 3.

3.6 Phase four - selection of readability test

In the literature review it was outlined how patients who are suffering from norovirus or think they may have caught the infection are told to remain in doors. If one of the increasing ways to access health information is the World Wide Web then the readability level of these websites must be at a suitable level. This is because patients with reading difficulties such as disabilities that affect their reading or younger patients may have difficulties reading the webpage. Readability tests were identified in the literature review, for instance, the SMOG test, the Fry test, and the Flesch test which is comprised of the Flesch Reading Ease and the Flesch Kincaid Level (Aleligay et al 2008). The Flesch test was selected in this study due to its ease of use and simple formulae calculation. The Flesch test has worked well in previous studies; it has been used to evaluate stroke health information (Surman & Bath 2013), genetic information (Shedlodsky-Shoemaker et al 2009), Parkinson's disease (Hulley et al 2010), geriatric health information (Fitzsimmons, 2010), social phobia (Khazaal et al 2008) and pediatric neuro-oncology (Hargrave et al 2006). Furthermore, Surman (2010) used the Flesch tool citing its ease of use and the dissertation was subsequently published as a journal (Surman & Bath 2013). The Flesch Reading Ease and the Flesch Kincaid Level can be found via the Spelling and Grammar function in Microsoft Word 2010. This means the tests are extensively available; this formed a reason for selecting the Flesch test. After the document has been checked for its spelling and grammar Microsoft Word calculates a value for both the Reading Ease and Grade level. This means that the calculation required for each reading test does not have to be completed manually. The score for the Reading Ease is based on a 100 point scale where the higher the score the easier it is to understand (Microsoft Office 2010). The score between 60 and 70 is considered to be the standard for most documents (Microsoft Office, 2010). The Flesch-Kincaid Grade Level rates the text on a U.S. school grade system (Microsoft Office 2010). That is, for example a score of 8.0 would mean that a pupil in the eighth grade in the U.S.

could understand it and for the UK this would equal 8 years of education. The ideal score for most documents for the Kincaid Grade Level is between 7.0 and 8.0 (Microsoft Office 2010). Surman (2010) references Hargrave et al (2006) as recommending that healthcare information should have a maximum of 6.0 score. The first 500 to 599 words of each website will be evaluated using the tests. The reasoning behind this is that if the patient reads the opening paragraphs of a website and finds them too difficult they may stop reading and search for another webpage. It has also been found that using too many words in the text can skew the results and a sample size of 3 to 4 paragraphs which is around 200 to 500 words is a suitable sample size (Readability Formulas 2013).

3.7 Application of tools

The 40 websites were evaluated by the researcher using the tools once. The researcher evaluated one website at a time via an offline browser, as the websites had been downloaded and captured. The websites were evaluated using the two generic tools, the norovirus tool, and the readability test. It was mentioned by Surman (2010) and Hsu (2006) that using tools in the same order when evaluating websites would not be fair Surman (2010). The problem highlighted by Hsu (2006) is that if the researcher uses the Discern tool first to evaluate a website and uses the HON code next, after reviewing question 1 from the Discern tool the researcher may already know the answer. This would allow the researcher to answer the first question of HON by using the answer from the Discern tool. The researcher therefore may not fully evaluate the website using Discern; but refer to answers from the HON code. Therefore the tools will be rotated for each website to overcome any researcher bias, the sequence applied can be found within table 1.

Table 1: Rotation of tools

Website Number	Sequence of tools
1	Discern (D) –> Norovirus tool (N) –>HON (H) –> Readability test (R)
2	N–> H –> D -> R
3	H–> D–> N–> R
4	D–> N–> H–> R
5	N–> H–> D–> R
6	H–> D–> N–> R
etc.	Etc.

The scoring method for each tool can be found in Appendices 1, 2, and 3. The responses to each question for each tool were recorded in Microsoft Excel. In line with Surman (2010) the time taken to evaluate each website with the generic and specific tools was also recorded by using a stop watch; this will allow the tools to be compared for feasibility later in the study. This was achieved by recording the time from the start of the evaluation of the page until it had been completed; this was recorded to the nearest second. The scoring method for each tool can be found within Appendix

3.8 Summary

This section has outlined the choice of generic tools; the Discern tool and HON code, the specific norovirus tool, and a Flesch reading test. The section outlined how the four tools combined and rotated on each website will result in a through evaluation on websites that contain information on norovirus. The next sections Chapter 4: Results 1 evaluation of norovirus website quality and Chapter 5: Results 2 analysis of evaluation tools will present the results of the website evaluations and will analyse the performance of the evaluation tools used to evaluate the websites.

Chapter 4: Results

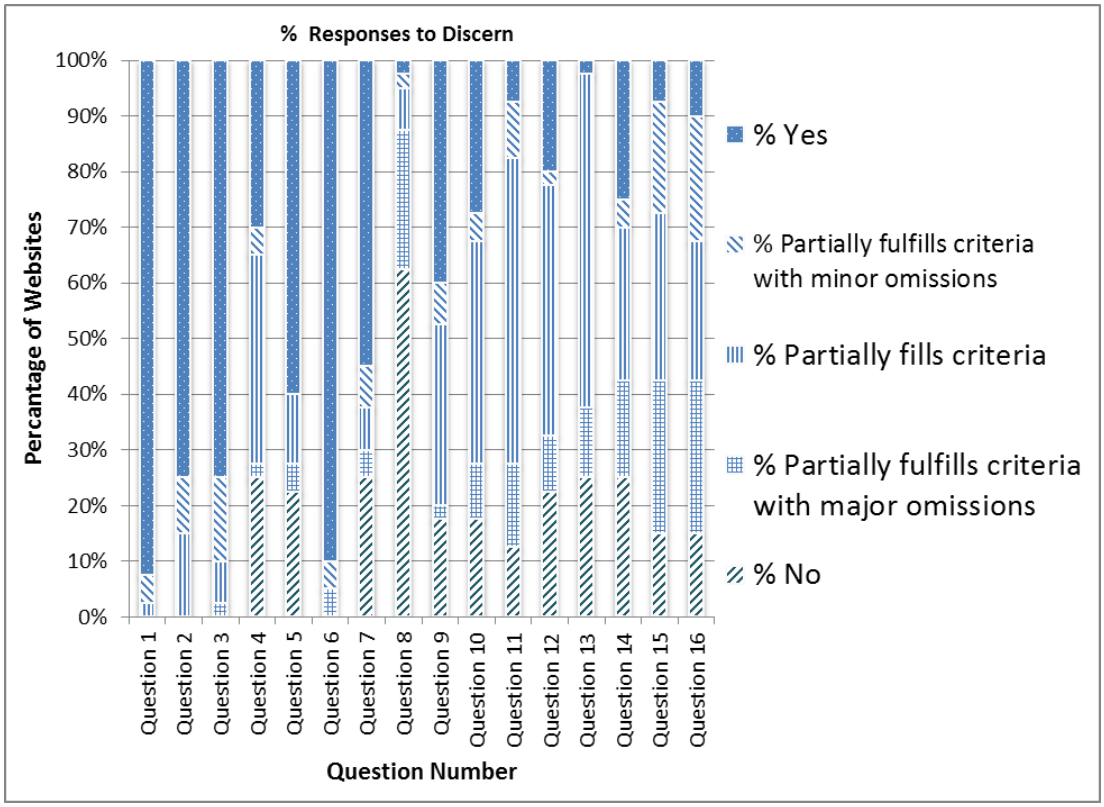
4.1 Introduction

This section will present the results from the website evaluations in the method outlined in Chapter 3 Methodology. The results of the evaluations will be outlined below in detail employing statistical tests where necessary. The overall rank of the websites will also be provided for each website alongside each tool. The validity, reliability, and feasibility of each of the tools will also be discussed.

4.2.1 Score for Discern Tool

The Discern tool, as mentioned in the methodology, largely assesses a websites reliability and treatment information. Figure 2.1 below displays the responses to the 16 questions of Discern for each website.

Figure 2.1: 'Scores for Discern Tool'



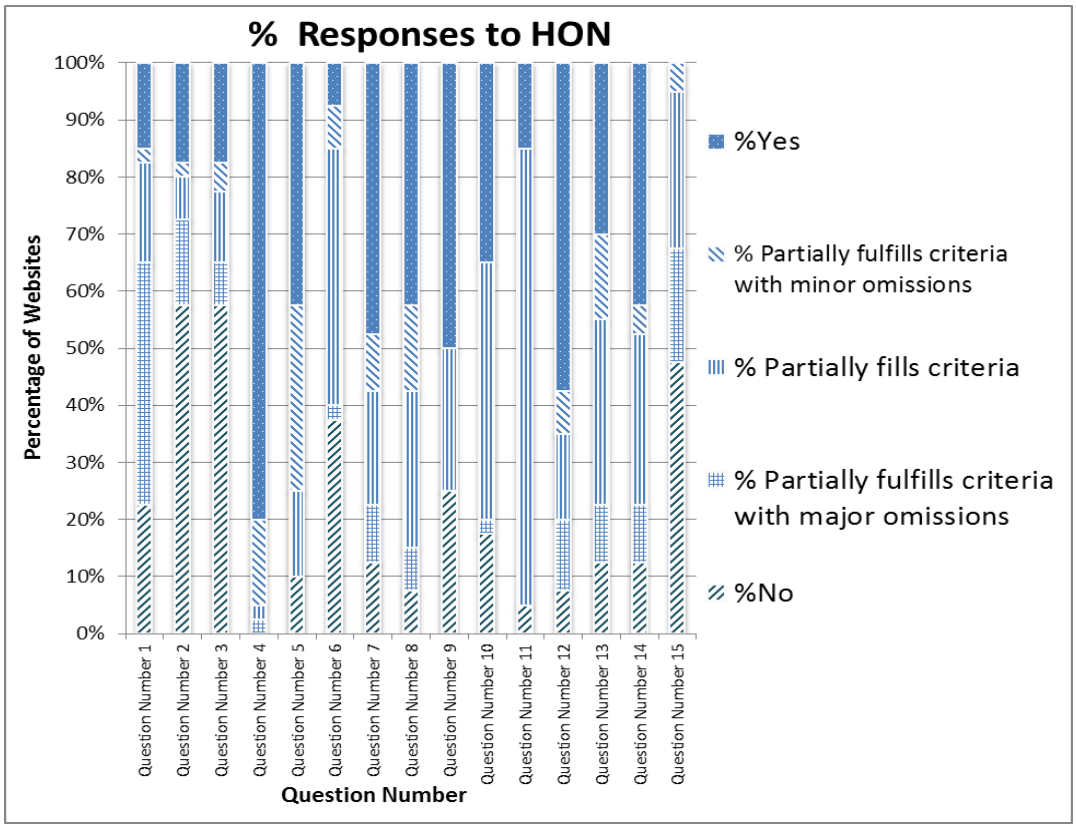
Appendix 1 contains the Discern tool which was used in this dissertation. The tool is compromised of 16 questions, question 1 to 8 concern the reliability of the website whereas question 9 to 15 concern the quality of treatment choices available. The final

question is an overall rating on treatment choice. It can be deduced from the figure above that the reliability of websites was fairly good as most of the websites achieved a 'Yes' response. Yet, in regards to the treatment choices the results vary significantly with more 'Partially' responses.

4.2.2 Score for HON Code

The HON Code tool, Appendix 2, is based on a set of eight principles which aim to help web developers create websites which are of high information quality.

Figure 2.2: Scores for HON tool



The results of the HON code vary greatly with only questions 4 and 12 standing out suggesting many websites stated the purpose of the website (q4) and provided contact details of a webmaster (q12). The variety of response for the other questions may be due to the nature of the questions as each question focuses on different aspects of a website. That is, the 8 principles are split into 13 questions:

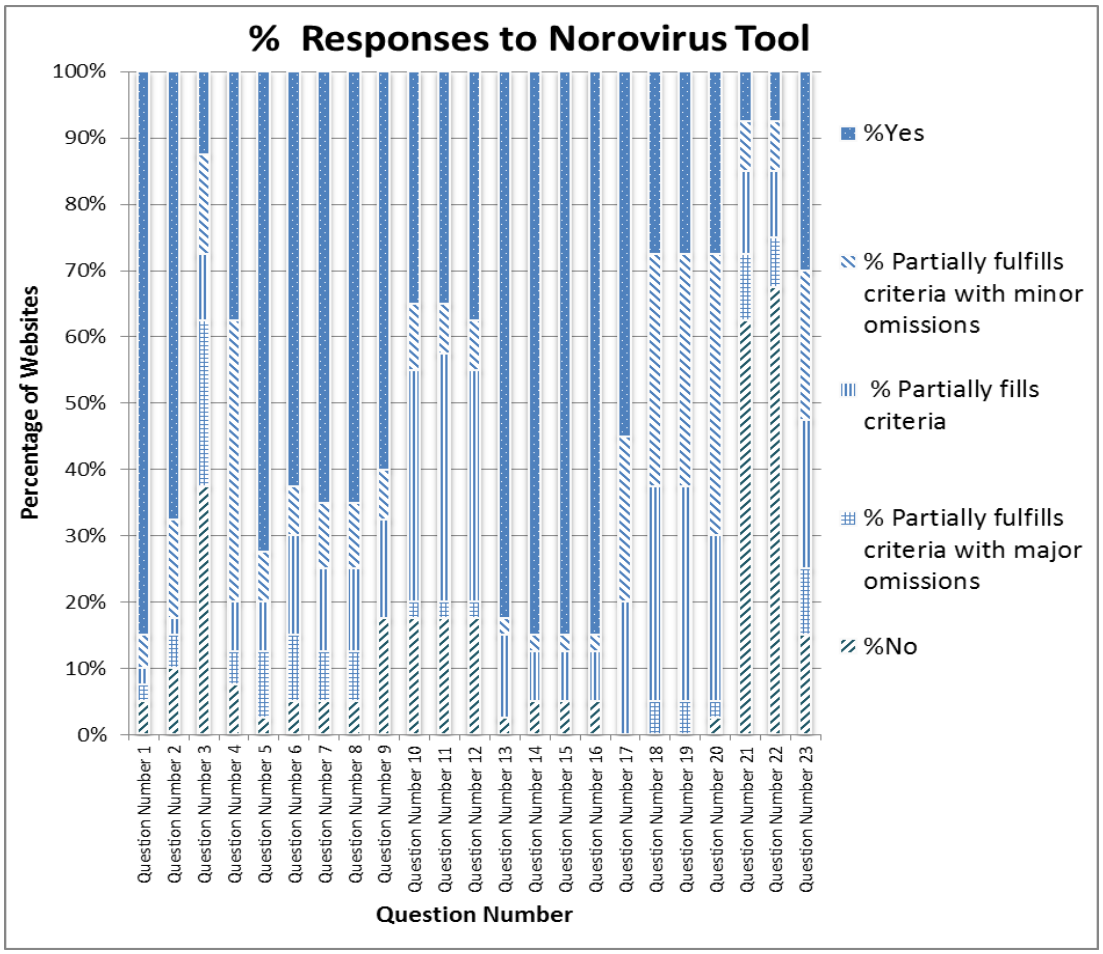
- *'Authority'* questions 1, 2, and 3.
- *'Purpose of Website'* questions 4, 5, and 6.

