

Evaluating how users interact with NHS Direct Online

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Abstract. Evaluating the NHS Direct Online website presents some challenges and therefore a number of evaluation methods and approaches are utilized by NHS Direct. This paper presents one approach, web log analysis, to explore how users interact with the NHS Direct Online website. Focusing on one health topic, MRSA for one-day's website visits, proved informative and highlighted a number of interesting questions about the user interaction with the MRSA topic and about navigation on the website. The findings show 242 visits to the Methicillin-resistant staphylococcus aureus (MRSA) topic, the PDF or print pages were visited 9 times on the day, and therefore, it may be assumed that the MRSA topic was viewed in an apparently logical sequence. For the remaining visits to the website, some visits achieved quite good coverage of the MRSA topic, however, none of the visits followed any of the logical sequences hypothesized for viewing health information content.

1 Introduction

NHS Direct provides the main health advice and information service for the NHS for patients and the public. The NHS Direct telephone service has handled more than 25 million telephone calls since its inception as a pilot project six years ago, and the NHS Direct website (www.nhsdirect.nhs.uk) has received around 19 million visits since it was launched in December 1999. The NHS Direct self-help guide will soon have been delivered to 18 million households in England as part of the Thomson Local directory, and NHS Direct Interactive, a digital satellite health information channel, is now available to some 7.5 million homes.

NHS Direct New Media is the directorate within NHS Direct with responsibility for provision of the digital health information platforms such as the website, NHS Direct Interactive (health information channel on digital television) the printed self-help guide and the Online Enquiry Service. The purpose of providing a range of health information platforms is to ensure that information about health care, treatment, self-care and healthy lifestyles is accessible to a diverse population in respect of their health needs for information.

The NHS Direct website had over 6 million visitors during 2003/4. The health information provision on the website includes:

1. A self-help guide to treating common health problems at home;

2. An encyclopaedia covering hundreds of health topics, with links to other quality assured health websites;
3. Information on the choice of treatments available for 60 different conditions;
4. Frequently asked questions;
5. Hot topics on the latest health issues;
6. A searchable database of local health services e.g. GPs, dentists, pharmacies;
7. A contact us section of the website
8. An online email service for requesting health information (Online Enquiry Service).

Every time a user links up to a website, the server keeps track of all the actions in the web log file. The web logs provide details about file requests to a server and the server response to those requests. The type of data that can be collected depends on how it has been set up and defined by the technical staff. Log files can contain an enormous amount of data that may be irrelevant to what is required for the analysis; therefore, extraction methods for relevant data are required.

In a health information environment collecting and analysing the web logs could potentially provide information about the numbers of people coming to the site, the health topics of importance to the public and what aspects of the health topic they are viewing.

2 Literature Review

2.1 Using the Internet for health information

Health information is considered fundamental for promoting patient choice, informed consent, shared decision-making and self-care. The Internet plays a crucial role in UK government proposals to provide more information to create a more informed patient population¹. The NHS Plan, published in July 2000, made a commitment for patients to “have far greater information about how they can look after their own health and about local health services” and that “patients will be helped to navigate the maze of health information through the development of NHS Direct New Media, digital television, and NHS Direct information points in key public places”². Providing better information has been identified as one of the key methods of improving patient experience by understanding what people want in terms of information and ensuring that the information is there when, where and how they want it with the expectation that good quality information forms the basis for patients to make informed choices about their care.

Increasing numbers of consumers are using the Internet to support their healthcare³. Worldwide there are over 6.75 million health-related internet searches carried out every day, representing approximately 5% of all internet searches⁴. The internet is increasingly playing a role in lay help-seeking behaviour, with many clinic-based surveys showing that patients are using the internet in relation to specific health consultations^{5,6}. People consult the internet both for themselves, and on behalf of families and friends⁷. It is well known that

patients may not have all their questions answered in traditional health encounters⁸. It is possible that internet health services are able to help those who for whatever reason are unable to have their questions answered in a formal health setting.

2.2. Methicillin-resistant staphylococcus aureus (MRSA)

Some microorganisms, referred to as pathogens, cause infection when they gain access to body tissues, establish themselves, multiply and cause an adverse reaction. Certain parts of the body have a natural flora or commensal population of microbes, which are harmless in the area they normally inhabit but may set up an infection elsewhere in the body. Bacterial resistance to antibiotics may be intrinsic or acquired. Intrinsic resistance is associated with a natural property of the organism, whereas acquired resistance arises either from mutation in sensitive cell populations or by the resistance from one cell to another. *Staphylococcus aureus* is commonly present on skin and mucous membranes. The most common site of colonisation is the nose, 20-30% of the general population are carriers' of staphylococci. Some staphylococci aureus organisms have acquired resistance to antibiotics primarily because of the frequent and sometimes injudicious use of antimicrobial therapy. Mild, moderate and serious infections due to MRSA involving soft tissues, bones and joints, postoperative wounds, urinary tracts and lungs have been reported. Autoinfection is responsible for approximately one third of infections due to this organism. However, the most important mode of spread for MRSA is probably contact transmission by the hands of health care professionals⁹. Worldwide staphylococcal infection is a major form of acquired sepsis in hospitals and is responsible for outbreaks in hospitals¹⁰. It is for this reason that MRSA has a high profile with the public and with the popular press. Phrases such as 'hospital super bug' have appeared in alarmist media stories. Therefore, there is a need for the public to be able to access good quality research-based information about the prevention, causes, symptoms and treatment of MRSA.

