The Map of Medicine: 
its current and potential impacts

- in service redesign
- in clinical practice
- in medical education

Final Report

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EXECUTIVE SUMMARY

This report presents the findings of the Map of Medicine study undertaken by the Institute of Clinical Education, Peninsula Medical School in collaboration with the South West Strategic Health Authority. The study had 3 objectives:

Objective 1: to provide a systematic review of the national status of the Map of Medicine to determine the extent of the evidence for its impact on clinical practice. This identified a paucity of evidence in the published literature and a variable quality of the evidence that does exist. Despite this, there are some encouraging early indications for the use of the Map of Medicine within service redesign, leading to an increase in appropriate referrals to Secondary Care, decreased patient waiting times and considerable cost savings.

Objective 2: to explore the Map of Medicine’s potential in undergraduate medical education. A survey of UK medical schools found that only 1 out of 23 medical schools was using the Map of Medicine in their undergraduate curriculum at the end of 2009. When embedded within the Peninsula Medical School undergraduate medical programme, the student response was extremely positive. Students liked the Map of Medicine’s navigability and help in accessing reliable information quickly. Use of the Map of Medicine by students grew steadily throughout the period of the study, with the exception of during Easter and summer holidays, and peaked at 595 sessions in February 2010. There was evidence that usage by students was directly linked to curricular events, particularly problem-based learning tutorials and medical knowledge assessments.

Objective 3: to explore clinicians’ decisions to access medical information resources in the South West. The interviews showed that the most important factor influencing a clinician’s decision to access medical information resources was speed and ease. Due to very busy schedules and short consultation times, clinicians choose to access resources that are quick and easy to access, and easy to use. Passwords acted as a significant barrier to accessing resources.

Combining these observations, the study demonstrates that the Map of Medicine is finding an important niche within service redesign in UK healthcare communities and has the potential to make a significant impact as a training tool, particularly within undergraduate medical education. The Map is still not embedded widely within clinical practice in the South West, however, with only one of the 22 clinicians interviewed having used it in the preceding week. Speed and ease of use of resources are of vital importance to clinicians and, in making evidence available to clinicians to use for the benefit of patients, the role of passwords as a significant and detrimental barrier must be recognised. The study also highlights the need for more evidence of the impact of the Map of Medicine on clinical practice within the published literature in order to support policy and resourcing decisions.

The recommendations of the study are:
1. That clinical and academic communities work together to design evaluations of the impact of Map of Medicine on clinical practice.
2. That Map of Medicine Ltd work towards providing medical schools with full access to the NHS-licensed version of the Map of Medicine resource.
3. That medical schools who wish to embed the Map of Medicine in their undergraduate curricula learn from our experiences described within this report.
4. That further research explores whether Map of Medicine use by medical students and postgraduate medical trainees leads to better assessment outcomes.
5. That the NHS provides clinicians with resources that are evidence-based but quick and easy to access, and where passwords do not present a significant barrier to access.
1. INTRODUCTION

This report presents the findings of the Map of Medicine study undertaken by the Institute of Clinical Education, Peninsula Medical School in collaboration with the South West Strategic Health Authority.

1.1 Background to the study

In spring 2008, the late Sally Hernando, formerly the Head of Knowledge Management and E-Learning at the South West Strategic Health Authority, contacted the Peninsula Medical School to discuss the possibility of a collaborative study embedding the Map of Medicine resource within undergraduate medical curricula and local healthcare teams. Sally had recognised the importance of the Map of Medicine and had applied to the Strategic Health Authority for funding to carry out the study.

The objectives of the study at that stage were:

1. to provide a model for use of Map of Medicine in undergraduate curricula;
2. to provide one or more exemplar ‘localisation models’ with Map of Medicine in priority areas identified by the Primary Care Trusts and Trusts e.g. cancer, stroke, falls, diabetes via existing networks;
3. to conduct a scoping study leading to recommendations on how Map of Medicine can be used by health communities to support workforce planning;
4. to conduct a scoping study leading to recommendations on how Map of Medicine might link with Choose and Book software.

The funding was used to employ a Research Fellow to work on the study but an initial failed attempt to recruit a Research Fellow led to a time lapse before the study actually started in September 2009. By this time localisation around the Map of Medicine in the South West had progressed considerably due to the work of Caroline Squires, Map of Medicine Implementation Consultant for the South West, and her team. As a result a meeting was arranged between the Peninsula Medical School research team, Karen Mattick and Nicola Brennan, and Tricia Ellis, the present Head of Knowledge Management and E-learning at the South West Strategic Health Authority, to discuss whether the study objectives were still current. The conversation led to a number of possible study objectives, Table1, which were subsequently prioritised to include three key areas.

1.2 Study Objectives

The objectives of the study are:

1. to provide a systematic review of the national status of the Map of Medicine to determine the extent of the evidence for its impact on clinical practice, pg 5-10;
2. to explore the Map of Medicine’s potential in undergraduate medical education, pg 11-16;
3. to explore clinicians’ decisions to access medical and health information resources in the South West, pg 17-27.

1.3 Structure of report & dissemination

This report presents the research carried out on the three study objectives. Each objective has been written up separately in the format of a paper for a peer-reviewed journal. Section 2 presents the systematic review of the national status of Map of Medicine. Section 3 explores the potential for embedding the Map of Medicine in undergraduate curricula. Section 4 explores the factors that influence clinicians’ decisions to access medical information resources. Finally the report concludes with some recommendations and avenues for further research.
Objective one:

A REVIEW OF EVIDENCE FOR THE MAP OF MEDICINE’S IMPACT ON HEALTHCARE


2.1 Introduction

Decisions about the delivery and provision of healthcare are increasingly being driven by evidence of clinical and cost-effectiveness as well as systematic assessment of actual health outcomes.\(^{(1)}\) In the UK, the National Health Service (NHS) as part of its £12.4 billion investment in IT has launched NHS Evidence\(^{(2)}\), an electronic portal which provides access to high quality electronic clinical and non-clinical evidence and information about health and social care. NHS Evidence also provides access to a number of other specialised evidence-based resources on its Health Information Resources pages. One such resource is the Map of Medicine.

Map of Medicine is an evidence-based online knowledge support tool that is regularly updated. Using a pathway approach, Fig 1, it provides a visual representation of evidence-based practise-informed care journeys covering 390 pathways in 28 medical specialities. The concept of the Map of Medicine was first devised in 2001 by medical entrepreneur Dr Mike Stein and Prof. Owen Epstein, who were part of a development team working to reduce clinic waiting times in the face of increasing referral numbers. The team found that the quality of referrals had a major impact on waiting times and that by making specialist knowledge available to community-based clinicians it improved referrals. Thus the Map of Medicine was born as a tool to make specialist knowledge available to clinicians and improve dialogue between Primary and Secondary Care. The resource was developed as a commercial venture with the financial support of University College London and the Royal Free Hampstead NHS Trust. As demand for the resource grew amongst healthcare communities in the UK, the business was acquired by international publishers Informa plc in June 2005 and then by the Hearst corporation in April 2008.

Map of Medicine has been procured at significant cost for the NHS through local service providers by NHS Connecting for Health, a Directorate of the Department of Health which was created in April 2009 to bring in new systems and services. It is deployed across the UK by the Strategic Health Authorities in England, and Informing Healthcare, the Welsh-Assembly-funded health IT programme in Wales, with help from Connecting for Health and the Map of Medicine Central Team who are supporting early adopter NHS organisations to develop specialist clinical pathways. The resource has also been purchased by the National Boards of Health in Sweden and Denmark.\(^{(3, 4)}\)

Given the investment in the Map of Medicine by the Department of Health in the UK in the development, deployment, funding of the license, and in staff time as well as the investment by healthcare providers in Sweden and Denmark, it is important to establish the beneficial impact that investment has had on healthcare practice and, ultimately, on patient outcomes. Thus, the aim of this study is to conduct a systematic review of the published literature on the Map of Medicine to determine the extent of the evidence for its impact on clinical practice at the current time.