- *'Privacy – Confidentiality'* questions 7 and 8.
- *'Information must be documented'* questions 9, and 10.
- *'Justification of claims'* question 11.
- *'Website contact details'* question 12.
- *'Disclosure of funding sources'* question 13.
- '*Advertising policy*' questions 14, and 15.

4.2.3 Score for Norovirus Tool

The Norovirus tool, Appendix 3, was a specific tool designed to look at the information contents of each webpage. This was deemed necessary as a website may be of high quality in regards to HON and the first section of Discern but contain little or no knowledge on norovirus. The Norovirus tool was based on 6 sections: symptoms, causes, treatment, prevention, consequence of spreading norovirus, and an overall section.

Figure 2.3: Scores for the Norovirus Tool



The figure above suggests the majority of websites achieved a response of 'Yes', and very few 'No' responses, at least 12 websites clearly achieved more than 50% of 'Yes' responses. This suggests that the majority of websites did contain basic information on norovirus and the websites with the higher scores contained more information on norovirus, for instance, the depth of treatment choices or possible consequences for the elderly, or those with compromised immune systems.

4.2.4 Results of information quality across the three tools

The three figures below display the standardised percentage scores based on the raw score, as outlined in the Methodology, of each website against the three tools:

Figure 3.1.1: Results of information quality evaluation using 3 tools Sites 1-16

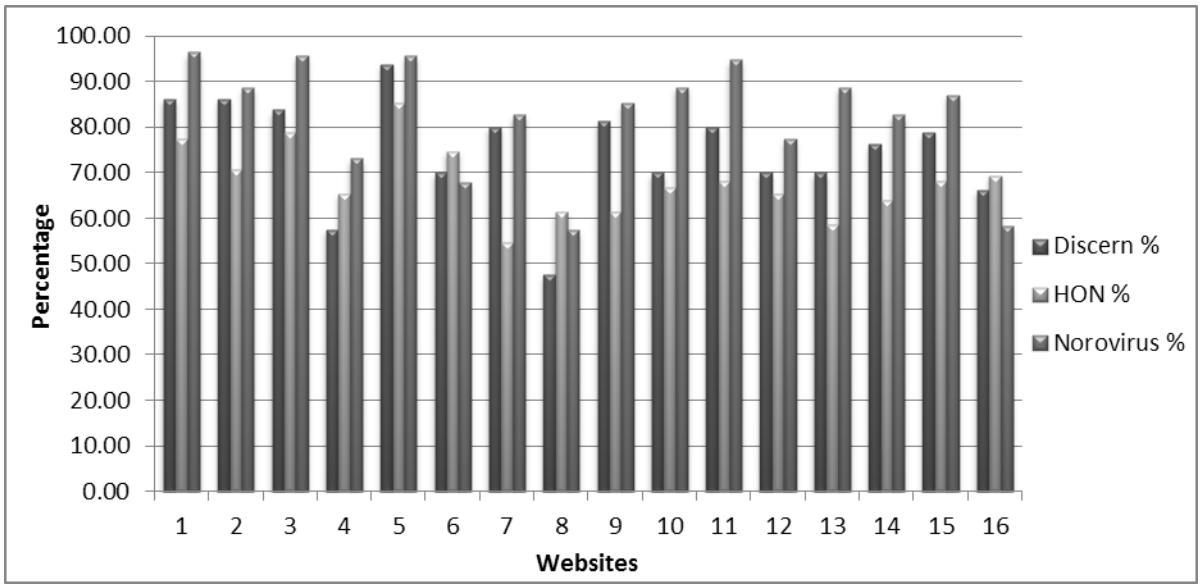


Figure 3.1.2: Results of information quality evaluation using 3 tools Sites 17-33

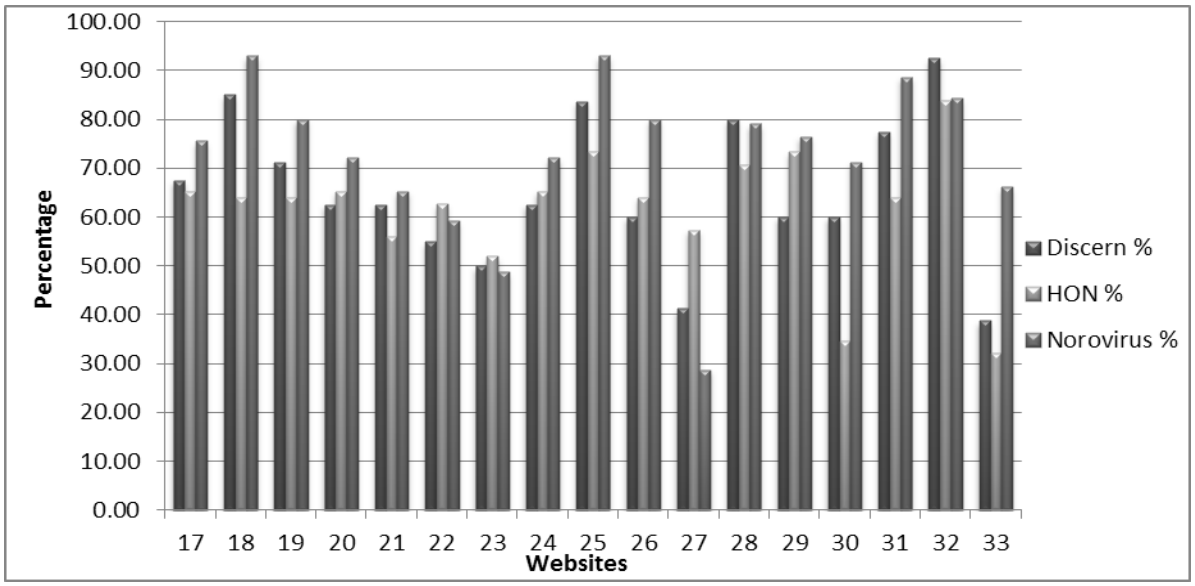
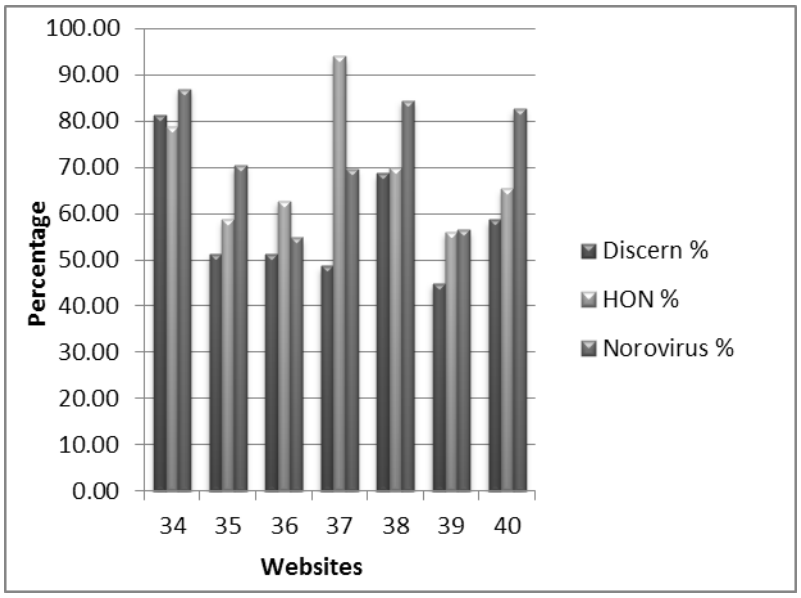


Figure 3.1.3: Results of information quality evaluation using 3 tools Sites 34-40



4.3 Score for readability tests

The Flesch reading test produced two results: The Flesch Reading Ease score and the Flesch-Kincaid Reading Level. Figures 4.1 and 4.2 below summarise the results of the scores:

Figure 4.1: Flesch Reading Ease Score

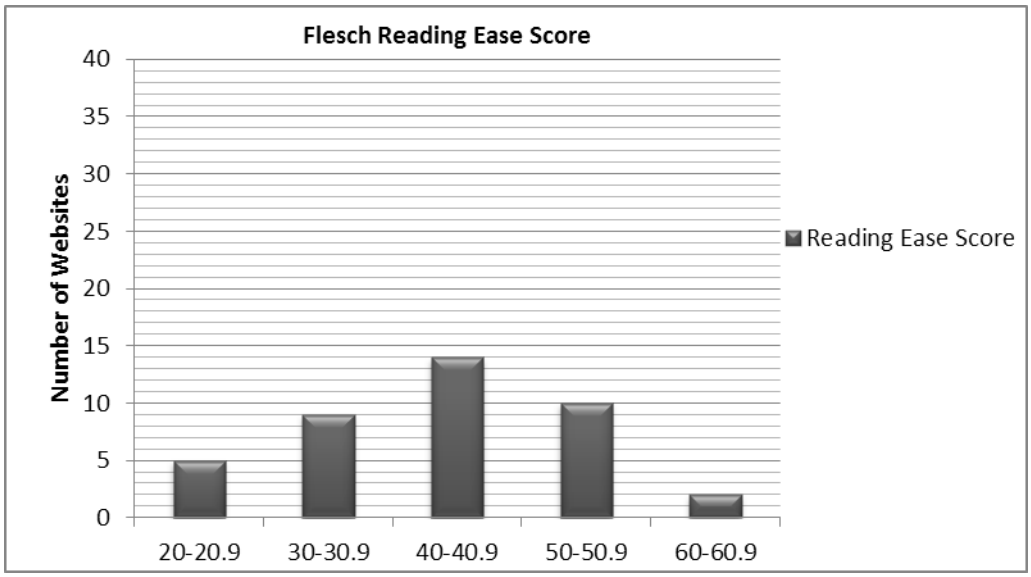
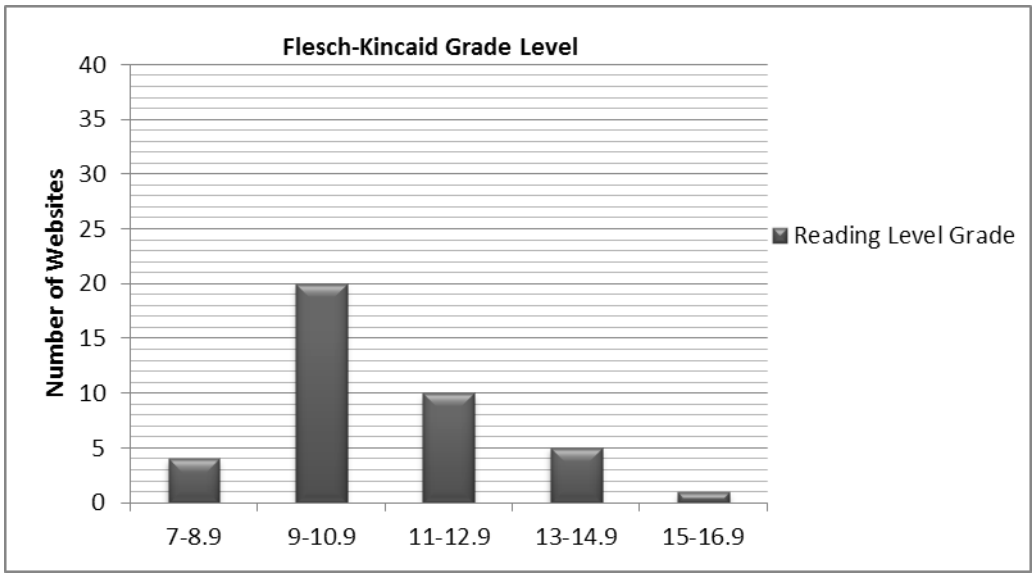


Figure 4.2: Flesch-Kincaid Grade



The first figure suggests that almost all the websites have a low level of reading ease with no website achieving a score of 70 or higher, which is known to be of a good reading score (Surman 2010). In regards to the reading grade level almost all websites were above grade 7 which is known as the general reading level of the public (Surman 2010). These two

reading tests suggest that norovirus websites are difficult to read. This may be due to the complex nature of norovirus and the complex terminology used.

4.4 Ranking of each website against each tool

Table 5: Ranking of each website against each tool and percentage score with each website evaluation tool and raw scores with reading tests

Site Name	Web site No.	Overall Rank	Discern Rank and %	HON Rank and %	Norovirus Tool Rank and %	FRE Rank and score	FKGL Rank and score
NHS Direct	1	1st	3 (86.25%)	6 (77.33%)	1 (96.52%)	4 (58.70)	2= (8.8)
Medicine Net	3	2nd	6= (83.75%)	4= (78.67%)	2 (95.65%)	16 (47.30)	4 (8.8)
Boots Health	34	3rd	8= (81.25%)	4= (78.67%)	11= (86.96%)	6 (55.10)	6= (9.5)
Toronto Health	10	4th	17= (70.00%)	16 (66.67%)	7= (88.7%)	1 (65.70)	1 (7.5)
CDC	2	5th	3= (86.25%)	10= (70.67%)	7= (88.7%)	15 (47.70)	15= (10.2)
Mayo Clinic	5	6th	1 (93.75%)	2 (85.33%)	3 (95.65%)	25 (42.00)	23= (10.9)
VDH State	15	7th	13 (78.75%)	14= (68%)	11= (86.96%)	17 (46.60)	15= (10.2)
Wikipedia	4	8th	31 (57.50%)	17= (65.33%)	25 (73.04%)	2 (64.60)	6= (9.4)
Health NY Gov.	12	9th	17= (70.00%)	17= (65.33%)	22 (77.39%)	21 (44.50)	6= (9.4)
THH NHS	13	10th	17= (70.00%)	32= (58.67%)	7= (88.7%)	9 (51.20)	21= (10.7)
NLM Medline Plus	6	11th	17= (70.00%)	7= (74.67%)	31 (67.83%)	23 (42.90)	11= (9.9)
Royal Free Health	7	12th	10= (80.00%)	37 (54.67%)	16= (82.61%)	11 (51.00)	15= (10.2)
Patient UK	32	13th	2 (92.50%)	3 (84%)	14= (84.35%)	35 (31.30)	36 (13.7)
Health State	19	14th	16 (71.25%)	23= (64%)	19= (80%)	18 (46.40)	15= (10.2)
Public Health	9	15th	8= (81.25%)	30= (61.33%)	13 (85.22%)	20 (44.90)	21= (10.7)
SWBH NHS	24	16th	24= (62.50%)	17= (65.33%)	26= (72.17%)	13 (49.90)	13= (10)
Edition Health	11	17th	10= (80.00%)	14= (68%)	4= (94.78%)	33 (35.90)	33= (12.7)
Croydon NHS	40	18th	30 (58.75%)	17= (65.33%)	16= (82.61%)	12 (50.80)	20 (10.5)
About Norovirus	25	19th	6= (83.75%)	8= (73.33%)	4= (93.04%)	39 (24.20)	40 (15.3)