2.3 Web log analysis

There is a paucity of published research or professional papers about web log analysis. However, what there is can generally be found in the computer science literature and rarely relates to health websites¹¹. Nicholas et al 2004 evaluated the NHS Direct New Media website and undertook a web log file analysis. The main outcome from the study was the development of useful theoretical concepts relating to how the public generally search for health information on the Internet; concepts such as 'promiscuous users', formulated for those who visited a combination of websites, which included the NHS Direct website. The authors reported that site penetration search sessions lasted approximately five minutes and approximately three quarters (74%) of user sessions featured three or fewer pages, 20% contained between 4 and 10 and 6% featured 10 or more pages¹². The potential of web log analysis has, of course, been recognised in commercial settings where the aim is to have an understanding of how the website is used to subsequently increase the visitors to the website and this is where the commercial software companies are finding a niche.

3 Study design and methods

The purpose of the study is to develop a web log analysis approach that would enable the exploration of how users interact with the NHS Direct Online website.

The objectives of the study are to:

1. Develop an approach to web log analysis that will enable the NHS Direct New Media web logs to be analysed in a meaningful and informative way
2. Establish an approach to extracting, truncating and analysing the data from NHS Direct New Media web logs
3. Develop an awareness of the navigation and health information seeking behaviour of users accessing MRSA information web page on the NHS Direct New Media website.

3.1 Time period of the study

A Monday, 4th October 2004, was identified for data collection for this study for a number of reasons; first, the volume of website traffic is generally highest on Mondays. Second, there were no uncharacteristic changes to the volume of website traffic due to; the operation of the servers, which were fully operational, there were no adverse MRSA media stories and there was no additional website activity related to MRSA, such as a 'Hot Topic', which presents topics of interest that are for a particular time under public scrutiny.

3.2 Description and processing of the data

To cope with the amount of daily visitors to the website NHS Direct New Media uses three servers. In order to manage a vast amount of data this study proposes to process and analyse one day's log file data. Even exploring one day's activity from three servers for the website comprised over 121MB. These large data files were transferred to SPSS and data truncation methods were used, according to accepted web log analysis conventions, to reduce the data to visits to the website.

The variables used to identify a visit to the website by a computer or computer network visit are; time, IP address and user browser and operating system characteristics. Confining the analysis to the visits within a topic area increases confidence of identifying the linked pages, rather than identifying the associated pages across many hundreds of health topics, which is the usual web log analysis approach.

4 Discussion of findings

MRSA was the 15th most frequently visited health topic on 4th October 2004, comprising 242 visits, which reflects the general public health concern with MRSA. The most popular time for accessing MRSA information was between the

hours of 7pm and 10pm. 56.1% (n=137) only visited one page during their visit and of those 86.1% visited the introductory page. It is interesting to reflect on this finding; do the majority of people only search for broad introductory level information and not have any interest in the causes, symptoms, treatment and prevention of MRSA or are the links from this page to other aspects of the topic information navigationally difficult to find. The site penetration data of 74% visiting 3 or fewer pages in the Nicholas et al (2004) study¹² cannot be compared to the data in this study which explores topic penetration. The concept of site penetration is the number of pages it would take to get through to useful information. However, in the current study the user has already penetrated the website to a health topic and therefore, this concept was not directly applicable.

Health information in its written form is commonly presented according to an accepted public health structure. This structure appears to logically support the step-by-step development of comprehension of the health topic under examination and comprises:

- Introduction
- Causes
- Symptoms
- Treatment
- Prevention

On the website, the various sections of the health information topic are presented in the top central bar, which is meant to indicate that content should be accessed in the order from left to right, in the following order:

- Introduction
- Symptoms
- Causes
- Treatment
- Prevention

This structure varies slightly from the usual written structure and symptoms appear before causes. It is possible that visitors to the website did not recognise that the information sections are meant to be accessed from left to right across the bar and therefore, may read the sections from the top line to the bottom line and in this case the order would be:

- Introduction
- Treatment
- Symptoms
- Prevention
- Causes

Although some visits showed relatively good coverage of all sections of the content of MRSA on the website, none of the visits, with the exception of the visits viewing the PDF/print pages, searched for MRSA health information according to any of the possible hypothesized pathways presented above. This

poses a question about the impact of health information, in respect of the visitor increasing their knowledge and gaining a comprehensive understanding of the health topic, if the visitor is not following the usually accepted structure of health information. It may be that searching for health information on a website is fundamentally different in nature to written information and visitors access it in a much more unsystematic way. An additional question would be, if the navigational bar at the top of the page, which contains the information sections of the topic, does in fact help visitors to search for health information in a way that is meaningful for them. Further research would be required to understand the complex issue of how visitors search for information on a health website and to identify if there should be increased signposting to information, which guides the visitor through a logical journey to the various sections of the health topic. Nine print or PDF pages viewed indicates that all the topic information was accessed, possibly to be viewed at the visitors leisure or with friends/family/colleagues when offline. Therefore, it may be considered that all the MRSA information was viewed on these occasions in a logical order and this is a positive outcome for NHS Direct New Media.

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