2.2 Methods

In order to access the peer reviewed literature relating to Map of Medicine, all of the NHS Health Information Resources, including AMED, BNI, CINAHL, EMBASE, HEALTH BUSINESS ELITE, HMIC, MEDLINE, PSYCINFO, were searched for articles containing the following search term “map of medicine” in the title and text. These databases signpost literature from international journals and across a broad range of healthcare disciplines. Google Scholar which is a more generic academic web search engine was also searched for the same search term anywhere in the article. The searches were restricted to papers written in the English language that had been published since January 2001 when the Map
of Medicine was first developed. The Map of Medicine website was also searched for additional peer reviewed articles that were not identified through the formal search.

The grey literature was explored by two different routes. In order to assess the types of literature that were discussing the Map of Medicine, the same search term “map of medicine” was entered into Google, limiting the findings to between 2001 and the present day. This retrieved 124,000 hits, of which the first 1000 were screened. In addition, the Map of Medicine company website was searched for articles that presented data but had not been published in peer-reviewed journals. All of the searches were performed on the 23rd February 2010.

Duplicate articles were removed and the remaining articles were screened. The inclusion criteria were that the articles had to be relevant to the research question: “What impact has the Map of Medicine had on clinical practice?” and must present empirical data on this topic. The final group of articles were read in full and independently by the three authors. Data were extracted separately by each author using a common framework for data extraction. The authors then met to discuss the findings and identify key themes across the articles.

2.3 Results

Literature identified

The literature search identified 133 articles, derived from the NHS Evidence databases (36), Google Scholar (75) and the Map of Medicine website (22). The Google search yielded mainly documents and websites from Strategic Health Authority’s and Healthcare Trusts referring to the Map of Medicine and offered no new leads.

There were 16 duplicate items, 16 irrelevant articles and 66 were publications where the Map of Medicine was mentioned only briefly, Fig 2. Of the remaining 35 items, 12 of the papers were classified by the researchers as resource descriptions (5-16), which contained descriptive information about the Map of Medicine but no evidence of its impact on clinical practice and were thus excluded. Eight newsletters (17-24) and four case studies (25-28) were excluded for the same reason.

The remaining 11 items, that were relevant to the research question and presented empirical data or statements about key findings, consisted of 1 peer-reviewed journal article presenting primary research (29), 8 case studies (30-37) and 2 newsletters containing articles which presented empirical data. (38, 39)

Evidence of impact

i) Reduced referral to Secondary Care

The one primary research study investigated the use of the Map of Medicine for assessing chronic kidney disease referrals in Gwent healthcare community in Wales. (29) The same findings were reported in less detail as a case study. (30) By analysing changes in the number of new referral letters received following the launch of the Map of Medicine-based chronic kidney disease patient referral pathway in November 2007, they found that there was an overall decrease in referrals from approximately 85% in September and October 2007 to approximately 60% between November 2007 and June 2008. By analysing patient referral letters in 6 consecutive months prior to and following the launch of the chronic kidney disease patient referral pathway, they also found that there was a decrease in referrals with inadequate information to Secondary Care from 23% to 14%. However there was a slight increase in inappropriate referrals from 13% to 16%. Furthermore they found that 62% of all Primary Care practices in the Gwent healthcare community were registered with the Map of
Medicine after the intervention and that these practices sent a higher proportion of appropriate referrals and were less likely to generate referrals with inadequate information.

Five of the 8 case studies also suggest that the Map of Medicine can lead to a decrease in inappropriate referrals. Newham Local Healthcare Community used the Map of Medicine to communicate a new Anticoagulation pathway which resulted in 33% of stable patients being managed in Primary Care. The number of referrals from Primary to Secondary Care for monitoring almost halved in the months after the pathway was implemented. Similarly, the introduction of a diabetes pathway resulted in a reduction of 14% in the first to follow up ratios for Newham University Hospitals Trust, despite an increase in the number of outpatient attendance to Secondary Care. The introduction of a Knee Pain pathway in South Devon resulted in a 70% decrease in referral to Secondary Care and an increase in appropriate referrals. In Western Cheshire Local Healthcare Community the introduction of the Cellulitis pathway reduced hospital admissions by almost half. Finally, Wirral Primary Care Trust reported reduced referrals after the introduction of an incontinence and Age-related Macular Degeneration pathway, although exact figures were not reported in the case study.

ii) Cost savings

Some considerable cost savings were presented in the articles reviewed. For example, introducing the Newham Anticoagulation pathway produced estimated savings of £300,000 for 2009/2010 and up to £500,000 in 2010/2011; and the Western Cheshire Cellulitis pathway was thought to save at least £2,000 per patient. South Devon knee pain pathway projects a reduction of in excess of 400 consultant appointments with a saving of at least £60,000. Wirral AMD service reports that it is now delivered at a significantly lower cost than alternative providers with the cost reduction at approximately 20%. Overall savings from the new service at Wirral are reportedly in the order of £200,000 per year with costs reduced in both initial assessment and treatment tariffs.

iii) Reduced patient waiting times.

The introduction of the AMD pathway in Wirral led to an improvement in patient waiting times from 10 weeks to 10 days. The adoption of the knee pain pathway in South Devon also resulted in reduced patient waiting times, although exact figures were not reported in the case study.

iv) Use as a training tool

One of the newsletter articles interviewed 100 senior hospital doctors in England and Wales to find out which one of four key benefits they would find most useful about the Map of Medicine. The results indicated that the Map was rated most highly as a knowledge resource for training teams. Similarly a study of the viability of the mobile Map of Medicine found that it showed potential for formal clinical training. A quote from a GP in one of the case studies also stated that it was a good teaching resource for medical students.

v) Other benefits

Other benefits may include reduced wastage from unnecessary pathology testing, greater confidence in dealing with matters outside their own expertise, support for teams seeking alternative diagnoses, better communication between care providers, or a more unified approach to evidence-based care.
2.4 Discussion

This study presents a systematic review of the literature on the Map of Medicine to determine the extent of the evidence for its impact on clinical practice at the current time. The findings will help individuals and organisations to decide whether to invest in the Map of Medicine, and where and how it can be utilised to make the biggest impact for patients. It will also help policy makers and researchers to set a research agenda that can generate evidence of impact for new initiatives on a timescale that can support policy decisions.

The most important finding of the study is the paucity of evidence available on the impact of the Map of Medicine and the variable quality of that which does exist. There is only one article published in a peer-reviewed journal that presents empirical data relating to its impact. This seems astonishing, given the high level of financial investment by the Map of Medicine company and healthcare providers in the UK, Sweden and Denmark and highlights a need for more and better research in this area. The paucity of peer-reviewed literature may reflect the time involved in designing and performing rigorous research and this being written up, peer reviewed and published. The Map of Medicine was first developed in 2001. However it has only been available in all Trusts across England and Wales since 2007 and in Sweden and Denmark even more recently. If this is the case, we hope that there will be an abundance of literature emerging in the coming months and years.

Many of the studies had multiple aims and presented limited methodological detail. The multiple aims may be expected with interventions that are part of a service redesign project but made it difficult to establish the specific impact of an intervention. The limited detail also made it difficult to establish the specific impact and proved a barrier to using inventories that could measure the quality of the research studies as we had intended. Furthermore, there appeared to be some flawed conclusions within the studies. For example, in two of the case studies, the results showed a shorter patient journey but the conclusions reported a better patient experience. We would argue that, although a shorter patient journey may result in a better patient experience, this is not necessarily the case.

The potential for bias in the literature was high. The case studies were numerically the largest source of evidence for impact but because they were not peer reviewed and were published largely as promotional material on the Map of Medicine website, there is considerable potential for bias or selective publication. In addition, the case studies were written by healthcare communities that participated in the Map of Medicine Early Adopter programme. Early Adopters received free consulting resources and training support and, in return, were required to write a number of case studies. Importantly, there are certain pre-requisite criteria to becoming an Early Adopter e.g. specific business challenge, specific and measurable outcomes and this may mean that only those likely to be successful participated.

It is important to be clear that the dearth of quality literature at the current time indicates that we have insufficient evidence about the impact of the Map of Medicine on clinical practice, rather than that the evidence suggests that there is no impact. Indeed there are some encouraging early indications, particularly for the Map of Medicine as a tool within service redesign, where it seems to be leading to an increase in appropriate referrals, decreased patient waiting times and considerable cost savings. The Map of Medicine is also perceived by clinicians as a valuable training tool, although the evidence of impact associated with this will be more difficult to prove.