Waht NHS	22	20th	32 (55.00%)	28= (62.67%)	34 (59.13%)	3 (58.90)	2= (8.6)
Health Tap	16	21st	23 (66.25%)	13 (69.33%)	58.(26 35%)	19 (45.50)	11= (9.9)
Infectious Diseases	28	22nd	10= (80.00%)	10= (70.67%)	21 (79.13%)	29 (38.90)	31 (38.90)
Dudley NHS	21	23rd	24= (62.50%)	35 (56%)	33 (65.22%)	5 (55.60)	5 (9)
Fox News	17	24th	22 (67.50%)	17= (65.33%)	(24 75.65%)	14 (48.80)	25= (11.2)
Medical Dictionary	18	25th	5 (85.00%)	23= (64%)	4= (93.04%)	37 (27.80)	35 (13.3)
U Texas	14	26th	15 (76.25%)	23= (64%)	16= (82.61%)	27 (39.70)	23= (10.9)
Asquith Nurseries	38	27th	21 (68.75%)	12 (70%)	14= (84.35%)	30 (38.70)	30 (11.6)
HPA	37	28th	36 (48.75%)	1 (94%)	30 (69.57%)	22 (43.60)	19 (10.3)
Wales NHS	29	29th	27= (60.00%)	8= (73.33%)	23 (76.52%)	26 (41.20)	27 (11.3)
King Country GOV	36	30th	33= (51.25%)	28=(62.67%)	38 54.78%	7 (53.00)	6= (9.4)
David Darling Encyclopedia	26	31st	27= (60.00%)	23= (64%)	19= (80%)	24 (42.30)	25= (11.2)
Medical News	31	32nd	14 (77.50%)	23= (64%)	7= (88.7%)	40 (23.70)	39 (14.9)
Infection Control	33	33rd	40 (38.75%)	40 (32%)	32 (66.09%)	8 (51.40)	10 (9.6)
Fit for Travel Advice	20	34th	24= (62.50%)	17=(65.33%)	26= (72.17%)	34 (34.30)	32 (12.1)
Imodium	23	35th	35 (50.00%)	38 (52%)	39 (48.7%)	10 (51.10)	13= (10)
CHP HK GOV	35	36th	33= (51.25%)	32= (58.67%)	29 (70.43%)	31 (37.30)	29 (11.6)
Norovirus Org	30	37th	27= (60.00%)	39 (34.67%)	28 (71.3%)	32 (36.60)	28 (11.4)
Somerset NHS	39	38th	38 (45.00%)	35 (56%)	37 (56.52%)	28 (39.60)	33= (12.7)
Europa Health	8	39th	37 (47.50%)	30= (61.33%)	36 (57.39%)	38 (26.00)	38 (14.1)
Health Tips Blog	27	40th	39 (41.25%)	34 (57.33%)	40 (28.7%)	36 (27.90)	37 (13.8)

The top three websites according to the four tools taken together are NHS Direct, Medicine Net, and Boots Health. The deciding factor in the ranking is the readability of the website as the websites in the top tier achieved similar results across the generic tools, and the

specific norovirus tool. The = symbol indicates where two or more websites achieved the same score with the same tool.

4.5 Selection of statistical methods

Inferential statistics will be applied to analyse the results in more detail. Surman (2010) citing Vaughan (2001) writes that four assumptions based on the data must be achieved in order to use parametric tests; if these assumptions are not met non parametric tests should be employed. Vaughan (2001) writes the assumptions as follows:

- *The samples are randomly selected*
- *The sample data are of the interval ratio type*
- *The two populations are approximately normally distributed*
- *The standard deviations of the two samples must be fairly similar*

(p. 122)

The first assumption is not met as the data was not randomly selected as stated in the methodology. The second assumption is not met as the data used in this study is ordinal based on a 1 to 5 scale. Surman (2010) drawing on Bowling (2009) writes that non-parametric tests can be used with nominal, ordinal, and interval data. In order to see whether the data meets the third and fourth assumptions histograms with distribution curves and the Kolmogorov-Smirnov test was applied to the data (figure 6.1 to table 6.6 below). This will decide whether to accept the following null hypothesis:

H_0 = The data is normally distributed.
H_1 = The data is not normally distributed.

Figure 6.1: Distribution of scores using discern

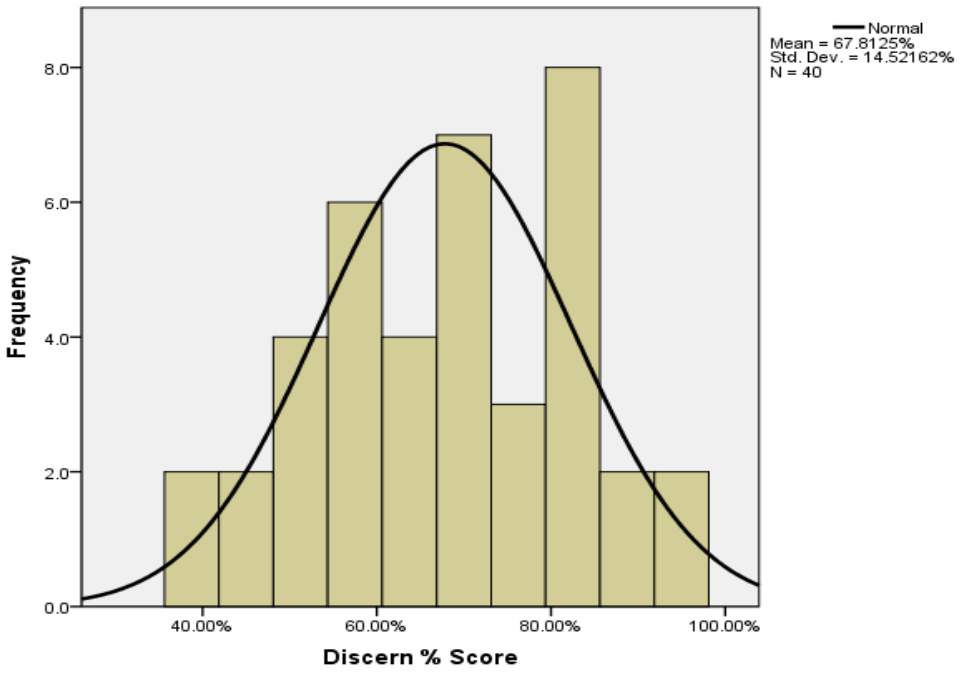


Figure 6.2: Distribution of scores using HON

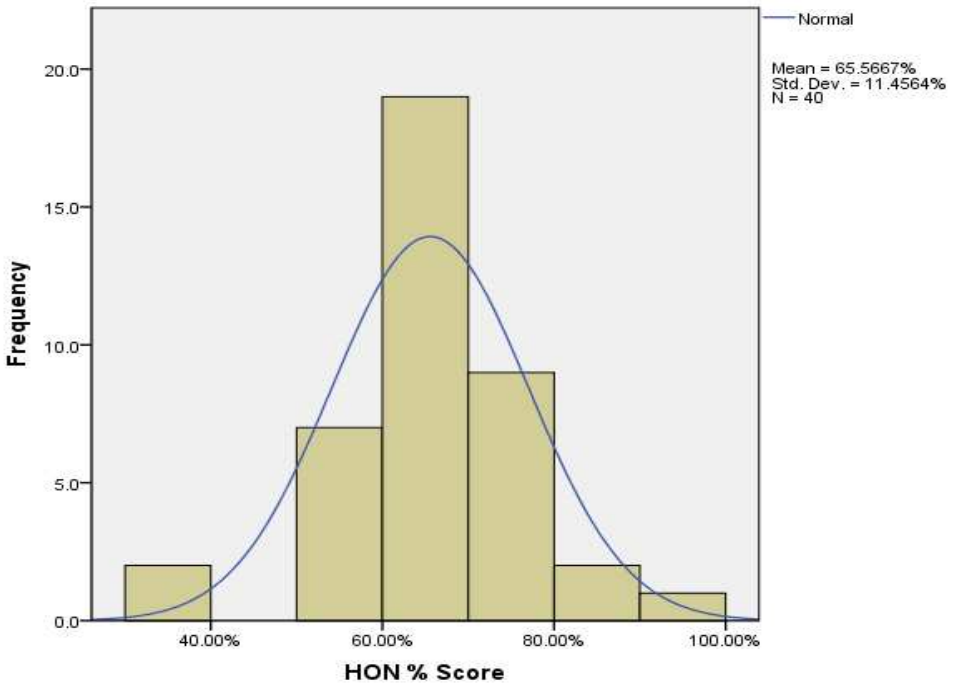


Figure 6.3: Distribution of scores using Norovirus

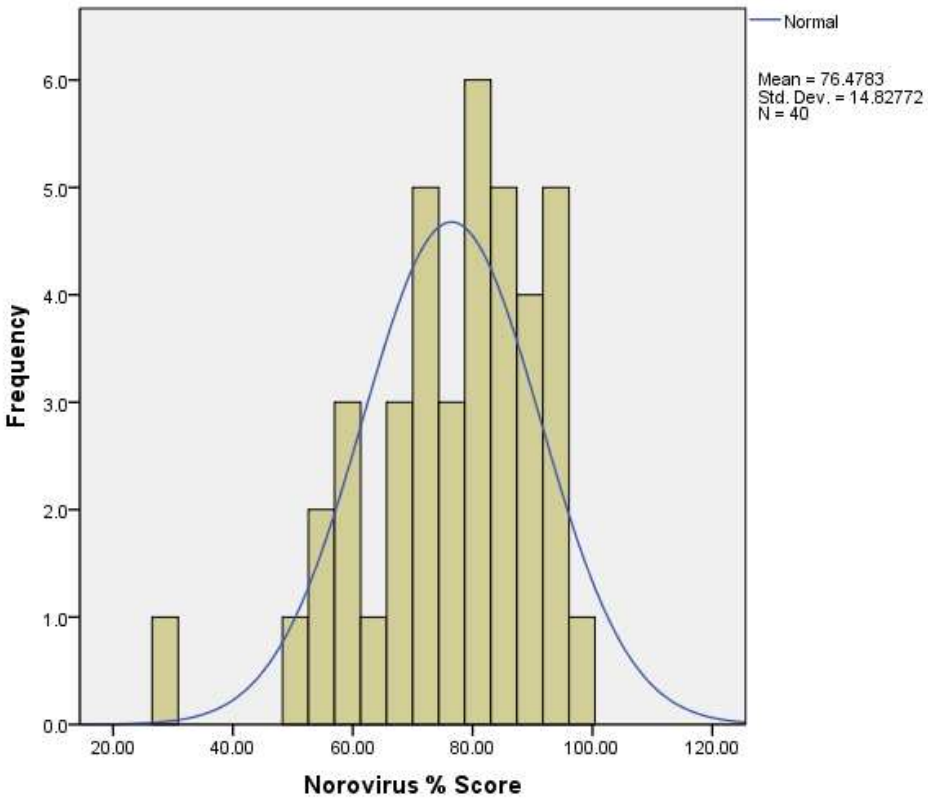


Figure 6.4: Distribution of scores using Flesch Reading Ease

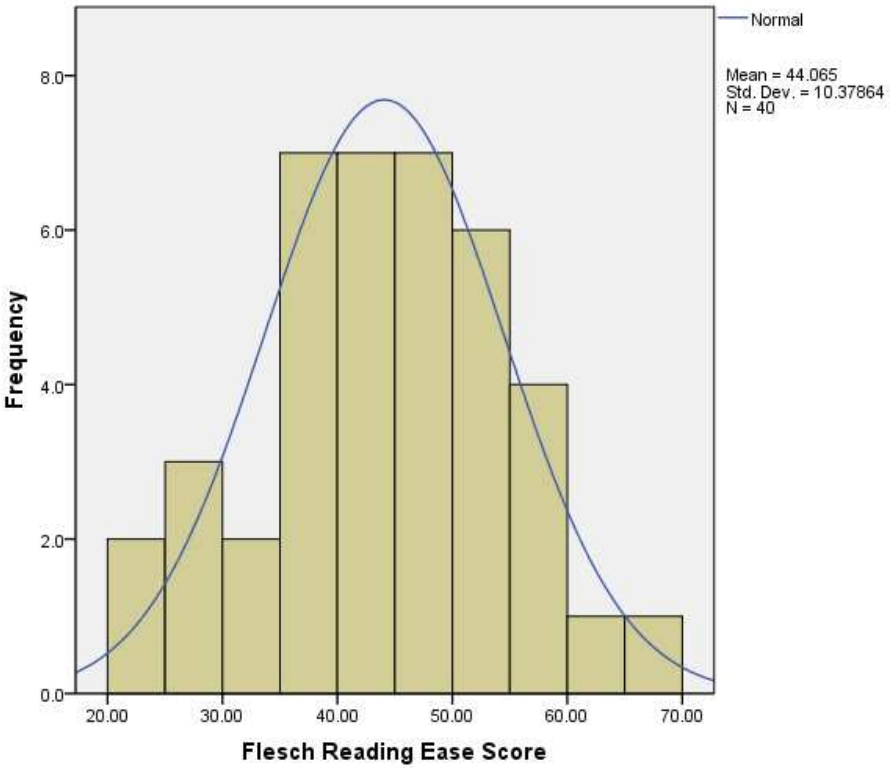


Figure 6.5: Distribution of scores using Flesch-Kincaid Grade Level

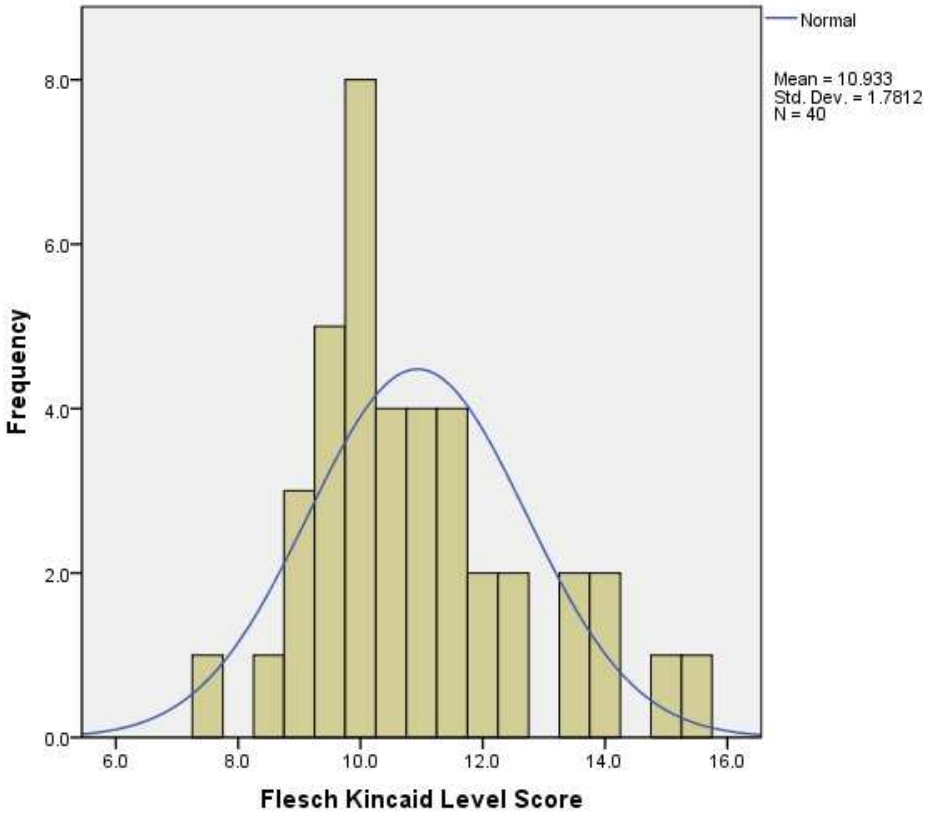


Table 6.6: Kolmogorov-Smirnov Test

		Discern % score	HON % Score	Norovirus % Score	Flesch Reading Ease	Flesch Kincaid Level Score
N		40	40	40	40	40
Normal Parameters[a,b]	Mean	67.8125	65.5667	76.4783	44.0650	10.933
	Std. Deviation	14.52162	11.45640	14.82772	10.37864	1.7812
Most Extreme Differences	Absolute	.099	.131	.110	.065	.114
	Positive	.073	.108	.088	.065	.114
	Negative	-.099	-.131	-.110	-.053	-.070
Kolmogorov-Smirnov Z		.628	.828	.698	.413	.719
Asymp. Sig. (2-tailed)		.825	.500	.715	.996	.679

Table 6.6: Kolmogorov-Smirnov Test

		Discern % score	HON % Score	Norovirus % Score	Flesch Reading Ease	Flesch Kincaid Level Score
N		40	40	40	40	40
Normal Parameters[a,b]	Mean	67.8125	65.5667	76.4783	44.0650	10.933
	Std. Deviation	14.52162	11.45640	14.82772	10.37864	1.7812
Most Extreme Differences	Absolute	.099	.131	.110	.065	.114
	Positive	.073	.108	.088	.065	.114
	Negative	-.099	-.131	-.110	-.053	-.070
Kolmogorov-Smirnov Z		.628	.828	.698	.413	.719
Asymp. Sig. (2-tailed)		.825	.500	.715	.996	.679

a. Test distribution is Normal.

b. Calculated from data.

The histograms above and the significance value given above in the Kolmogorov-Smirnov Test suggest that the distribution of the data has a degree of normality which means that null hypothesis (H_0) can be accepted. Yet, in regards to the forth assumption the standard deviations of the data are in fact fairly similar. Only the Flesch Kincaid Score varies where as the standard deviations of the three tools is: 14.5 for Discern, 11.4 for HON, 14.8 for the Norovirus tool and 10.3 for the Flesch Reading Ease. Therefore as the assumptions remain partially matched and unmatched, a selection of parametric and non parametric tests will be used to further analyse the results. The method of selecting appropriate statistical tests applied here is similar to that of Surman (2010) and Harland (2004).

4.6 Reliability of evaluation tools

The figure below displays the results of the Cronbach's Alpha; this statistical test was selected as it allows for comparisons with many other studies such as Harland (2004) and Surman (2010) which will be discussed in Chapter 5 Discussion. The reliability could also be tested by using two researchers to evaluate the websites, or to evaluate each website twice, for instance. Yet, this was not possible due to time constraints; therefore the internal consistency of the tools will only be measured in this study. The Cronbach's Alpha Coefficient ranges between 0 and 1; the higher the score between 0 and 1 would indicate a better internal reliability. Although, as mentioned by Surman (2010) citing Bryman and Cramer (1997) a score of 0.8 or above is desirable in order to accept the internal reliability of a tool.

Table 7: Cronbach's Alpha results

Evaluation tool	Cronbach's Alpha Coefficient	Number of questions
Discern	.877	16
HON code	.642	15
Norovirus tool	.925	23

The figure above suggests that the Discern tool and Norovirus tool are reliable as they widely achieve over 0.8, 0.877 and .925 respectively. This means that the scores from the tools can be considered to be reliable. The HON code achieved a score of .642 which is questionable (George & Mallery 2003; Kline 1999). Nevertheless, the HON code achieved over 0.5; as '$\alpha < 0.5$' is considered to be unacceptable (George & Mallery 2003; Kline 1999). Comparisons to other studies and possible reasons for the varied results will be discussed in Chapter 5.

4.7 Feasibility of evaluation tools

The maximum times appeared during the very first evaluation of the websites. After using the tools the time taken reduced significantly as the researcher was able to recall questions for each tool from memory. Table 8 below displays the maximum, mean, and minimum of the three tools.

Table 8 - Time Taken for each tool in mm:ss

Evaluation Tool	Maximum	Arithmetic Mean	Minimum	Standard Deviation
Discern	13.21	4.06	2.01	1.56
HON	14.51	5.18	2.35	2.25
Norovirus Tool	11.09	04.32	2.00	1.55

The table above confirms what the researcher experienced during the evaluations. That is, as Surman (2010) suggested the tools used influence the time taken to evaluate webpages. This was also the case in this study but factors such as the webpage itself influenced the time taken itself rather than any of the three tools. Therefore, the layout of a webpage would influence the time more than the use of different of tools. This would occur with the HON code if verifying the webmasters contact details, or whether the websites advertising policy was listed etc. The Discern tool and Norovirus Tool would suffer if a website was split into several hyperlinked sections, or if the authors of the website were not known. Therefore, figures 8.1.1 to 8.1.3 below show the time spent assessing the websites with the three tools.

Figure 8.1.1: Results of time spent assessing websites (sites 1 to 16)

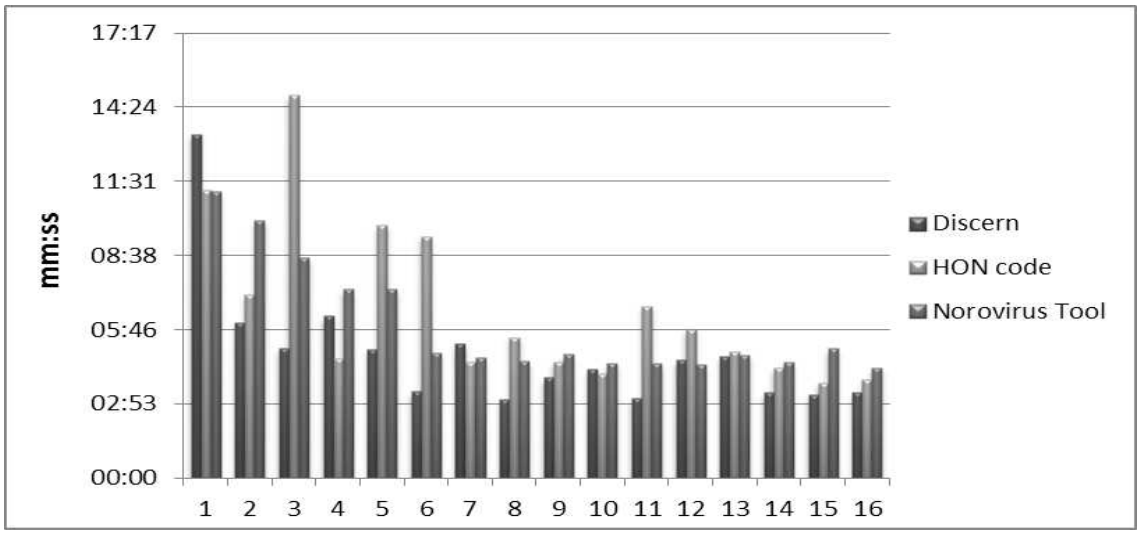


Figure 8.1.2: Results of time spent assessing websites (sites 17 to 33)

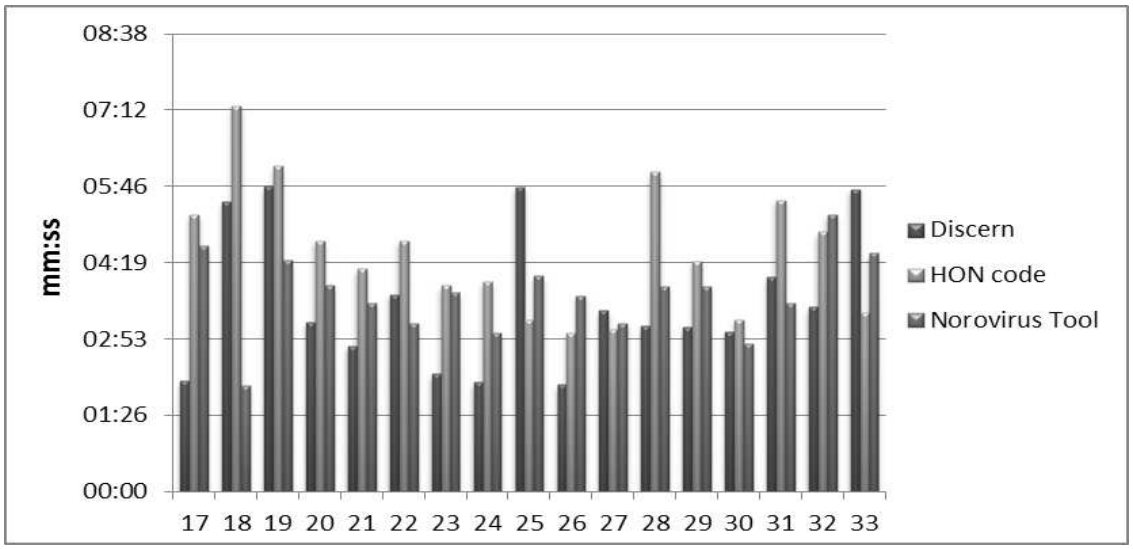
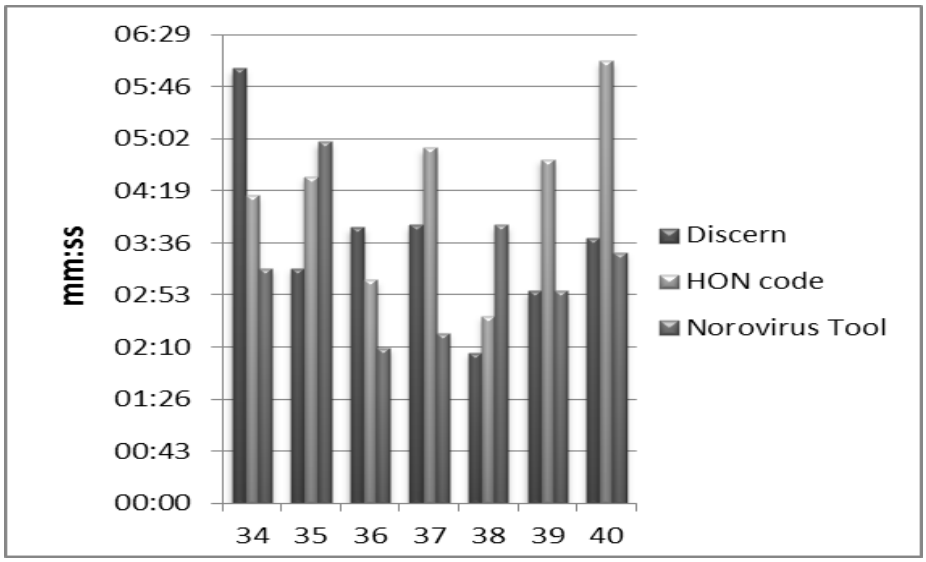


Figure 8.1.3: Results of time spent assessing websites (sites 34 to 40)



The figures above, 6.1.1 to 6.1.3, suggest that the HON code took longer to use in comparison to Discern and the Norovirus tool. This was explained at the start of the section as the HON code requires verifying the whether the authors of the information is listed, or whether a valid link to a webmaster is on the webpage, for instance. This may call into question whether the HON code tool, in its adapted form, is of value to evaluate healthcare websites for end users. In order to examine this statistically the Kruskall Wallis test was applied, as done so by Harland (2004) and Surman (2010), to find out if:

H_0 = There is no difference between the mean time taken to assess the websites

H_1 = There is a difference between the mean time taken to assess the websites

Table 8.2: Kruskall Wallis test results

Ranks

	Tools	N	Mean Rank
Time	Discern	40	49.46
	HON	40	73.08
	Norovirus	40	58.96
	Total	120	

Test Statistics[a,b]

	Time
Chi-Square	9.334
df	2
Asymp. Sig.	.009

a. Kruskal Wallis Test

b. Grouping Variable: Method

Table 8.2 above outlines that there are significant differences in mean time taken to evaluate the webpages, and the significance level is less than 0.05 (P<0.05). Therefore, the null hypothesis (H_0) is rejected. It can be noted that the HON code tool did take longer to use compared to the Discern, and Norovirus tool. This is as opposed to previous studies such as Harland (2004), and Surman (2010) who found the specific tools to take longer to use. The contributing factor in this study as discussed in Chapter 3 Methodology is that the Norovirus tool was kept to 23 questions, considerably less then previous studies, in order to avoid overlap with the generic tools.

4.8 Validity of evaluation tools

It is suggested that by investigating the validity of the tools it is possible to derive whether 'the tools measure the criteria which they purport to measure' (Surman 2010 p.56; Bowling 2009). This study will examine the construct validity of the tools which is achieved by testing the convergent validity of the tools. This is achieved by looking at the correlation of the three tools, as they attempt to measure the same webpages. In line with Surman (2010) Kendall's Coefficient of Concordance and Spearman's and Pearson's Correlation Coefficients were selected to test the construct validity of the three tools. Kendall's Coefficient of Concordance *(W)* was applied to examine whether the rankings of the three evaluation tools and the two readability tests agreed with one another. '*W'* returns a value of 0 to 1 where the closer to 1 the better the tools agree with one another, and the extent to which they measure the same notions.