One interesting theme emerging from our review was around the changing role for the Map of Medicine within healthcare. The Map of Medicine was initially designed as a knowledge support tool to make specialist knowledge available to community-based clinicians and improve dialogue between Primary and Secondary Care. More recently, however, it seems
to have found a niche as a service redesign tool. Possible future applications seem to be a role in clinician training. It is interesting to speculate on the reasons for these changes. One case study suggests that anxiety around the Map of Medicine’s potential to reduce the need for clinical judgement has formed a barrier to its uptake and usage.\(^{(26)}\) It could be that the resource has specific uses for different people in different healthcare roles. GPs may find the Primary Care part of the Map and the crossover to Secondary Care most beneficial. Healthcare students and educators may find the whole Map useful in providing a visual framework of a complete patient journey. Healthcare managers may find the overview useful to aid service redesign and quality improvement.

**Strength and limitations of the study**

It is important to consider both the strengths and limitations of our study. The topic is important and the study is timely, given the financial climate in which decisions are having to be made. This systematic review involved a wide ranging literature search. Three different authors read each of the papers in full which ensured rigour in the review and resulted in different perspectives on the literature found. Whilst this paper focuses on the Map of Medicine, it may raise a similar lack of evidence for the impact of other healthcare interventions, particularly e-resources.

A limitation of the study is that despite the wide ranging literature searched, as with all systematic reviews, there may have been some literature missed, including literature published in languages other than English, particularly Danish and Swedish. Furthermore, the search terms used would not have found studies on similar resources with different names, which could have contributed to a full picture. Another possible limitation relates to the potential bias of the authors, who were two academic staff members at the Peninsula Medical School and an NHS employee in the Strategic Health Authority. We sought to ensure a balanced appraisal of the literature through our structured review process and by ongoing reflection on the process and our own potential bias, and this was a regular agenda item for the research team meetings.

Further research with study designs that can generate high quality evidence and are performed by independent researchers are needed to provide evidence of the impact of Map of Medicine on clinical practice, although it is acknowledged that these will not be easy to do. We would encourage Local Healthcare Communities to consider designing their evaluations with the rigour required for research publication and incentivising their staff to make them available to a wider audience via the academic literature. This may require partnerships between clinical and academic communities, in line with recent UK healthcare initiatives e.g. CLAHRCs\(^1\), HIECs\(^2\).

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1. [http://www.nihr.ac.uk/infrastructure/Pages/infrastructure_clahrcs.aspx](http://www.nihr.ac.uk/infrastructure/Pages/infrastructure_clahrcs.aspx)

Objective two:

EXPLORING THE MAP OF MEDICINE’S POTENTIAL IN UNDERGRADUATE MEDICAL EDUCATION
3.1 Introduction

Evidence-based medicine ‘is the use of mathematical estimates of the risk of benefit and harm, derived from high-quality research on population samples, to inform clinical decision making in the diagnosis, investigation or management of individual patients’.\(^{(41)}\) An understanding of evidence-based medicine and how to implement it in practice has become an essential requirement for all professionals involved in the delivery of healthcare.\(^{(42)}\) There are a vast range of electronic resources available to support evidence-based practice. One such resource is the Map of Medicine, www.mapofmedicine.com.

The Map of Medicine is a web based knowledge resource depicting evidence-based pathways of patient care for common and important medical conditions. It presents medical pathways of care as ‘decision trees’ that indicate Primary and Secondary Care roles in optimal disease management, Fig 1. This provides an overview of medical care that can provide several useful functions including supporting clinical decision making and service redesign. In the UK, the Map of Medicine has been procured by the NHS Connecting for Health programme and is available to all NHS staff via NHS Athens.\(^{(43)}\) Athens is an Access Management System that manages access to the electronic resources the NHS has commissioned.

Recent publications suggest a possible role for the Map of Medicine as a training tool. When asked to indicate where the Map of Medicine might make most impact, senior hospital doctors felt it had significant potential as a knowledge resource for training.\(^{(38)}\) Similarly a study of the mobile Map of Medicine designed specifically for Personal Digital Assistants, smart phones and Tablet Personal Computers demonstrated its potential within formal clinical training and the early stages of a clinical career.\(^{(39)}\) To our knowledge, however, the potential for the Map of Medicine within undergraduate medical education has not been reported in the literature. It is unclear to what extent medical schools are already incorporating this resource within their programmes and, if so, whether it has had a beneficial impact. This study set out to explore the potential of the Map of Medicine to enhance undergraduate medical education.

3.2 Methods

Survey of UK Medical Schools

A survey methodology was adopted to investigate the use of Map of Medicine by medical schools in the UK. In October 2009, an e-mail was sent to the nominated primary contact for each medical school listed on the Higher Education Academy website, asking whether the Map of Medicine was used in their undergraduate programme. A total of 23 of the 31 medical schools responded (74% response rate).

Implementation at one medical school and evaluation of impact

a) Setting

The Peninsula Medical School undergraduate curriculum was used to explore the potential of the Map of Medicine within undergraduate medical education. The Peninsula Medical School is based in the South West of England and has a 5 year integrated curriculum featuring small group learning, including problem-based learning in the first two years. The study was carried out in the 2009/2010 academic year during which there was a total of 963 students across all five years.
b) Access

The Map of Medicine is licensed by the NHS and is accessed via NHS Athens. A patient version of the resource known as Healthguides is freely available via NHS Choices. While the Healthguides look the same as the Map of Medicine and hold the same generic pathways, they do not show localised pathways or have live links to other resources e.g. the British National Formulary, Google and NHS purchased information resources accessible through NHS Evidence.

The authors felt that for an optimal investigation of potential, medical students needed to have access to the NHS licensed version of Map of Medicine as it would be more authentic to medical practice and would familiarise students with a resource that they may use as qualified doctors. Third, fourth and fifth year healthcare students whilst on placement or attachment with an NHS organisation in England can already self-register for Map of Medicine from an NHS computer. However first and second year students, and non-NHS staff cannot. Access to the NHS licensed version of the Map of Medicine was kindly given by Map of Medicine Ltd to all Peninsula Medical School staff and students for this study. The resource was made available through the Peninsula Medical School managed learning environment and required Higher Education Athens passwords to log on.

c) Implementation

The resource was introduced to teachers and students between September and March 2010. Teachers were given a 5 minute demonstration of the resource’s key features by the lead researcher and their feedback about the potential benefits in using the resource within their teaching was sought. The resource was also introduced to 60 teaching staff at the annual in-house education conference. If the resource was deemed beneficial by the teachers, then they were able to introduce it in their teaching sessions in whatever way they saw fit. Thus the resource was generally introduced to students by their teachers. In addition, it was introduced to some groups of students directly by the lead researcher using the same format but asking about its potential in their learning.

When full access to the resource was gained in December 2009 an e-mail was sent to all students and teaching staff to inform them that the Map of Medicine was available via the Managed Learning Environment. Staff were also informed via the weekly newsletter. Relevant parts of the Managed Learning Environment were populated with links to the resource and to specific pathways e.g. the obesity problem-based learning case was linked to the obesity pathway on the Map of Medicine.

The key areas of the curriculum that incorporated the Map of Medicine were problem-based learning, years 1 and 2, special study units, year 1 and evidence-based practice, years 1 and 2.

d) Evaluation

The evaluation framework outlined by Kirkpatrick in the 1950s and later adapted to medical education was used to evaluate the Map of Medicines’ potential in undergraduate education, Fig 3. The first two levels, participation and reaction, were the focus for the current study. Participation data on the level of usage of the Map of Medicine by Peninsula Medical School staff and students was gained from Map of Medicine Ltd. The data provided information on the number of Map of Medicine sessions, the top 10 pathways accessed and the user activity. It was only possible to get these data for the Peninsula level which includes
the Peninsula Medical School and three other NHS organisations. It was possible to
distinguish between the Peninsula Medical School and the other NHS organisations for
some of the data but not all.

Reaction data was generated when the Map of Medicine was introduced to staff and
students, as detailed notes of the discussion and feedback were recorded. In addition, the
lead researcher met with groups of students to evaluate their experience of using the
resource and sought verbal and email feedback about how students were using the Map
within their studies. The data were subjected to thematic analysis.