Figure 9.1: Kendall's Coefficient of Concordance for:

All tools

N	40
Kendall's W[a]	.797
Chi-Square	127.540
df	4
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

Norovirus, Discern, and Hon

N	40
Kendall's W[a]	.319
Chi-Square	25.550
df	2
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

HON and Discern

N	40
Kendall's W[a]	.023
Chi-Square	.900
df	1
Asymp. Sig.	.343

a. Kendall's Coefficient of Concordance

the correlation decreases when the readability tests are not included as *W=.319*. This is similar to that of Surman (2010) who also found this to be the case; indicating that the results have a form of concordance with each other. Furthermore, when the Norovirus tool is removed to leave the HON and Discern tools the concordance drops to *W=.023.* This suggests that the Norovirus tool has a form of correlation with the three tools. It also indicates that the HON code and Discern tools assess different information aspects of websites. This result is different to that of Surman (2010) who found that the correlation between Discern and HON increased when the specific tool was removed. These results will be further discussed in Chapter 5 Discussion.

In order to display the correlations in a visual format scatter plots were employed which can be found below, figure 9.2 to 9.8.

Figure 9.2: Scatter plot of correlation between Discern and HON

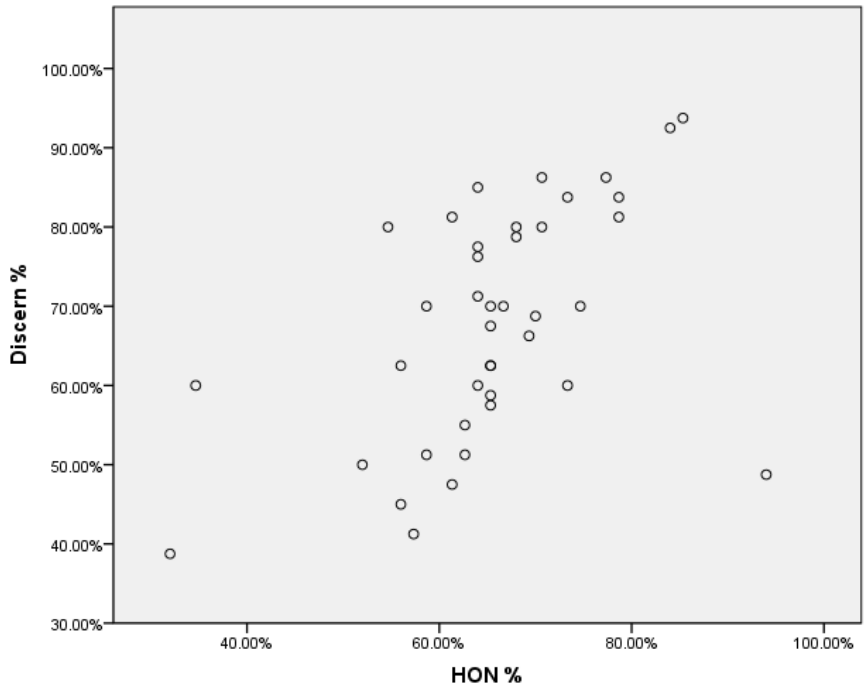


Figure 9.3: Scatter plot correlation between discern and the Norovirus Tool

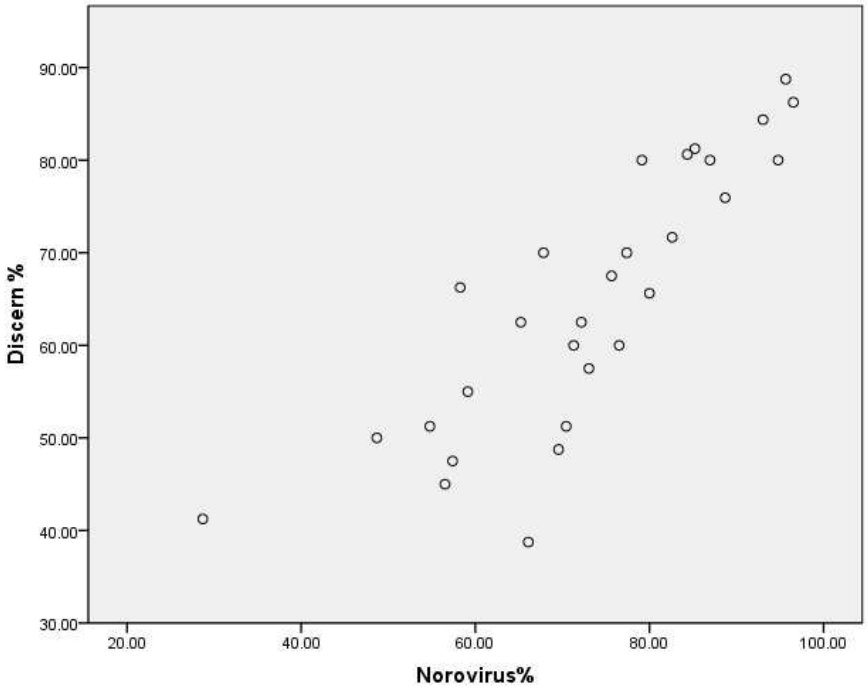


Figure 9.4: Scatter plot of correlation between HON and the Norovirus tool

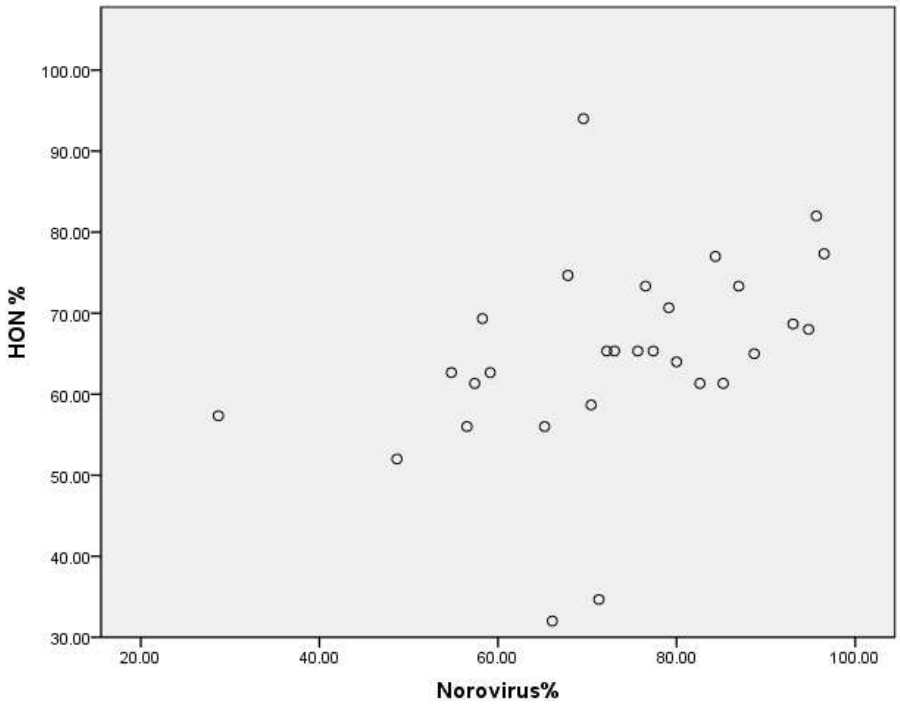


Figure 9.5: Scattor plot of correlation between FRE and FKGL

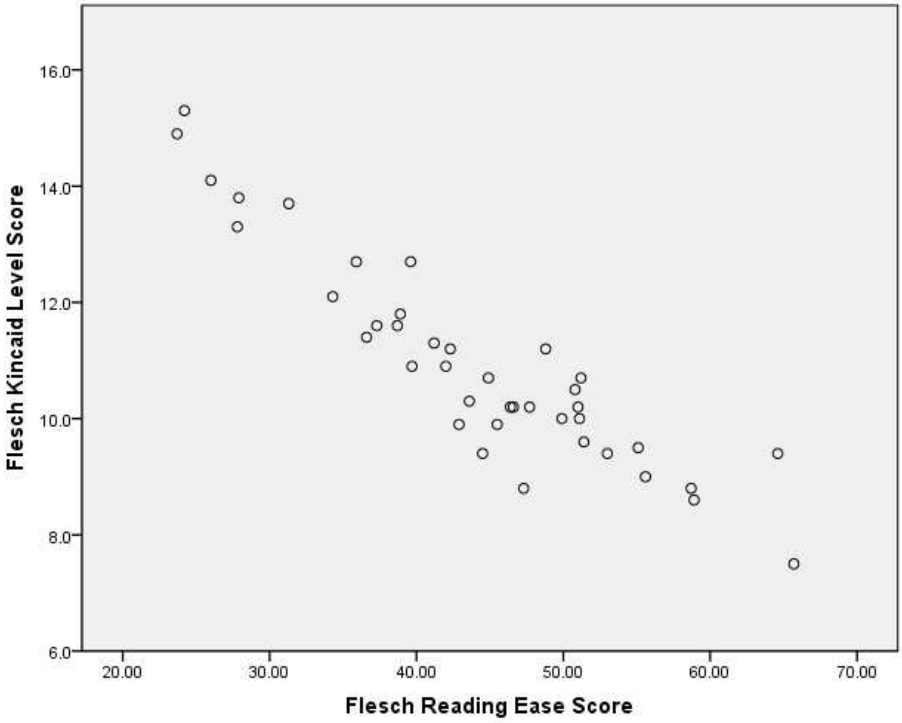


Figure 9.6: Scatter plot of correlation between FRE and Discern

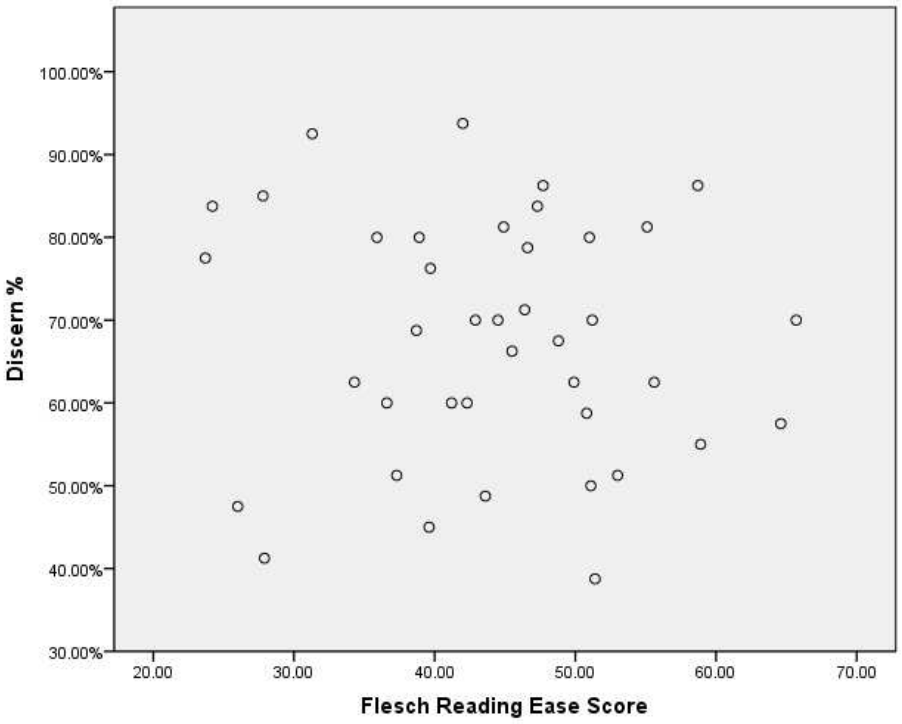


Figure 9.7 Scatter plot correlation between FRE and HON

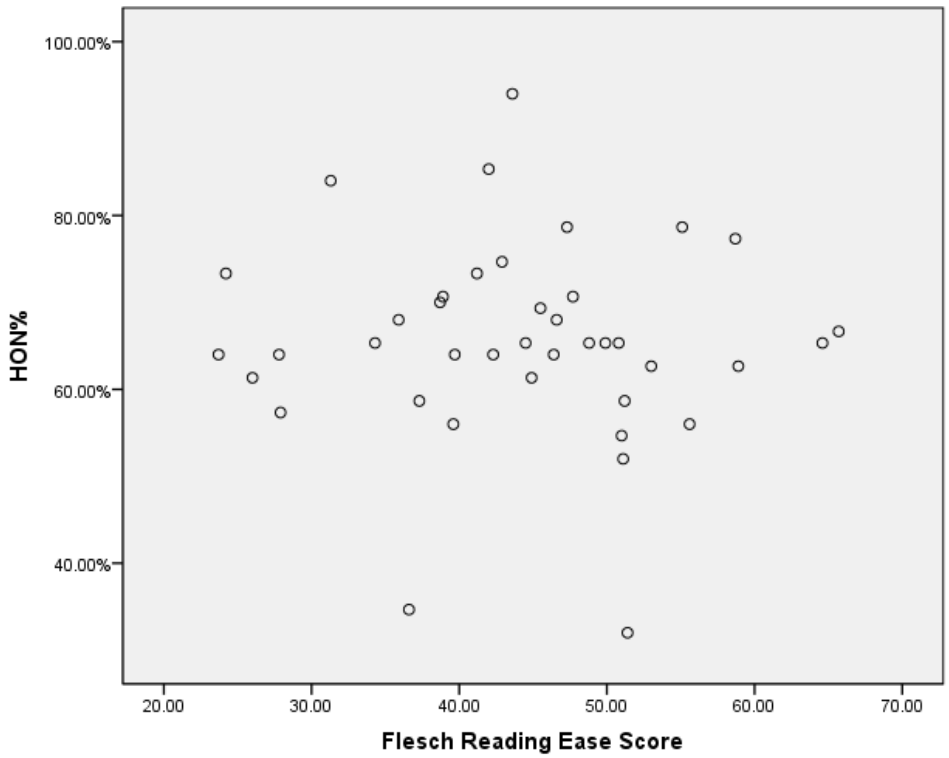
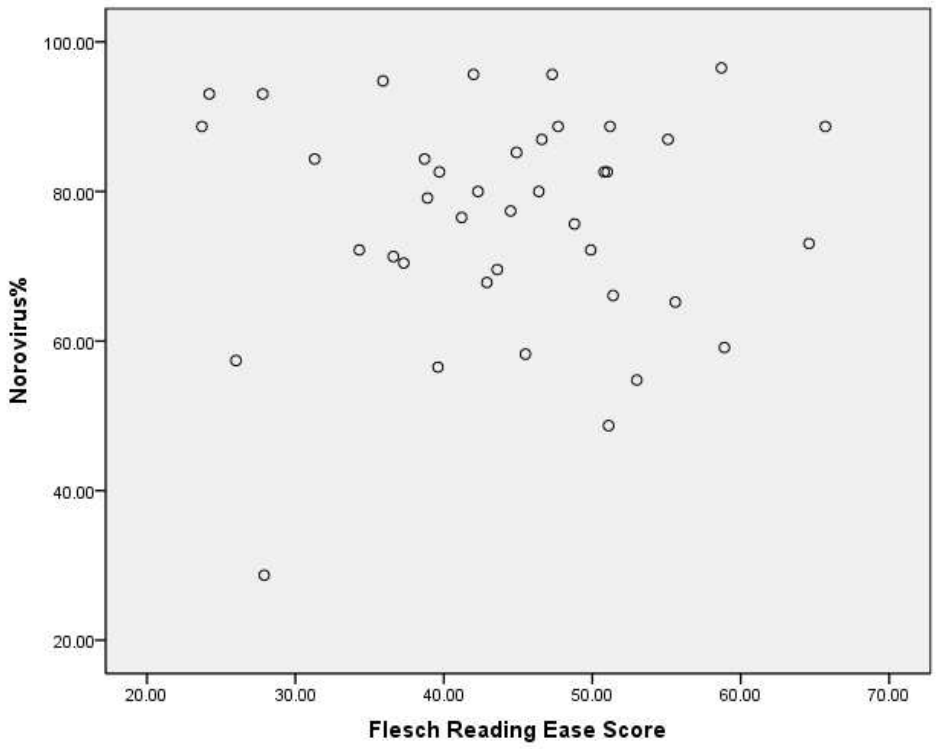


Figure 9.8 Scatter plot of correlation between FRE and Norovirus tool



The scatter plots above suggest that the three website evaluation tools have some form of correlation. The Discern and HON code show a level of correlation. The Discern and the Norovirus tool show a good level of correlation which suggests they measure the same type of criteria. The HON code and the Norovirus tool also display some correlation. There was a high negative correlation between the reading grade and reading ease tests. This is because the lower the score for the reading level the better the webpage whereas as for the reading ease the higher the score the better. Therefore, there was in fact perfect correlation between the two readability tests. There is no correlation between the three website evaluation tools and the reading ease score; mainly because they measure completely different aspects of websites.