The study also engages in process evaluation by providing information that allows other
medical schools or healthcare educational institutions to replicate the study, particularly in
terms of how to gain access to the Map of Medicine and how to embed it and promote it in
the curriculum.

3.3 Results

3.3.1 Survey of UK Medical Schools

The survey found that only one of the 23 medical schools that responded to the
questionnaire actively used the Map of Medicine in their undergraduate curriculum. At that
school, the resource was introduced to their third year students during an introductory
course on information skills. Two medical schools indicated they were thinking of
incorporating it in the future. One of the medical schools was prompted to look at the
resource by our survey and reported it to be a potentially useful resource. One medical
school had been approached by their Strategic Health Authority about using the resource.

3.3.2 Evaluating the Impact at Peninsula Medical School

Participation - Student and staff usage

Student use of the Map of Medicine increased from nobody using the resource in November
2009 to 557 sessions in May 2010, Fig 4. However usage did decline to 190 and 105
sessions in April and June respectively which most likely relates to the Easter Holidays, 29th
of March to the 12th of April, and summer holidays, which started between the 12th and 29th of
June depending on the year of the programme students were in. Staff usage remained low
throughout the time period.

If we assume that each student session in February 2010, when usage levels were highest,
was by a different student, then 61% of the students in all 5 years of the undergraduate
medical programme used the Map in February 2010. Alternatively we could assume that the
usage is mainly by years 1 and 2 students given the linkage with the problem-based learning
case units. If the sessions were only being used by years 1 and 2 students, this means that
on average each student used the Map 1.5 times in February. Realistically there will be
some students that did not use the Map at all and some who would have used it more than
1.5 times in the month of February.

The most viewed pathways on the Map of Medicine between January and March 2010, Fig 5,
show a strong correlation with the problem-based learning cases studied in the same time
period, Table 2.

Peninsula Cancer Network, South Western Ambulance Service, Peninsula Cardiac Network and
Devon Partnership Trust
There were peaks and troughs in the level of usage of the Map of Medicine during actual months, Fig 6 a, b & c, and these seemed to coincide with curricular activities in problem-based learning sessions and assessment. This suggests that the Map of Medicine was used partly in preparation for the progress tests which were held on the 14th of January 2010 and the 18th of March 2010. However it is important to note that the peak of activity does not coincide with the assessment but with a point 2 or 3 days prior to the progress test.

**Reaction - Student and staff perceptions and feedback**

Students’ reactions were largely positive to the resource, while feedback from staff was mixed. The thematic analysis identified 4 main themes, highlights of which are presented in Table 3. The most dominant theme was “accessing reliable information”. Students and staff found the resource useful for accessing reliable evidence-based information. Another important theme identified was “pathway format/ease of use”. Staff and students liked the pathway format and the fact that the resource was easy to use.

### 3.4 Discussion

The usage figures combined with the qualitative feedback indicate that there is appetite for the Map of Medicine amongst medical students. Students commented on its navigability and help in accessing reliable information quickly. Furthermore, the fact that students were still using the resource 5 months after hearing about it and were repeatedly visiting the resource provides an active endorsement of the resource.

There is evidence that the pathways that were viewed by students in the study period were directly linked to events in the undergraduate curriculum. There was a strong correlation in terms of what was being covered in the different case units in problem-based learning in years 1 and 2. Similarly, there appeared to be higher usage of the Map of Medicine just before an assessment of applied medical knowledge. Other studies have reported similar findings. (47, 48)

While some staff perceived it as beneficial, particularly for students’ self-directed learning, others were not so keen. There were questions as to how this resource was different from the numerous other resources available, for example, Clinical Knowledge Summaries (also available on NHS Athens). There was also an initial fear amongst problem-based learning tutors that it may negate the problem-based learning process with first year students. An important part of the problem-based learning process is students learning how to find different sources of information and critically appraising the information they find. Tutors felt that if students were introduced to the Map of Medicine which has reliable information that is already critically appraised and graded, that students would not look for further information and would just regurgitate what the Map of Medicine says on a particular topic. However other tutors thought the Map of Medicine motivated learning through its authenticity to clinical practice, was a good starting point for a student’s research, and enabled them to spend more time on the most important information.

The current study used the NHS licensed version of the resource, access to which was provided by Map of Medicine on a one-off basis. Other medical schools wanting to embed the resource in their undergraduate curriculum could seek access in a similar way, although we should caution that this was time consuming. An alternative would be to rely on the freely available Healthguides through NHS Choices for their pre-clinical students and the full version of Map of Medicine accessed through an NHS Athens password for their clinical students. Although we felt the Healthguides might be a poorer experience for the pre-clinical
students and be less authentic to clinical practice, in fact we found no evidence that students were using the localised pathways.

Rowley\(^{(49)}\) reports that in terms of students’ use of electronic resources there is little evidence on the effectiveness of promotional strategies. The current study provides evidence that an active period of resource promotion can lead to a new resource being successfully adopted in routine learning practice. Furthermore the process evaluation approach\(^{(46)}\) adopted in the current study detailing how access to the resource was gained, how it was embedded in the curriculum and actively promoted provides a model that other medical schools or indeed other healthcare educational institutions could replicate.

The strengths of the study are in introducing an intervention that may stimulate and support student learning, particularly within integrated curricula. The intervention’s authenticity to clinical practice is an important feature. The strength of the evaluation strategy was in its combination of quantitative and qualitative data, with the quantitative usage data taking a ‘before and after’ design in the sense that students did not have access to the resource through HE Athens prior to this work. A limitation of the study is that we cannot make links between intended behaviour change in individual learners to actual behaviour change and on to changes in learning, as do other similar studies which evaluated knowledge gains after the introduction of an intervention mainly using multiple choice written tests.\(^{(50)}\) It will be interesting to see if use of the Map of Medicine becomes embedded within the Peninsula programme and whether this will have any implications for our graduates in practice. A second limitation is that this study took place on a single site. It would be interesting to know if medical students elsewhere find it a useful resource too.

To conclude, there is clearly potential for the Map of Medicine in undergraduate medical education. An important question and a potential avenue of research is whether use of this kind of resource at undergraduate level leads to use within clinical practice as a qualified doctor.
Objective three:

EXPLORING CLINICIANS’ DECISIONS TO ACCESS MEDICAL INFORMATION RESOURCES
4.1 Introduction

An understanding of evidence-based medicine and how to implement it into practice has become an essential requirement for all professionals involved in the delivery of healthcare. However keeping current with the growing body of new evidence is an increasing challenge for clinicians. There are over 20 million medical articles available today with thousands of medical journals being published worldwide every month. Clinicians are estimated to need to read 17 articles per day, every day of the year in order to stay abreast of relevant developments and inform their practice with current research evidence, an impossible task for even the most dedicated and tireless clinician. Alongside the primary information sources in journals, there are also a vast range of secondary resources that can be utilised such as systematic reviews and knowledge and information resources. As clinical practice becomes busier, and time for reading and reflection becomes even more precious how do clinicians decide which information resources to use in their evidence-based clinical practice?

In recent years, there has been a plethora of research on the information seeking behaviour of doctors using a variety of methodologies from observation to interviews and self reports. These studies have focused on the types of clinical information sought by doctors, the frequency of information need, the differences according to type of healthcare setting and the patterns of information resource used and the time spent searching. There has also been research around the information sources utilised by doctors including the number of sources utilised and a comparison of information sources utilised. However to the best of our knowledge there has been no research to date exploring the factors underpinning their information source decisions.

The aim of this study is therefore to explore clinicians’ decisions to access medical information resources.

4.2 Methods

Participants

Twenty-two clinicians were recruited to the study. In order to recruit an appropriate cross section of clinicians, we decided to use a pathway of care to structure our strategy. We chose ‘Falls in the Elderly’ since this is a high priority area for the South West region. The sample was stratified further by the type of clinician and level of qualification working in this pathway covering both Primary Care e.g. general practitioners (GPs) and GP registrars, and Secondary Care including specialist registrars and consultants working in the relevant specialities, Emergency Medicine, Acute Medicine, Surgery and Elderly Care. In order to provide breadth in the sample, participants were recruited from three different Primary Care Trusts and 3 different Secondary Care Trusts in Devon. GPs were recruited from Torbay Care Trust, NHS Devon and NHS Plymouth. Secondary Care clinicians were recruited from South Devon Healthcare NHS Foundation Trust, Royal Devon and Exeter Healthcare NHS Foundation Trust and Plymouth Hospitals NHS Trust.
Recruitment

Each of the clinicians was contacted by e-mail with a study information sheet and consent form. The information sheet outlined the aim of the study, what participation would involve and guarantees of anonymity. A follow up phone call by one of the researchers then followed, to answer any questions the potential participants may have and discuss the project further. If they wanted to participate in the study, it was necessary to complete the consent form.

The strategy was to recruit 5 GPs from each of the Primary Care Trusts and 5 clinicians from each of the Secondary Care Trusts (2 in Elderly Care, 1 in Emergency Medicine, 1 in Acute Medicine and 1 in Surgery). A list of all of the GPs and relevant Secondary Care clinicians at each site was compiled (6 lists in total) through publically-available information or via the Trusts. Each list was randomised and participants were contacted in groups of 3-5 at a time until sufficient numbers were reached.

Ethics Approval

An enquiry was made to the NHS Research Ethics Service by the primary researcher to check whether ethical approval was needed for the study. The NHS Research Ethics Service classified this type of study as a service evaluation which does not require review. A courtesy e-mail with some basic information on the study was sent to the local Research and Development offices at each of the chosen Trusts.

Stimulated recall interviews

In order to explore clinicians' decisions to access medical information resources, a stimulated recall technique was utilised. Stimulated recall is an introspection procedure in which (usually videotaped) passages of behaviour of individuals are used to stimulate recall of their decision making. Due to the busy nature of clinical work and the fact that clinicians may look at information resources at different times in different places, it was not possible to videotape their use of information resources. Instead participants were asked to keep a self-report diary of the resources they used over the period of a week which would be used as a stimulus in the interview. Participants were given a structured diary template which could be completed electronically or printed out and completed by hand, Table 4.

Once the diary was completed, a stimulated recall interview was held with the participant. The interview was conducted as soon as was possible after the observation week in order to promote participant recall rather than reflection on the observation period. In the interview, the interviewer asked the participant to choose key decision-making events from the diary and discuss how they came to make these decisions. Wherever possible the participant was allowed to talk freely about the decision-making process, with questions from the interviewer to promote recall, rather than reflection, to gain deeper understanding of an issue, or to steer them back to the original question. The main prompts used were:

- Can you remember what you were thinking?
- Can you tell me a bit about this decision and how you came to make it at the time?
- Can you remember what was going through your mind at the time?

The second half of the interview asked more generic reflective questions building on the stimulated recall and probing further. For example:

- How often do you access resources for your medical work?
- When do you access resources for your medical work?
- Which ones do you use most regularly?
The diary template was piloted by a member of the research team who is a specialty registrar in Acute Medicine. Alice Miller kept a diary of her use of information resources in clinical practice for the period of a week. The research team then met up and practised interviewing each other using the interview schedule and the diary entries. This process resulted in two changes being made to the diary template. The number of possible entries was reduced and the topic box was made bigger.

Intervews were carried out between April 2010 and July 2010 by the three researchers (Nicola Brennan, Karen Mattick and Alice Miller and AM).

Data Analysis

Following data collection, the interviews were transcribed verbatim by a professional transcriber. Initial thematic analysis of the interview data was performed by Nicola Brennan and themes were verified by Karen Mattick and Alice Miller. A thematic index was then developed by the research team to which the entire dataset could be coded. Data were then coded by Nicola Brennan to the individual categories in the thematic framework using NVivo, a computerised indexing system for qualitative data. An overview of the thematic framework and the results are presented in Fig 7.

4.3 Results

Participants

Of the twenty-two clinicians recruited to the study 16 were male and 6 were female, Table 5. Ten were GPs, 8 were consultants and four were specialist registrars. Thirteen were based in Primary Care, 3 in Acute Medicine, 3 in Surgery, 2 in Elderly Care and 1 in Emergency Medicine. The majority of participants were based in the general area of location 1.

Diaries

A diary was used to stimulate recall in 19 of the 22 interviews. Two participants forgot to complete the diary and one forgot to bring the diary along to the interview. In these three interviews, the interviewer asked the participant to recall recent, specific events where they sought information in their clinical practice and to try and recall their decision-making around the information resources they accessed.

Of the 19 people who kept diaries, 17 used the diary template provided. Two participants used their own template. One recorded the topic looked up, the resource used and the date. The other diary summarised the resources they used in the period of observation and how many times they used them but it did not record when they looked up the resources.

The number of diary entries recorded per participant varied greatly from two to 32 per week, with an average of 10.9 and a standard deviation of 8.5. The average number of entries was a lot higher for registrars, including GP registrars, 19, n=5, than for GPs, 5, n=8 or consultants, 5, n=5. Clinicians in Primary Care recorded an average of 13 diary entries.
compared with 8 for Secondary Care, although excluding the registrars from each groups brought the averages to 10 and 9 respectively.

The most common resources entered in the diaries were Google, GP Notebook, British National Formulary, Joint Formulary, NICE guidelines, local departmental guidelines, Oxford Handbook of Clinical Medicine and Patient.co.uk, Table 6.

The average number of minutes spent searching for information ranged from 1 minute to two hours with a mean of 10.8 minutes, a standard deviation of 14.4 minutes a median of 12.6 and a mode of 12.5.

Why do clinicians access information resources in their clinical practice?

There were seven main reasons that clinicians accessed information:

a) Prescribing

One of the main reasons participants accessed information resources was for prescribing queries, Fig 7, particularly checking correct dosages, first and second line treatments, and contraindications. These prescribing queries were normally answered very quickly and easily there and then, by looking at the British National Formulary or local Joint Formularies, mainly text versions.

“a lot of what I look up is just to clarify what I think I’m going to use, so checking a drug dose or checking the first line or second line drug if somebody’s allergic” Female, GP Registrar #2, Location 1.

“A patient asked me is it safe to use Clotrimazole in pregnancy, and I just double-checked. I try not to remember interactions … drugs that are safe in pregnancy, drugs that are safe in breast-feeding and so on, because I don’t trust my memory that well. There are certain drugs I remember might have interactions and there are certain situations that I always look up. So I mean I was 99% sure it was safe, but I’d always do that just as a matter of fear” Male, GP #2, Location 2.

b) Rare clinical case

Participants accessed information resources in order to find out information about a rare clinical case or a patient type they were not familiar with.

“Okay, so the first time I kind of engaged with looking something up was a patient presented with an unusual case of vertigo, something I’d never really encountered before, very brief episodes of vertigo, which prompted me to go on the web” Male, GP #7, Location 1.

“If I’m in the outpatient clinic and somebody comes in who’s got a diagnosis of some rare syndrome that I’ve forgotten all about because it’s not where my work usually goes, I will look that up just to make sure that there aren’t any associations with that clinical syndrome that I might have missed” Female, Consultant #6, Location 2.

c) Show information/evidence to a patient

Participants accessed information resources to provide information or evidence for a patient within the consultation or to print out a patient information sheet for the patient to take away with them. Sometimes the act of talking a patient through some information concealed a clinician’s need to double check something or update their clinical knowledge.
“And, again, that’s to demonstrate things to patients… if you think it’s a particular diagnosis and you can bring it up to the patient and say I think it’s this, it’s obviously rashes, it’s … you know, and show them and say this is why I think it’s this, because it’s got these features” Male, GP Registrar #2, Location 1.

“And I mean as a general thing I find it’s quite useful, because what you can do is you go into that, ‘I’m going to give you a patient information leaflet, I’ll just check the information is appropriate,’ because what you’re doing actually is a memory check yourself” Male, GP #2, Location 2.

d) Clinical updating
In order to update their clinical knowledge participants accessed information resources:

“it was just half an hour between cases/20 minutes, just reading a copy of the major orthopaedic journal, JBJS – which I carry in my bag and just leaf through it when I’ve got 20 minutes to spare, just to keep me … supposedly keeping knowledge up-to-date and so on” Male, Consultant #8, Location 2.