The amount of correlation between the five tools was also analysed using Pearson's Correlation Coefficient (r) and Spearman's Rank correlation Coefficient (r_s). Pearson's is known as a parametric test (nominal distribution) and uses the raw scores of each tool providing to be more powerful. Spearman's is non-parametric and does not base itself on normal distribution, using rankings of the scores. This usually results in a lower rate of correlation. The two tests will investigate the degree of correlation between each tool, and were both used in Surman (2010) and deemed to be of value. The values of the tests have a range of -1 to 1 respectively with values closer to 1 or -1 suggesting a correlation, and indicating the tools have a similar evaluation criterion.

Table 10.1: Pearson's Correlation Coefficient Results

		Discern	HON	Norovirus	Flesch Reading Ease	Flesch Kincaid Level Score
Discern % Score	Pearson Correlation	1	.510**	.824**	-.088	.058
	Sig. (2-tailed)		.001	.000	.590	.721
	N	40	40	40	40	40
HON % Score	Pearson Correlation	.510**	1	.406**	-.042	.003
	Sig. (2-tailed)	.001		.009	.795	.983
	N	40	40	40	40	40
Norovirus % Score	Pearson Correlation	.824**	.406**	1	.022	-.019
	Sig. (2-tailed)	.000	.009		.894	.909
	N	40	40	40	40	40
Flesch Reading Ease Score	Pearson Correlation	-.088	-.042	.022	1	-.920**
	Sig. (2-tailed)	.590	.795	.894		.000
	N	40	40	40	40	40
Flesch Kincaid Level Score	Pearson Correlation	.058	.003	-.019	-.920**	1
	Sig. (2-tailed)	.721	.983	.909	.000	
	N	40	40	40	40	40

**.Correlation is significant at the 0.01 level (2-tailed).

Figure 10.2: Spearman's Correlation Coefficient Results

		Discern %	HON%	Norovirus%	Flesch Reading Ease Score	Flesch Kincaid Level Score
Discern%	Correlation Coefficient	1.000	.553**	.853**	-.096	.030
	Sig. (2-tailed)	.	.000	.000	.556	.856
	N	40	40	40	40	40
HON %	Correlation Coefficient	.553**	1.000	.506**	-.068	-.064
	Sig. (2-tailed)	.000	.	.001	.678	.696
	N	40	40	40	40	40
Norovirus%	Correlation Coefficient	.853**	.506**	1.000	-.058	.065
	Sig. (2-tailed)	.000	.001	.	.723	.689
	N	40	40	40	40	40
Flesch Reading Ease Score	Correlation Coefficient	-.096	-.068	-.058	1.000	-.899**
	Sig. (2-tailed)	.556	.678	.723	.	.000
	N	40	40	40	40	40
Flesch Kincaid Level Score	Correlation Coefficient	.030	-.064	.065	-.899**	1.000
	Sig. (2-tailed)	.856	.696	.689	.000	.
	N	40	40	40	40	40

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the correlation tests in figures 10.1 and 10.2 show that the most of the correlations are significant as most *p* (significance) values are <0.01. The correlations between the readability scores and the website evaluation tools were at >0.01. In general the readability scores and the website evaluation tools had the lowest amount of correlation. The two readability tests had the best correlation, as experienced by Surman (2010), as they are both produced by the same software, and both solely measure the readability of a website. The Norovirus tool and Discern had a correlation at .824 for Pearson's and .853 for Spearman's. This suggests that they attempt to measure similar criteria when evaluating a webpage. The correlation between the readability tests and the webpage evaluation tools was low, as demonstrated by the scatter plots earlier. This is mainly due to the fact that they measure different criteria of webpages. These results will be further discussed in Chapter 5 Discussion, where comparisons to other studies will also be made.

4.9 Summary

This chapter has presented the results of the website evaluations as described in the methodology section. The chapter has looked at the feasibility, reliability, and validity of the evaluation tools. The statistical results suggest that the tools are internally reliable, and feasible to use. Although, the HON code did take longer to use and may not be suitable for end users, it provided to be useful tool as it was proved it measured different elements of webpages; compared to the Discern and Norovirus tools which had a good correlation. Furthermore, the readability tools did not seem to correlate with the webpage evaluation tools as they measured completely different aspects of a webpage.

Chapter 5: Discussion

5.1 Introduction

This section will discuss the results found in Chapter 4 and compare these to previous studies, in order to widen the scope of this research. The possible disagreements between the evaluation tools in regards to reliability, feasibility, and validity will also be discussed. Chapter 6 will provide a conclusion of the study as a whole.

5.2 Evaluation of Information about Norovirus found on the Web

The quality of Norovirus websites was found to be fairly good. Discern only had 5 websites which fell below 50%, HON code had 2 websites which fell below 50%, and the Norovirus tool also had 2 websites which fell below 50%. The average percentage score for Discern was at 67.81%, for HON code this was at 65.70%, and for the Norovirus tool this was at 76.48% (figures 2.1 to 2.3). This suggests that the websites currently providing information on Norovirus are providing good quality information. Especially in respect to the Norovirus tool which suggests websites are covering the content of Norovirus, whilst also conforming to stringent quality control measures applied by the Discern and HON code. Yet, despite these results there are still issues web developers may want to address. As noted in the results section websites are not providing enough information on what the implications of having norovirus are, if you suffer from other medical conditions. A further finding is that websites are not informing patients to not visit their G.P. as there is no treatment for the virus. Some websites would also not offer a helpline, for instance, for those in the UK contacting the NHS, or a suitable healthcare phone line. The risks of spreading norovirus, which may be the most important aspect of the virus, were not explicitly stated on the websites. These are possible improvements websites could include to provide more accurate information on norovirus websites.

In regards to the HON code websites performed particular poorly on who the authors of the website were, and their medical credentials. This also applied to the NHS website which was ranked as No. 1, yet it failed to list the authors of the page and their qualifications. In addition it was rarely stated when the information was offered by a non-medical professional. Websites on the most part did not provide their advertising policy, or the economic benefit from the link exchange to other websites. Websites could vastly improve their scores with the HON code by simply providing the criteria above and in doing so making the website more reliable for end users.

The problem areas with the Discern tool was that the websites did not provide full treatment information on norovirus, some websites simply suggested waiting out the symptoms. Only a few websites described alternative herbal remedies, and the risks of over the counter treatments. Websites also failed to fully list the sources of information that were used to compile the publication. If minor changes to webpages were made based on the criteria above for the Norovirus tool, HON code, and Discern tool then websites would appear to be much more reliable.

Although the website evaluation tools found the websites to be of good quality, the readability tests found readability to be of a high standard for many of the websites; no website achieved a score of 70 on the reading ease and almost all websites gained a reading grade higher than grade 7 (Figures 4.1 and 4.2). This is also in line with Surman (2010) who found readability on breast cancer websites to be of a high standard. This means that the wider public would not likely to be able to understand the complex terminology employed on Norovirus websites. One website stated that the readability of the page was of a high nature. Many of the websites are not accessible to all due to the high readability level required (Figures 4.1 and 4.2). This is particular problematic for the condition of norovirus as patients are often told to remain at home, and not visit their G.P. Writers for norovirus webpages could do better to provide fact sheets or simple to read information.

5.3 Validity, reliability and feasibility of tools used to assess information quality

5.3.1 Feasibility

The times taken to evaluate each webpage varied from 2 minutes for the Norovirus tool and 14 minutes and 51 seconds for the HON code tool. The upper end of the time taken for the websites was during the first 5 webpage evaluations; after familiarity with the tools was gained the times to evaluate each webpage decreased. It was suggested in Chapter 4 that the tools all varied in the time it took to evaluate a webpage. The HON code tool it was found took the longest time to apply, although not my much. A possible reason for this anomaly, as the HON code tool contains the least amount of questions at 15, is that it measures different aspects of a webpage. That is, it would require physically moving around a webpage to see if a webmasters email address was provided or whether medical qualifications were provided for the publication. Furthermore, as noted by Surman (2010) even though the tools were rotated it is inevitable that answers from previous tools may

influence the times taken. That is, the first tool to be used to evaluate a webpage may take longer than the second tool as some of the questions would have already been covered. Finally, in regards to the times taken to evaluate websites it may not necessarily be a negative aspect if a tool takes slightly longer. That is, for example, a webpage may heavily impact on the time taken to evaluate a website. So, the webpages may have an influence on the times more so than the actual use of the tools. Appendix 6 provides the website name and the time taken for each tool; Appendix 7 displays the rotation of tools for the websites.

5.2.2 Validity

The degree of correlation between the tools was found to be significant in Pearson's and Spearman's, but not perfect. The Discern and Norovirus tool were found to have good correlation: a correlation of .824 for Pearson's and .853 for Spearman's, respectively. Yet, the HON code and Discern tools had a correlation of .510 and .553 for Pearson's and Spearman's, respectively. The HON code and Norovirus tool had a correlation of .406 and .506 for Pearson's and Spearman's, respectively. The majority of correlations were not ideal as many were below 0.7; especially in the case of the readability tests. Surman (2010) found the reliability coefficients of Pearson's to be below 0.7 where the HON code and Discern tools achieved a correlation at 0.693. Surman (2010) found the specific stroke tool to correlate better compared to previous studies with .629 for Discern and .454 for HON (Pearson's). Hsu (2006) who also used Discern and HON found that the tools correlated fairly low with most scores below 0.5. In the case of HON and Discern the correlation was at 0.458, employing Kendall's Tau_B. In regards to generic and specific tools previous studies have reported far less correlations. Hsu (2006) found correlation coefficients to be between 0.238 and 0.430, and Harland found these to be at 0.249 and 0.368. The reasons for the variety of results could be similar to the ones outlined above, that is, the number of websites, questions, and the scales used to access websites could all skew statistical tests.

5.3.3 Reliability

The results as returned by Cronbach's alpha suggested that the tools show a good level of reliability, especially in the case of the Norovirus tool. Although the HON code tool, as opposed to other studies, returned a low level of reliability.

Table 11: Results of Cronbach's alpha for current and previous studies

Evaluation tools	This study	Surman (2010)	Ademiluyi et al. (2003)	Harland and Bath (2006)	Hsu (2006)
Discern	.877	0.915	0.777		0.816
HON code	.642	0.860		0.537	0.817
Norovirus tool	.925				
Stroke tool		0.922			
MS tool				0.930	
BC tool					0.876

The differences between studies can be down to a number of factors. Firstly, as each study looked at different health conditions a tool that shows reliability for breast cancer may not do so for norovirus. The number of websites selected in a study will also vary the results. The more websites that are selected and the bigger the sample size would reduce any error margin. Hsu (2006) citing Kline (2000) suggests a sample of 100 websites would be necessary to return more accurate statistics, whereas this study only evaluated 40 webpages. The reliability of the HON code in this study being significantly low could be due to the fact that this study used a Likert scale of 1 to 5. This could skew the results as scores of 2, 3, and 4 were considered to be partly; whereas different studies employed different rating scales. Furthermore, many of the websites evaluated would fulfill the HON code partly in the sense that they many provide a link exchange policy but not expand on the economic benefit gained by this; resulting in a partly result of either 3 or 4. Finally another contributing factor is that this study only evaluated webpages once whereas Ademiluyi et

al. (2003) employed two researchers. Other studies assed the same webpage more then once by using the same tool such as Harland (2004) who used the IQT tool twice. Therefore multiple assessments of websites are able to indicate the reliability of a tool by looking at whether the two scores with the same tools agreed.

5.4 Summary

This section has provided a discussion of Chapter 4 results and provided possible reasons for the varying results compared to studies undertaken in the past. It has discussed the feasibility, reliability, and validity of the three tools. This section also provided a textual outline of the information quality of norovirus websites and how it may be possible for web developers to improve webpages on norovirus. Overall it can be stated that the feasibility, reliability, and validity of the three tools has faired well.

Chapter 6: Conclusions and recommendations

6.1 Introduction

The results section has established that this dissertation has returned interesting results about the information quality of norovirus websites, and the feasibility, reliability, and validity of the evaluation tools applied the websites. The key findings of this study have slightly differed from previous evaluations on the information on webpage quality.

6.2 Key findings

Several key finding were found both on the quality of the webpages and of the tools used to evaluate the webpages. In regards to the quality of the webpages it was found that norovirus websites for the most part are of high quality but require high levels of reading ability. It was also noted that certain aspects of webpages could be improved, for instance, listing the authors medical qualifications (HON code), stating that a visit to the G.P is not necessary (Norovirus tool), and stating that there may be more treatments available, but which carry risks (Discern). The readability of the webpages was particularly high which suggests that those with reading difficulties would have trouble accessing high quality information on norovirus by using the World Wide Web. In regards to the instruments employed to evaluate webpages it was found that there was varying correlations between the five tools applied to the webpages. Yet, this variance of correlation should not necessarily be perceived as a negative aspect of the study. This is because these findings are similar to previous studies conducted on webpage information quality which suggests that different tools seek to measure different information quality criteria.