“And that was a patient with a community-acquired pneumonia and they were penicillin allergic. So, again, it was just checking out what the latest guidance was, because it seems to change reasonably frequently” Male, Registrar #4, Location 3.

e) Refresh memory
Participants also accessed information resources to refresh their memory around a particular topic or remind themselves how to do a particular procedure:

“Basically I’d had a patient that morning who had gout and was asking me all sorts of questions about what they should and shouldn’t eat. So, yeah, basically it was me just trying to remind myself about what foods and stuff they should and shouldn’t eat and the best treatments for gout” Male, GP #8, Location 1.

“And it’s a good resource when you want to refresh yourself on the range of options that might cause symptoms and also very specific information about individual topics as well” Male, Consultant #1, Location 1.

f) Double-check
Participants also accessed information resources in order to confirm what they were thinking or check something they are unsure about. There was strong overlap between this theme and prescribing as a lot of the time they were double-checking prescribing issues.

“so that, again, tends to be information for myself, so after the patient’s left, checking that the symptoms were what I thought they were, there wasn’t anything else I might be missing, just a brief check really and that’s that” Female, Registrar #3, Location 1.

“but I’m just double-checking the name or I’m just double-checking like if they said, well, I’m going to prescribe (), I think what do the PCT want us to do first line?” Female, Registrar #2, Location 1.

g) Trainee doctors
Participants tended to access resources in order to show trainee doctors something or to show them how to find information on a particular topic.
“I think, and the trainee wasn’t aware of the use of nasal sprays and how you should use them. There’s a really good diagram in the Joint Formulary about using nasal sprays in an upside down position, so I got that out to show them and the patient the picture – which I quite often use” Male, GP #7, Location 1.

“it will be after having looked at an x-ray we will on the same PC look up some extra bit of information. And I usually will be doing it with a junior doctor at the time, because they won’t be able to give me the answer I need and if I can’t give them the answer I need I’d much rather they will see me gaining security, plus” Male, Consultant #2, Location 1.

When do clinicians access information resources to support their clinical practice?

There were three main times where clinicians accessed information resources:

a) During a consultation with patients
The majority of participants accessed information resources during a consultation with patients.

“And so I showed her what I was thinking and backed that up with GPnotebook, but then also gave her an information sheet from patient.co.uk” Male, GP Registrar #1, Location 1.

“I try and get stuff done as quickly as I can when the patient’s here, when it’s hot. If I try and save it for later on, then the chances are (laughs) I’ll forget what it is I wanted to do, or not necessarily do it in the way that I wanted to do it at the time. So I try and do it there and then” Male, GP #3, Location 1.

However there were a few participants that preferred not to access resources in front of patients as they felt it was showing uncertainty or lack of knowledge.

“I did do that with her. […] that’s probably one of the only things I would, I suppose, very openly do with a patient would be a rashes book […]I very occasionally do a straightforward Google search with a patient, but it would tend to be if they come with a drug in a foreign name and they say I had this drug prescribed in the country I’ve been in, and I’d say it’s not a drug we know, let’s do a Google search and we’ll find how we prescribe it. So I guess that’s information that’s … you’d understand if your doctor wouldn’t know it. Let’s see, in front of the patient would I do any other things? Err … I can’t think of an example, but there must be a couple of things that I might do in front of the patient, but I personally try not to” Female, GP #9, Location 1.

“I don’t like putting things into Google with patients being present […] it doesn’t look good. […] The bit I don’t like about it is I don’t know what I’m going to get back […] And if I make a decision as to one of them to click on to look at, why did I decide that one and not another one? So it becomes a … there’s the potential for it to look as being indecisive or not knowing what you’re doing really” Male, GP #3, Location 1.

Another participant talks about a shift in patients’ perspectives and expectations on clinicians seeking information during a consultation:

“Yeah. Normally I always do it at the patient consultation. I mean, I suppose something that’s happened over the years of being in practice, the attitude if you ever looked anything up from a patient point of view and your point of view was that you
don’t know it. And I think the perspective is completely different now, the patient’s expectation is that you will look things up or check things and talk through things. And if you share it with them I think that’s fine. And that’s probably something that internet access has done” Male, GP #10, Location 3.

b) Between consultations
Some participants accessed information resources between consultations:

“Barely research really, it was just half an hour between cases/20 minutes, just reading a copy of the major orthopaedic journal, JBJS” Male, Consultant # 8, Location 2.

c) Out of clinical hours
Participants also accessed information resources for their clinical work outside their working hours for example in the evenings or at the weekend:

“Almost invariably in the evenings. The days are filled with meetings and clinical work, so it’s almost invariably in the evenings” Male, Consultant #3, Location 1.

Factors influencing a clinician’s decision to access information resources
There were five main factors influencing the choice of information resource used:

a) Speed and ease
The main factors influencing participant’s decision to access information resource was speed and ease. They tended to opt for resources that were quick and easy to access, and easy to use.

“[...] I quite like, because it’s easy to follow with the eye where you’re going and end up with the information you’re looking for quite quickly” Female, GP Registrar #3, Location 1.

“like that is because I can look at it and in 5 minutes I’ve got the information I need, so you’ve got nice, easy flow charts to go through and I know that I’m not going to run behind my next consultation just because I’ve spent a couple of minutes looking at that” Male, GP #8, Location 1.

b) Password
Another important factor was passwords. Having to put in a username and password to access a resource acted as a major barrier. Participants reported not being able to remember passwords because they have so many different passwords for different things. They also reported having written them down but could not remember where they had put them. They also had issues with logging-in to resources.

“Part of the reason why I don’t use it now is my brain’s full of passwords and I can’t … (laughs) it’s a poor excuse, I know it is, but these things I don’t need to use passwords for […] And I have enough difficulty trying to remember my number to get money out of the hole in the wall, let alone trying to … And then you end up writing them down, which is the one thing you shouldn’t do, or you make it something that’s the same as something else, which is something you shouldn’t do. So I actually find passwords a barrier to using things. They’re meant to be there as a security, you think, but not actually a barrier, because my whole life is governed by passwords” Male GP #3, Location 1.
“Because I can never find my password and I can never remember what it is and it just completely puts me off accessing it basically. Maybe that’s lazy, but actually I don’t need that information enough to make the effort” Female, GP Registrar #3, Location 1.

“And the trouble with Athens is it’s another password. I have got to the point now where I’m sick of it and starting to write them down, and I’m going to end up with all my passwords on the wall, because it is stupid. And it may be protecting a few people, but it stands in my way. And the other day I put the wrong password in 3 times, couldn’t get into the letters part of our programme. It was after 6, so the 2 people who know how to change the password had left. It wasn’t, but it was potentially dangerous, I could have been dealing with a patient and not known, all because of the password. You’ve got me going now. (laughter) That stops me on Athens – Athens makes life difficult for us” Male GP #2, Location 2.

c) Evidence
Participants were also concerned with the evidence base of the resources they accessed.

“Because that’s the one we feel has got the greatest, meaningful evidence to back it up in terms of current knowledge” Female, GP #4, Location 3.

“The one thing I haven’t mentioned is GPnotebook, which I do use sometimes. But I had recently a thing from EMIS about their information sources not necessarily being as robust or quality marked as they could be, and my understanding is GPnotebook is part of EMIS. So I’ve become a little bit … I’m perhaps falsely wary of it” Male, GP #3, Location 1.

d) Diagrams/pictures
Another important factor was whether the resources had diagrams or pictures. Many of the participants liked to show pictures to patients or to be able to compare patient’s conditions with pictures.

“Probably Patient UK again – because I would have wanted to show the picture to the patient” Female, GP Registrar #2, Location 1.

“And actually that one on vaginal prolapse, because you get used to what’s in the patient leaflets and what’s useful, and there’s lots of pictures, so it’s quite nice to be able to say, a bit like a mere model, say well this is this and this is that and this is what’s happening to you, and pictorial kind of stuff I find quite useful when explaining stuff to patients” Female, GP #3, Location 1.

e) Trust or Reliability
Participants tended to use resources that they trusted or found reliable.

“It’s a … NICE is a trusted national peer reviewed … well respected … yeah, website. Again, I don’t find it very user–friendly, but it’s authoritative and I feel I trust it” Male, GP Registrar #1, Location 1.