6.3 Achievement of aims and objectives

The main aim of assessing the information quality of websites providing healthcare information on norovirus has been met (Chapter 4 and Chapter 5). Furthermore, the several objectives of the study have also been met displayed below in chronological order from the introduction:

- The most commonly searched for norovirus websites were found and captured offline and evaluated (Chapter 3.3)
- A specific evaluation tool based on the perceived needs of norovirus sufferers was created which aimed to mimic advice provided by a qualified doctor (Chapter 3.5)
- A suitable readability test was selected and applied to the webpages (Chapter 3.6 and Chapter 4)

- Generic tools were selected in order to evaluate healthcare websites (Chapter 3.4)
- Websites were evaluated by using generic tools, a readability test and a specific norovirus tool (Chapter 4)
- The website evaluation tools were evaluated for the validity, reliability, and feasibility (Chapter 4 and Chapter 5)

6.4 Limitations to the study

A major limitation to this study is that patients needs who have suffered from norovirus was not considered; as the literature review found no previous studies on norovirus or the needs of the patients. An improved norovirus tool should include the needs of the patients; either by drawing on upcoming research or by conducting surveys and questionnaires. The sample size of the websites was limited to 40 due to time constraints and due to the limited websites on norovirus. A much more comprehensive study could look at a much larger sample of norovirus websites as they become available. Yet, it may be difficult to capture such websites due to the changing nature of the internet. In this study alone 5 prospective websites were removed within a week which suggests there may be difficulty in capturing the quality of websites at any one time as more websites would rapidly appear. This study only employed 2 generic tools, a specific tool, and two readability tests. A more comprehensive study would use a wider range of tools which measure more criteria then the tools used in this study. The study also only focused on English written websites based mainly in developed countries based in the UK and USA. A wider study could incorporate websites from different languages and geographical bounds. The websites were only evaluated once. A more comprehensive study would employ multiple evaluations of the same webpage or use two researchers to evaluate the same page. As only one researcher was used in this study with no medical background the websites may have been evaluated subjectively. There may be disagreements on whether a website has fulfilled particular criteria, or the researcher could be scoring webpages more positively compared to a stricter scorer. The researcher had suffered from norovirus and may have unconsciously looked for information that would fulfill the researcher's needs rather than the general public. This would mean that a website may fulfill one persons information needs but not another's.

6.5 Recommendations for further research

Derived from the shortcomings explained above the following recommendations are advised for future studies looking to evaluate website information on norovirus:

1. Gain an understanding of patients needs who suffer from norovirus or have suffered from norovirus
2. Use a researcher with medical background in norovirus
3. Apply multiple evaluations on websites
4. Use more tools to examine further criteria of websites
5. Use a larger sample size of websites including non-English based webpages

6.6 Summary

This study has returned interesting results on the information quality of webpages on norovirus and it is hoped this may fuel further research on this particular topic. Any study conducted on the internet will become dated fairly soon; as websites appear as quickly as they are made redundant. Although, this study has only provided a small opening on the quality of webpages on norovirus in the months of June, and July 2013; it has highlighted that web developers, alongside writers, can improve the readability of norovirus websites.

14,985 words

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Appendices

Appendix 1 Discern Handbook

DISCERN

An instrument for judging the quality of written consumer health information on treatment choices

Funded by The British Library

For further information please contact:

Sasha Shepperd
University of Oxford
Division of Public Health and Primary Health Care
Institute of Health Sciences
Old Road
Headington
Oxford OX3 7LF

Section 1

IS THE PUBLICATION RELIABLE?

1 Are the aims clear?

No		Partially		Yes
1	2	3	4	5

HINT Look for a clear indication at the beginning of the publication of:

- what it is about
- what it is meant to cover (and what topics are meant to be excluded)
- who might find it useful.

If the answer to Question 1 is 'No', go directly to Question 3

2 Does it achieve its aims?

No		Partially		Yes
1	2	3	4	5

HINT Consider whether the publication provides the information it aimed to as outlined in Question 1.

3 Is it relevant?

No		Partially		Yes
1	2	3	4	5

HINT Consider whether:

- the publication addresses the questions that readers might ask
- recommendations and suggestions concerning treatment choices are realistic or appropriate.

4 Is it clear what sources of information were used to compile the publication (other than the author or producer)?

No		Partially		Yes
1	2	3	4	5

HINT

- Check whether the main claims or statements made about treatment choices are accompanied by a reference to the sources used as evidence, e.g. a research study or expert opinion.
- Look for a means of checking the sources used such as a bibliography/reference list or the addresses of the experts or organisations quoted.

Rating note: In order to score a full '5' the publication should fulfil both hints. Lists of *additional* sources of support and information (Q7) are not necessarily sources of *evidence* for the current publication.

5 Is it clear when the information used or reported in the publication was produced?

No		Partially		Yes
1	2	3	4	5

HINT Look for:

- dates of the main sources of information used to compile the publication
- date of any revisions of the publication (but not dates of reprinting)
- date of publication (copyright date).

Rating note: The hints are placed in order of importance – in order to score a full '5' the dates relating to the first hint should be found.

6 Is it balanced and unbiased?

No		Partially		Yes
1	2	3	4	5

HINT Look for:

- a clear indication of whether the publication is written from a personal or objective point of view
- evidence that a *range* of sources of information was used to compile the publication, e.g. more than one research study or expert
- evidence of an external assessment of the publication.

Be wary if:

- the publication focuses on the advantages or disadvantages of one particular treatment choice without reference to other possible choices
- the publication relies primarily on evidence from single cases (which may not be typical of people with this condition or of responses to a particular treatment)
- the information is presented in a sensational, emotive or alarmist way.

7 Does it provide details of additional sources of support and information?

No		Partially		Yes
1	2	3	4	5

HINT Look for suggestions for further reading or for details of other organisations providing advice and information about the condition and treatment choices.

8 Does it refer to areas of uncertainty?

No		Partially		Yes
1	2	3	4	5

HINT

- Look for discussion of the gaps in knowledge or differences in expert opinion concerning treatment choices.
- Be wary if the publication implies that a treatment choice affects everyone in the same way, e.g. 100% success rate with a particular treatment.

Section 2

HOW GOOD IS THE QUALITY OF INFORMATION ON TREATMENT CHOICES?

N.B. The questions apply to the treatment (or treatments) described *in the publication*. Self-care is considered a form of treatment throughout this section.

9 Does it describe how each treatment works?

No		Partially		Yes
1	2	3	4	5

HINT Look for a description of how a treatment acts on the body to achieve its effect.

10 Does it describe the benefits of each treatment?

No		Partially		Yes
1	2	3	4	5

HINT Benefits can include controlling or getting rid of symptoms, preventing recurrence of the condition and eliminating the condition, both short-term and long-term.

11 Does it describe the risks of each treatment?

No		Partially		Yes
1	2	3	4	5

HINT Risks can include side-effects, complications and adverse reactions to treatment, both short-term and long-term.

12 Does it describe what would happen if no treatment is used?

No		Partially		Yes
1	2	3	4	5

HINT Look for a description of the risks and benefits of postponing treatment, of watchful waiting (i.e. monitoring how the condition progresses without treatment) or of permanently forgoing treatment.

13 Does it describe how the treatment choices affect overall quality of life?

No		Partially		Yes
1	2	3	4	5

HINT Look for:

- description of the effects of the treatment choices on day-to-day activity
- description of the effects of the treatment choices on relationships with family, friends and carers.

14 Is it clear that there may be more than one possible treatment choice?

No		Partially		Yes
1	2	3	4	5

HINT Look for:

- a description of who is most likely to benefit from each treatment choice mentioned, and under what circumstances
- suggestions of alternatives to consider or investigate further (including choices not fully described in the publication) before deciding whether to select or reject a particular treatment choice.

15 Does it provide support for shared decision-making?

No		Partially		Yes
1	2	3	4	5

HINT Look for suggestions of things to discuss with family, friends, doctors or other health professionals concerning treatment choices.

Section 3

OVERALL RATING OF THE PUBLICATION

16 Based on the answers to all of the above questions, rate the overall quality of the publication as a source of information about treatment choices

Low		Moderate		High
Serious or extensive shortcomings		*Potentially important but not serious shortcomings*		*Minimal shortcomings*
1	2	3	4	5

Part 5

Quick reference guide to the DISCERN criteria

A good quality publication about treatment choices will:

1 Have explicit aims
2 Achieve its aims
3 Be relevant to consumers
4 Make sources of information explicit
5 Make date of information explicit
6 Be balanced and unbiased
7 List additional sources of information
8 Refer to areas of uncertainty
9 Describe how treatment works
10 Describe the benefits of treatment
11 Describe the risks of treatment
12 Describe what would happen without treatment
13 Describe the effects of treatment choices on overall quality of life
14 Make it clear there may be more than one possible treatment choice
15 Provide support for shared decision-making

This guide should only be used once you are acquainted with the full DISCERN instrument.

EVALUATION

Organisations are authorized to reproduce The DISCERN Instrument without permission, provided (a) it is used in accordance with the instructions contained in this Handbook to ensure that its methodology is uniform and (b) that their experience in using it is summarized on this evaluation form. A copy of this evaluation should then be sent to Radcliffe Medical Press Ltd, 18 Marcham Road, Abingdon, Oxon OX14 1AA (Fax: 01235 528830) for assessment by the NHS Research & Development Programme as part of The DISCERN Project's future development.

1 What have you used DISCERN for?
(You may tick more than one)

☐ Assessing information for **professional** purposes
(i.e. for an organisation or as part of my job)

☐ Assessing information for my own **personal** use

☐ Producing information

☐ Other (please specify)

.....
.....
.....
.....

2 What do you like about DISCERN?

.....
.....
.....
.....
.....
.....
.....
.....
.....

Continued overleaf

3 What issues has DISCERN raised for you as an individual or member of an organisation?

.....

.....

.....

.....

.....

.....

.....

.....

4 Any other comments?

.....

.....

.....

.....

.....

.....

Your name _____

Job title (if relevant) _____

Organisation _____

Address _____

_____

_____

_____

_____

Please return this form to:

Radcliffe Medical Press Ltd

Appendix 2 – Modified HON code

HON CODE (Modified to a 1 to 5 scale from Ruth Surman's (2010) modified version based on Bouchier, 2001; Harland 2004; Hsu, 2006.)

Principle 1 : Authority

1. **Are the authors or editors of medical information given?**

No		Partially		Yes
1	2	3	4	5

2. **Are the authors' or editors' training or credentials listed?**

No		Partially		Yes
1	2	3	4	5

3. **Are there any clear statements made whenever the information is offered by non-medical professionals or organisations?**

No		Partially		Yes
1	2	3	4	5

Principle 2 : Purpose of the website

4. **Is the purpose of the website stated?**

No		Partially		Yes
1	2	3	4	5

5. **Is the intended audience of the website displayed?**

No		Partially		Yes
1	2	3	4	5

6. **Is the fact in quotations clearly stated? "The information on the website aims to support, not to replace the relationship between patient and physician"**

No		Partially		Yes
1	2	3	4	5

Principle 3 : Privacy - Confidentiality

7. Is there a privacy policy describing how personal and medical information is protected?

No		Partially		Yes
1	2	3	4	5

8. Does the privacy policy show that the site respects the legal requirements, including those concerning medical and personal information and privacy, which apply in the country of its location?

No		Partially		Yes
1	2	3	4	5

Principle 4 : Information must be documented (referenced and dated)

9. Is the last modification date provided for the site? * If the date is offered for the site as a whole, rate 'partly' * If the date is offered for the situations below, rate 'Yes' (a) for each page containing medical information (b) for all the pages of the site * None of the cases above, rate 'No'

No		Partially		Yes
1	2	3	4	5

10. Where the website contains information from external sources, is the reference to the source provided?

No		Partially		Yes
1	2	3	4	5

Principle 5 : Justification of claims

11. When mentioning the benefit or performance of a specific medical treatment, are the claims supported by clear references to scientific research or published papers? * If the claims are based on the authors' opinions or experiences, rate 'partly'

No		Partially		Yes
1	2	3	4	5

Principle 6 : Website contact details

12. Is a valid email address for the webmaster or a link to a valid contact form easily accessible via the site?

No		Partially		Yes
1	2	3	4	5

Principle 7 : Disclosure of funding sources

13. Is the source of the funding of the website clearly described?

No		Partially		Yes
1	2	3	4	5

Principle 8 : Advertising policy

14. Does the site provide its advertising policy?

No		Partially		Yes
1	2	3	4	5

15. Is there a statement describing the economic benefit derived from the link exchange between the site and the other sites?

No		Partially		Yes
1	2	3	4	5

Appendix 3 Norovirus Tool

Norovirus Tool

Section 1 - Symptoms

1. **Does the website contain information relating the symptoms of norovirus?**

No		Partially		Yes
1	2	3	4	5

2. **Are the symptoms clear and well defined?**

No		Partially		Yes
1	2	3	4	5

3. **Does the website explain what the symptoms may cause if you have other medical conditions?**

No		Partially		Yes
1	2	3	4	5

4. **Overall is this section adequate?**

No		Partially		Yes
1	2	3	4	5

Section 2 - Causes

5. **Does the website contain information on how the norovirus infection may be caused?**

No		Partially		Yes
1	2	3	4	5

6. **Are the causes clear and well defined?**

No		Partially		Yes
1	2	3	4	5

7. **Does the website explain in what situations you would be likely to catch norovirus?**

No	Partially	Yes

1 2 3 4 5

8. **Overall is this section adequate?**

No Partially Yes

1 2 3 4 5

Section 3 - Treatment

9. **Does the website contain information on the possible treatments of norovirus?**

No Partially Yes

1 2 3 4 5

10. **Are the treatments clear and well defined?**

No Partially Yes

1 2 3 4 5

11. **Does the website thoroughly explain how norovirus is treated?**

No Partially Yes

1 2 3 4 5

12. **Overall is this section adequate?**

No Partially Yes

1 2 3 4 5

Section 4 - Prevention

13. **Does the website provide information on how to prevent obtaining norovirus?**

No Partially Yes

1 2 3 4 5

14. **Are the preventions clear and well defined?**

No Partially Yes

1 2 3 4 5

15. **Does the website make it clear how to prevent the spread of norovirus?**

No Partially Yes

1 2 3 4 5

16. **Overall is the section adequate?**

No Partially Yes

1 2 3 4 5

Section 5 – Consequences of Spreading Norovirus

17. **Does the website contain information on the possible risks of spreading norovirus?**

No Partially Yes

1 2 3 4 5

18. **Are the risks of spreading norovirus clear and well defined?**

No Partially Yes

1 2 3 4 5

19. **Does the website sufficiently outline the consequences of spreading norovirus?**

No Partially Yes

1 2 3 4 5

20. **Overall is the section adequate?**

No Partially Yes

1 2 3 4 5

Section 6 – Overall

21. **Did the website state that norovirus does not require a visit to a G.P or any other qualified doctor?**

No		Partially		Yes
1	2	3	4	5

22. Did the website explain why norovirus does not require a visit to a G.P or any other qualified doctor?

No		Partially		Yes
1	2	3	4	5

23. Overall did the website give a breakdown of norovirus as a G.P or any other qualified doctor would?

No		Partially		Yes
1	2	3	4	5

Appendix 4 Website name and corresponding URLs

The websites were mainly created by the UK and USA, although tracing the domain location provided futile as websites were hosted in different countries, Appendix 4 provides a full list of the URL's. URL's containing '.uk' are aimed at the UK, '.us' for the USA, '.eu' for Europe and '.hk', for Hong Kong etc.

Website address	NUMBER	Name or organisation
www.nhs.uk/Conditions/Norovirus/Pages/Introduction.aspx	1	NHS Direct
www.cdc.gov/norovirus/	2	CDC
http://www.medicinenet.com/norovirus_infection/article.htm	3	Medicine Net
http://en.wikipedia.org/wiki/Norovirus	4	Wikipedia
http://www.mayoclinic.com/health/norovirus/DS00942	5	Mayo Clinic
http://www.nlm.nih.gov/medlineplus/norovirusinfections.html	6	NLM Medline Plus
http://www.royalfree.org.uk/default.aspx?top_nav_id=1&tab_id=502	7	Royal Free Health
http://ecdc.europa.eu/en/healthtopics/norovirus_infection/basic_facts/Pages/basic_facts.aspx	8	Europa Health
http://www.public.health.wa.gov.au/2/600/2/norovirus_infection_fact_sheet.pm	9	Public Health
http://www.toronto.ca/health/cdc/factsheets/norovirus_factsheet.htm	10	Toronto Health
http://edition.cnn.com/HEALTH/library/norovirus/DS00942.html	11	Edition Health
http://www.health.ny.gov/diseases/communicable/norwalk/fact_sheet.htm	12	Health NY Gov
http://www.thh.nhs.uk/services/infection-control/norovirus.php	13	THH NHS
http://www.utexas.edu/safety/ehs/bulletin/norovirus.html	14	U Texas
http://www.vdh.state.va.us/epidemiology/factsheets/norovirus.htm	15	VDH State
https://www.healthtap.com/topics/norovirus-infection-prevention	16	Health Tap
http://www.foxnews.com/health/2013/02/01/tips-for-preventing-norovirus-infection/	17	Fox News
http://medical-dictionary.thefreedictionary.com/Noroviruses	18	Medical Dictionary
http://www.health.state.mn.us/divs/idepc/diseases/norovirus/basics.html	19	Health State
http://www.fitfortravel.nhs.uk/advice/disease-prevention/norovirus.aspx	20	Fit for Travel Advice
http://www.dudley.nhs.uk/sites/Healthy-Living-Infection-Prevention-and-Control/index.asp?id=8538	21	Dudley NHS
http://www.waht.nhs.uk/en-GB/Our-Services/Clinical-Services/Infection-Control/Norovirus-and-Infection-Control/	22	Waht NHS
http://imodium.co.uk/understanding-diarrhoea/types-of-diarrhoea/norovirus	23	Imodium
https://www.swbh.nhs.uk/patients-visitors/infection-control/norovirus/	24	SWBH NHS
http://www.about-norovirus.com/norwalk_treatment#.Ub0BIufVCSo	25	About Norovirus
http://www.daviddarling.info/encyclopedia/N/norovirus_infection.html	26	David Darling Encyclopaedia
http://healthtips-lifestyle.blogspot.co.uk/2012/02/norovirus-gastroenteritis-incubation.html	27	Health Tips Blog
http://infectiousdiseases.about.com/od/diseasesbyname/a/Norovirus.htm	28	Infectious Diseases
http://www.wales.nhs.uk/sitesplus/888/page/43919	29	Wales NHS
http://norovirus.org.uk/	30	Norovirus Org
http://www.medicalnewstoday.com/articles/179107.php	31	Medical News
http://www.patient.co.uk/doctor/Norovirus.htm	32	Patient UK
http://www.infection-control-solutions.com/NOROVIRUS/	33	Infection Control
http://www.webmd.boots.com/digestive-disorders/tc/norovirus-treating-norovirus-infection	34	Boots Health
http://www.chp.gov.hk/en/content/9/24/33.html	35	CHP HK GOV
http://www.kingcounty.gov/healthservices/health/communicable/diseases/norovirus.aspx	36	King Country GOV
http://www.hpa.org.uk/infections/topics_az/norovirus/faq.htm	37	HPA
http://www.asquithnurseries.co.uk/healthcare/norovirus_infection.asp	38	Asquith Nurseries
http://www.somerset.nhs.uk/welcome/health-staff/patientsafety/infection-prevention/norovirus/	39	Somerset NHS
http://www.croydonhealthservices.nhs.uk/patients-visitors/Norovirus.htm	40	Croydon NHS

Appendix 5 Raw Scores of the three tools

Name of website	Website Number	Discern raw score	HON raw score	Norovirus raw score
NHS Direct	1	69	58	111
CDC	2	69	53	102
Medicine Net	3	67	59	110
Wikipedia	4	46	49	84
Mayo Clinic	5	75	64	110
NLM Medline Plus	6	56	56	78
Royal Free Health	7	64	41	95
Europa Health	8	38	46	66
Public Health	9	65	46	98
Toronto Health	10	56	50	102
Edition Health	11	64	51	109
Health NY Gov	12	56	49	89
THH NHS	13	56	44	102
U Texas	14	61	48	95
VDH State	15	63	51	100
Health Tap	16	53	52	67
Fox News	17	54	49	87
Medical Dictionary	18	68	48	107
Health State	19	57	48	92
Fit for Travel Advice	20	50	49	83
Dudley NHS	21	50	42	75
Waht NHS	22	44	47	68
Imodium	23	40	39	56
SWBH NHS	24	50	49	83

About Norovirus	25	67	55	107
David Darling Encyclopedia	26	48	48	92
Health Tips Blog	27	33	43	33
Infectious Diseases	28	64	53	91
Wales NHS	29	48	55	88
Norovirus Org	30	48	26	82
Medical News	31	62	48	102
Patient UK	32	74	63	97
Infection Control	33	31	24	76
Boots Health	34	65	59	100
CHP HK GOV	35	41	44	81
King Country GOV	36	41	47	63
HPA	37	39	47	80
Asquith Nurseries	38	55	35	97
Somerset NHS	39	36	42	65
Croydon NHS	40	47	49	95

Appendix 6 The time taken for each tool

NO.	Website address	Name or organisation	Discern time (mm:ss)	Hon time (mm:ss)	Norovirus tool (mm:ss)
1	www.nhs.uk/Conditions/Norovirus/Pages/Introduction.aspx	NHS Direct	13:21	11:10	11:09
2	www.cdc.gov/norovirus/	CDC	06:01	07:07	09:59
3	http://www.medicinenet.com/norovirus_infection/article.htm	Medicine Net	05:03	14:51	08:33
4	http://en.wikipedia.org/wiki/Norovirus	Wikipedia	06:18	04:37	07:20
5	http://www.mayoclinic.com/health/norovirus/DS00942	Mayo Clinic	05:00	09:48	07:19
6	http://www.nlm.nih.gov/medlineplus/norovirusinfections.html	NLM Medline Plus	03:22	09:23	04:51
7	http://www.royalfree.org.uk/default.aspx?top_nav_id=1&tab_id=502	Royal Free Health	05:12	04:31	04:40
8	http://ecdc.europa.eu/en/healthtopics/norovirus_infection/basic_facts/Pages/basic_facts.aspx	Europa Health	03:02	05:27	04:32
9	http://www.public.health.wa.gov.au/2/600/2/norovirus_infection_fact_sheet.pm	Public Health	03:54	04:31	04:48
10	http://www.toronto.ca/health/cdc/factsheets/norovirus_factsheet.htm	Toronto Health	04:13	04:04	04:28
11	http://edition.cnn.com/HEALTH/library/norovirus/DS00942.html	Edition Health	03:05	06:41	04:27
12	http://www.health.ny.gov/diseases/communicable/norwalk/fact_sheet.htm	Health NY Gov	04:34	05:46	04:23
13	http://www.thh.nhs.uk/services/infection-control/norovirus.php	THH NHS	04:44	04:54	04:46
14	http://www.utexas.edu/safety/ehs/bulletin/norovirus.html	U Texas	03:18	04:17	04:29
15	http://www.vdh.state.va.us/epidemiology/factsheets/norovirus.htm	VDH State	03:13	03:42	05:01
16	https://www.healthtap.com/topics/norovirus-infection-prevention	Health Tap	03:19	03:50	04:17
17	http://www.foxnews.com/health/2013/02/01/tips-for-preventing-norovirus-infection/	Fox News	02:05	05:14	04:38
18	http://medical-dictionary.thefreedictionary.com/Noroviruses	Medical Dictionary	05:29	07:17	02:00
19	http://www.health.state.mn.us/divs/idepc/diseases/norovirus/basics.html	Health State	05:46	06:09	04:22
20	http://www.fitfortravel.nhs.uk/advice/disease-	Fit for Travel	03:12	04:44	03:53

	prevention/norovirus.aspx	Advice			
21	http://www.dudley.nhs.uk/sites/Healthy-Living-Infection-Prevention-and-Control/index.asp?id=8538	Dudley NHS	02:45	04:12	03:33
22	http://www.waht.nhs.uk/en-GB/Our-Services/Clinical-Services/Infection-Control/Norovirus-and-Infection-Control/	Waht NHS	03:43	04:44	03:11
23	http://imodium.co.uk/understanding-diarrhoea/types-of-diarrhoea/norovirus	Imodium	02:13	03:53	03:45
24	https://www.swbh.nhs.uk/patients-visitors/infection-control/norovirus/	SWBH NHS	02:04	03:58	03:00
25	http://www.about-norovirus.com/norwalk_treatment#.Ub0BIufVCSo	About Norovirus	05:45	03:14	04:04
26	http://www.daviddarling.info/encyclopedia/N/norovirus_infection.html	David Darling Encyclopedia	02:01	03:00	03:42
27	http://healthtips-lifestyle.blogspot.co.uk/2012/02/norovirus-gastroenteritis-incubation.html	Health Tips Blog	03:25	03:03	03:11
28	http://infectiousdiseases.about.com/od/diseasesbyname/a/Norovirus.htm	Infectious Diseases	03:07	06:02	03:52
29	http://www.wales.nhs.uk/sitesplus/888/page/43919	Wales NHS	03:06	04:21	03:52
30	http://norovirus.org.uk/	Norovirus Org	03:01	03:15	02:48
31	http://www.medicalnewstoday.com/articles/179107.php	Medical News	04:03	05:30	03:33
32	http://www.patient.co.uk/doctor/Norovirus.htm	Patient UK	03:29	04:54	05:14
33	http://www.infection-control-solutions.com/NOROVIRUS/	Infection Control	05:42	03:23	04:30
34	http://www.webmd.boots.com/digestive-disorders/tc/norovirus-treating-norovirus-infection	Boots Health	06:01	04:15	03:15
35	http://www.chp.gov.hk/en/content/9/24/33.html	CHP HK GOV	03:15	04:31	05:00
36	http://www.kingcounty.gov/healthservices/health/communicable/diseases/norovirus.aspx	King Country GOV	03:49	03:05	02:09
37	http://www.hpa.org.uk/infections/topics_az/norovirus/faq.htm	HPA	03:51	04:55	02:21
38	http://www.asquithnurseries.co.uk/healthcare/norovirus_infection.asp	Asquith Nurseries	02:05	02:35	03:51
39	http://www.somerset.nhs.uk/welcome/health-staff/patientsafety/infection-prevention/norovirus/	Somerset NHS	02:56	04:45	02:56
40	http://www.croydonhealthservices.nhs.uk/patients-visitors/Norovirus.htm	Croydon NHS	03:40	06:07	03:28

Appendix 7 – Rotation of Tools and Scoring Method

The scores for each tool were added together, for instance, using Discern a perfect website would have 80/80; and gain a 100% as the 5 point Likert scale for 16 questions adds up to 80. These calculations were completed in Microsoft Excel to calculate a raw score out of 80. Therefore for the NHS website which had a raw score of 69 achieved a percentage score of 86.25, as 69 multiplied by 100 equals 6900; divided by 80 equals % 86.25. The maximum score for HON was 75 and 115 for Norovirus. The raw scores were all converted to percentages using the formula above by using the SUM and PRODUCT features of Microsoft Excel to avoid human error.

Tool Rotation	Sites 1 - 6	Sites 7-12	Sites 13 -18	Sites 19 -24	Sites 25 - 30	Sites 31 - 36	Sites 37 – 40
D–> N –> H -> R	*Web1*	*Web7*	*Web13*	*Web19*	*Web25*	*Web31*	*Web37*
N–> H –> D -> R	*Web2*	*Web8*	*Web14*	*Web20*	*Web26*	*Web32*	*Web38*
H–> D–> N–> R	*Web3*	*Web9*	*Web15*	*Web21*	*Web27*	*Web33*	*Web39*
D–> N–> H–> R	*Web4*	*Web10*	*Web16*	*Web22*	*Web28*	*Web34*	*Web40*
N–> H–> D–> R	*Web5*	*Web11*	*Web17*	*Web23*	*Web29*	*Web35*	
H–> D–> N–> R	*Web6*	*Web12*	*Web18*	*Web24*	*Web30*	*Web36*	

D= Discern, H = HONcode, N= Norovirus tool, R= Readability website

Appendix 8 – Ethics Approval

Information School Research Ethics Panel

Confirmation of a 'no-risk' application

Date: 17th June 2013

TO: Wasim Ahmed

The Information School Research Ethics Panel has examined the following application:

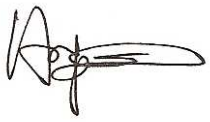
Title: Evaluation of web-sites that contain information relating to the norovirus infection

Submitted by: Wasim Ahmed

The Panel has concluded that the proposed research is classed as 'no-risk', and as such does not require ethics approval. No further action needs to be taken.

This letter is the official record of ethics approval by the School, and should accompany any formal requests for evidence of research ethics status.

Effective Date



Dr Angela Lin
Research Ethics Coordinator

List of Figures and Tables

Glossary/Key Terms

Generic tool or Generic instrument: A list of questions which seek to measure the quality of a webpage. A generic tool such as HONcode and Discern can be applied to various medical conditions as they are not disease specific hence the term Generic.

Specific tool or Specific Instrument: A tool specific to a condition normally created by a user, for instance, a specific tool on breast cancer which only seeks to measure the information quality of breast cancer on a webpage.

Webpage/Website evaluation tools: This includes any tool which seeks to evaluate the quality content of a webpage, and includes both generic and specific tools.

Readability test: A test which is able to determine the reading level or grade, depending on the readability test use. These tests are often employed by authors of children's books, for example, to ensure reading ability is low. A high readability would indicate that the text would be difficult to read.