“I guess reliability, because you know that the information you’re getting is the national sort of standard, as it were, so if you follow that then you’re very … or you should be very safe” Male, Registrar #4, Location 3.
4.4 Discussion

This study explored clinicians’ decisions to access medical information resources. The findings will help healthcare organisations that procure medical information resources, particularly NHS organisations, the NHS Strategic Health Authority and GP practices, to decide on the types of information resources they should be procuring for clinicians and how the resources should be made available.

The most important finding of the study is that the main factor influencing the information resources clinicians access is speed and ease. Due to very busy schedules, short consultation times and limited time between consultations, clinicians want to be able to access resources that are quick and easy to access, and easy to use. Other studies have reported similar findings\(^{(51, 53, 63)}\). The fact that clinicians only have time to complete ‘quick and dirty’ searches because of time constraints is worrying\(^{(53)}\) and may pose a barrier to optimal evidence-based practice.

Another major finding of the study was the reluctance of participants to access password-protected information resources. When time is scarce, having to remember or find a password and then go through the logging-in process took extra time that they did not have. Furthermore as the information was available elsewhere and was quicker and easier to access, the participants tended to favour these resources instead. A study of internet information-seeking behaviour also found that clinicians value unlimited access to resources\(^{(63)}\). These findings have implications for password-protected resources, for example, the NHS procured CORE CONTENT COLLECTION. A lot of money has been invested in procuring these resources and making them available for NHS staff. However the current study shows that these resources are being underutilised.

While the majority of participants tended to access information during a consultation with a patient, there were a couple of participants that did not like to do this, because they felt it demonstrated uncertainty or lack of knowledge on their behalf. One of the participants talked about the changing expectations of patients and how nowadays patients expect the doctor to access information resources during a consultation. A review of the literature on information seeking behaviour of doctors found that there is a gap in the literature examining when clinicians access information resources. However a study of clinicians’ use of information tools from the patients perspective found that patients reported having greater confidence in the care and advice caregivers offer when they use information tools\(^{(64)}\), although some suggested diminished confidence in care and a more impersonal environment resulting specifically from the use of the computer in the office.

The results of the current study support other studies conducted in the area. The finding that clinicians tend to access information resources to satisfy prescribing queries were similar to those of Wilson et al\(^{(65)}\) who found that printed drug resources were used several times a week or daily by 61% of respondents. Our study found that participants spent on average 10.8 minutes looking for information. Other studies have reported slightly longer times of 14.4 minutes\(^{(66)}\) and 15 minutes\(^{(67)}\) however when considering resources used at the point of care, in which the majority of cases were in the current study, the medical search time was lower at between 5 and 10 minutes.\(^{(68)}\) Excluding data for two participants that mainly looked up information for research purposes in the current study lowered the average time spent by participants even further to 6.4 minutes which is more inline with the previous figures.

The finding that registrars made a higher number of entries in their diaries than GPs or consultants relates to their level of knowledge and the fact that they are still learning and need to look things up. We would expect that this need would reduce as they get more
experienced. However a study by Bergus & Emerson\textsuperscript{(69)} found that family residents do not ask better-formulated clinical questions as they advance in their training.

The types of information resources accessed varied amongst clinicians from people to text to internet resources to own resources. Generally they preferred resources that they found quick and easy to access. For some this was their own books, while for others it was internet resources. Davies found that doctors mainly used text sources followed by humans followed by electronic resources.\textsuperscript{(53)} It was not possible to accurately count the types of resources in this study due to its qualitative nature; however, based on the information resource diaries completed, the most popular choice was internet resources, followed by textbooks. However some of the participants failed to record the BNF or people as information resources in their diary thus some of these categories may have been under represented.

In terms of the Map of Medicine, this study shows that the Map is still not embedded widely within clinical practice in the South West, with only one of the 22 clinicians interviewed having used it in the preceding week.

It is important to consider both the strengths and limitations of our study. The topic is important and the study is timely, given the financial climate in which decisions are having to be made and the fact that the NHS are currently going through a process of repurchasing information resources for NHS Evidence.\textsuperscript{(70)}

Using the participant’s diary in the interview to stimulate recall of specific instances where clinicians accessed information resources during their clinical practice strengthens the reliability of the findings. A normal retrospective interview may have elicited generalisations in participants’ use of information resources. However the diary itself was self-report. Video-passages of behaviour would have been better but were not practical for the study.

The study was conducted by an interdisciplinary research team which brought different but complimentary perspectives to the research enriching the design and methods used.

While 22 participants is an adequate number of participants for qualitative research and it was evident from the data analysis that data saturation was reached, we would like to have interviewed at least eight more participants but could not due to time constraints.

To conclude, our study has shown that while evidence was an important factor when deciding which information resources to use it was not as important as speed and ease. If clinicians only have a small amount of time to access information it is vital that authoritative evidence-based resources that can be quickly and easily accessed are available to them.
OVERALL CONCLUSIONS & RECOMMENDATIONS
5. CONCLUSIONS OF THE WHOLE STUDY

Drawing together the findings of the work addressing the three objectives, we can draw the following conclusions:

- Further research with study designs that can generate high quality evidence for the impact of Map of Medicine on clinical practice are needed in order to support policy and resourcing decisions.

- There is clear potential for the Map of Medicine in undergraduate medical education and an active period of resource promotion led to its embedding within routine learning practice.

- While evidence is an important factor when influencing clinicians’ decisions to access information resources, it was not as important as speed and ease. If clinicians only have a small amount of time to access information, it is vital that authoritative evidence-based resources that can be quickly and easily accessed are available to them.

6. RECOMMENDATIONS

The recommendations of the study are:

1. That clinical and academic communities work together to design evaluations of the impact of Map of Medicine on clinical practice.
2. That the Map of Medicine Ltd work towards providing medical schools with full access to the NHS-licensed version of the Map of Medicine resource.
3. That medical schools who wish to embed the Map of Medicine in their undergraduate curricula learn from our experiences described within this report.
4. That further research explores whether Map of Medicine use by medical students and postgraduate medical trainees leads to better assessment outcomes.
5. That the NHS provides clinicians with resources that are evidence-based but quick and easy to access, and where passwords do not present a significant barrier to access.
7. REFERENCES


[40] Reed DA, Cook DA, Beckman TJ, Levine RB, Kern DE, Wright SM. Association Between Funding and Quality of Published Medical Education Research. JAMA. 2007;298:1002-1009.


[70] NICE. Clinical hub centre tenders OJEU notice. 2010.
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<td>Implementing and evaluating impact of Map of Medicine within the PMD undergraduate curriculum</td>
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<td>2</td>
<td>Exploring how Map of Medicine is incorporated within clinician decision making</td>
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<td>3</td>
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<td>4</td>
<td>Scoping study – Map of Medicine links to workforce</td>
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<td>Exemplar localization model(s)</td>
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<td>Working with one clinical network to track decision making, e.g. in the provision of a clinical pathway compared to individual clinical research of literature</td>
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<td>8</td>
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Table 2: Topics covered in Problem Based Learning case units for year 1 and 2 medical students at the Peninsula Medical School - January to March 2010

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<tbody>
<tr>
<td><strong>Year 1</strong></td>
<td>Depression</td>
<td>Asthma</td>
<td>Colorectal Cancer</td>
</tr>
<tr>
<td></td>
<td>Alcohol abuse</td>
<td>Respiratory Disease</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Breast lump</td>
<td>Smoking</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Blood</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pressure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Palpations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hypertension</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Colorectal Cancer</td>
<td></td>
</tr>
<tr>
<td><strong>Year 2</strong></td>
<td>Obesity</td>
<td>Heart Failure</td>
<td>Non-Hodgkin’s Lymphoma</td>
</tr>
<tr>
<td></td>
<td>Dysphoria/Depression</td>
<td>Coronary Disease</td>
<td>End of Life Care</td>
</tr>
<tr>
<td></td>
<td>Low Back pain</td>
<td>Cervical Cancer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Atherogenesis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ischaemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ostheoarthritis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pulmonary Embolism</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DVT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emerging Themes</td>
<td>Students</td>
<td>Staff</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>1. Accessing reliable information</td>
<td>“I love it, so easy to access valuable information like national guidelines” (Third year medical student)</td>
<td>“Gives a good starting point” (Lecturer in Evidence Based Practice)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Good that the evidence is reviewed” (Year 1 SSU Medical Student)</td>
<td>“First port of call” (Year 1 &amp; 2 PBL Tutor)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Very useful resource. Provides weight behind evidence” (Year 1 &amp; Year 2 PBL Tutor)</td>
<td>“it has reliable sources instead of trawling through lots of useless stuff” (Year 1 PBL Tutor)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“it has reliable sources instead of trawling through lots of useless stuff” (Year 1 PBL Tutor)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Pathway format / ease of use</td>
<td>“Easy lay-out” (Year 1 SSU1 Medical Student)</td>
<td>“Useful resource intuitive map layout” (Clinical Skills Tutor)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Helped organise my thoughts and made me think of the bigger picture” (Year 1 PBL Medical Student)</td>
<td>“Excellent for conceptualising what students need to know” (Lecturer in Evidence Based Practice)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Understandable” (Year 1 SSU1 Medical Student)</td>
<td>“Useful resource intuitive map layout” (Clinical Skills Tutor)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“An invaluable resource I hope to incorporate into my studies”</td>
<td>“Helpful to students. As a map is easily orientated and can find your way round easier. You can go to papers from it” (Clinical Education Researcher)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Good for disease framework” (Year 1 SSU1 Medical Student)</td>
<td>“Hard to lift out required information and hard to print” (Clinical Lecturer)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Gave me an understanding of the process of treating a patient” (Year 1 PBL Medical Student)</td>
<td>“Not much in terms of pathways in undergraduate curriculum so grateful to have anything to do with NHS” (Year 1 PBL Tutor)</td>
<td></td>
</tr>
<tr>
<td>3. Uniqueness</td>
<td>“So many other resources out there. What’s so different about this one?” (Medial Humanities Lecturer)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Why ‘Map of Medicine’? Lots of other resources” (Year 5 Tutor)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Access</td>
<td>“If it’s more than 3 clicks away I am not going there” (Clinical lecturer)</td>
<td>“Why do we have to log on – I can never remember my password” (GP)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 4: Information Resource Diary Template

**Participant:** Dr Nicola Purchase  
**Week of observation:** 10th-16th May

**Instructions:** Please complete an entry for each information resource you use on a particular day. Entry #1 is completed as an example.

<table>
<thead>
<tr>
<th>Entry #</th>
<th>Topic</th>
<th>Resource used</th>
<th>Time used</th>
<th>How long used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Example</td>
<td>Falls</td>
<td>9.15</td>
<td>2 mins</td>
</tr>
<tr>
<td>#2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monday 10th May</th>
<th>Tuesday 11th May</th>
<th>Wednesday 12th May</th>
<th>Thursday 13th May</th>
<th>Friday 14th May</th>
<th>Saturday 15th May</th>
<th>Sunday 16th May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry #1</td>
<td>Example</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topic</td>
<td>Falls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resource used</td>
<td>GP Notebook</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time used</td>
<td>9.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How long used</td>
<td>2 mins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5: Characteristics of Participants

<table>
<thead>
<tr>
<th>Participant no.</th>
<th>Gender</th>
<th>Clinical Role</th>
<th>Speciality</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Female</td>
<td>GP</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>GP</td>
<td>Primary Care</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>GP</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Male</td>
<td>GP</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>GP</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Male</td>
<td>GP</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Male</td>
<td>GP</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Male</td>
<td>GP</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Female</td>
<td>GP</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Male</td>
<td>GP</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Male</td>
<td>GP Registrar</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Female</td>
<td>GP Registrar</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Female</td>
<td>GP Registrar</td>
<td>Primary Care</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Male</td>
<td>Specialist Registrar</td>
<td>Emergency Medicine</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>Male</td>
<td>Consultant</td>
<td>Acute Medicine</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Male</td>
<td>Consultant</td>
<td>Acute Medicine</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>Male</td>
<td>Consultant</td>
<td>Elderly Care</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>Male</td>
<td>Consultant</td>
<td>Elderly Care</td>
<td>3</td>
</tr>
<tr>
<td>19</td>
<td>Female</td>
<td>Specialist registrar</td>
<td>Emergency Medicine</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>Female</td>
<td>Consultant</td>
<td>Surgery</td>
<td>2</td>
</tr>
<tr>
<td>21</td>
<td>Male</td>
<td>Consultant</td>
<td>Surgery</td>
<td>2</td>
</tr>
<tr>
<td>22</td>
<td>Male</td>
<td>Consultant</td>
<td>Surgery</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16 Male</td>
<td>6 Female</td>
<td>5 registrars 10 GPs 7 consultants</td>
<td>13 Primary Care 2 Acute medicine 3 Surgery 2 Elderly Care 2 Emergency Medicine</td>
</tr>
</tbody>
</table>
Table 6: The most frequently cited information resources recorded in the diary templates by participants

<table>
<thead>
<tr>
<th>Information Resource</th>
<th>No. of participants that recorded resource in diary at least once</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google</td>
<td>10</td>
</tr>
<tr>
<td>British National Formulary</td>
<td>9</td>
</tr>
<tr>
<td>GP Notebook</td>
<td>7</td>
</tr>
<tr>
<td>Joint Formulary</td>
<td>7</td>
</tr>
<tr>
<td>National Institute of Healthcare and Clinical Excellence</td>
<td>5</td>
</tr>
<tr>
<td>Local departmental guidelines</td>
<td>3</td>
</tr>
<tr>
<td>Oxford Handbook of Clinical Medicine</td>
<td>3</td>
</tr>
<tr>
<td>Patient.co.uk</td>
<td>3</td>
</tr>
</tbody>
</table>
Fig 1: Map of Medicine – Acute Asthma
Fig 2: Literature Identified

133

- Duplicate (16)

117

- Irrelevant (16)

101

- Short mention only (66)

35

- Useful but did not present empirical data (24)

11
Fig 3: Adapted Kirkpatrick Model (45)

- **Impact**
  - e.g. What impact has the intervention had on the delivery of healthcare.

- **Performance**
  - e.g. Any changes in the learners' performance or behaviour as a result of the intervention?

- **Learning**
  - e.g. What new knowledge have the students gained?

- **Reaction**
  - e.g. Was it easy or enjoyable to use?

- **Participation**
  - e.g. How many students and staff used the resource?
Fig 4: Number of Map of Medicine Sessions by Peninsula Medical School Staff & Students
Fig 5 Top 10 Pathways at Peninsula Level – Cumulative Usage from January 2010 to March 2010. While these data are for the Peninsula level, Peninsula Medical School staff and students accounted for an average of 96% of usage over this time period.
Fig 6a, b & c Peninsula Level User Activity in January, February and March 2010. While these data are for the Peninsula level, Peninsula Medical School staff and students accounted for an average of 96% of usage over this time period.
**Fig 7: Summary of Coding**

**Tree Nodes**

<table>
<thead>
<tr>
<th>Name</th>
<th>Sources</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Why do clinicians access information resources</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Prescribing</td>
<td>13</td>
<td>53</td>
</tr>
<tr>
<td>Rare clinical case</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Information or evidence for patient</td>
<td>14</td>
<td>46</td>
</tr>
<tr>
<td>Clinical updating</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>Refresh memory</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>Double-checking</td>
<td>12</td>
<td>35</td>
</tr>
<tr>
<td>Trainee doctors</td>
<td>9</td>
<td>26</td>
</tr>
<tr>
<td>Other (less than 3 sources)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. When do clinicians access information resources</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>During a consultation</td>
<td>11</td>
<td>30</td>
</tr>
<tr>
<td>Out of clinical hours (e.g., evening or weekends)</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Between patients</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Staff meeting</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>There and then</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Before a clinic</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3. Factors influencing decision</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Speed</td>
<td>23</td>
<td>53</td>
</tr>
<tr>
<td>Passwords</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>Ease</td>
<td>15</td>
<td>42</td>
</tr>
<tr>
<td>Evidence</td>
<td>13</td>
<td>21</td>
</tr>
<tr>
<td>Trust or reliability</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Pictures or diagrams</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>Age</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Up-to-date</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Authoritative</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Habit</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Access to full journal articles</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Subscription</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Used it before or own experience</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Provenance</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Recommendation</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>It works</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Other (less than 3 sources)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Sources are the number of participants that mentioned this theme

**References are the number of times a theme was mentioned**