The Internet is rapidly expanding as a means of acquiring health information for medical professionals. It is now impossible to identify the total number of websites providing specialist information in trauma and orthopaedic surgery. Webpages may be from a leading expert with excellent documentation and a complete bibliography or merely in the form of encouragement from a friendly online support group. This makes it difficult to determine which information is usable and credible. Strategies for identifying quality academic information for trauma and orthopaedic surgery on the Internet are beginning to evolve. Information overload can be very difficult to cope with and surgeons will need to identify methods to deal with large volumes of material from the Internet. The rate of progress in information technology has been phenomenal and will change the way in which trauma and orthopaedic surgery is practised in the next millennium.

The Cold War was the initial stimulus for the development of the Internet which began in 1969 as an initiative of the United States Defence Department to link four American academic institutions. It was designed to put in place a computer system which was accessible across the USA and could survive a nuclear strike, but it was not until 1985 that the National Science Foundation developed the NSFNET (the Internet). It has now become a household appliance because of advances in personal home computing and is, in essence, a vast network of interlinked computers scattered across the world.

Many see the future as more of the same with faster computers, better cars, more television channels and better shopping, but developments in information technology (IT) will change life beyond current imagination.

Development of Information Technology

The development of modern IT is comparable to the invention of the printing press by Gutenburg, a German greengrocer, in 1457. Electronic mail has begun to replace the fax. The Internet, with its vast network capability, will certainly replace the CD-ROM, as cassette tapes succeeded gramophone records in the 1970s. Last-minute multimedia interactive presentations using computer-generated slides now replace dusty overhead projections and the old fuzzy diazo slides. Electronic stock trading, Internet banking, electronic commerce and electronic publication have already evolved. The next decade will see megashifts in the behaviour of IT as we move into the new millennium.

Usage of the Internet by Doctors

A survey conducted by the National Opinion Poll in August 1998 reported that approximately 15% of general practitioners (GPs) in the UK currently use the Internet, representing 5400 of a total of 36 000. Of the users, 81% said that they had accessed the Internet during the previous four weeks. On average, this represented 12 visits to websites over a four-week period by the GP, each spending almost 30 minutes on their most recently visited website. They sent three e-mails a week to other GPs; 46% used e-mail to obtain diagnostic information and 41% to participate in a discussion group. A medical newsletter was received via the Internet by 23%. A typical GP user (82%) qualified after 1975. The principal reason for use was to obtain up-to-date clinical information, particularly from online medical journals and other information sources such as Medline. Most GPs reported that their greatest difficulty was finding relevant information in a timely and efficient manner. This is not surprising since the number of distinct pages on the worldwide web in March 1998 was thought to total more than 275 million, with an additional 20 million pages being added each month.

Strategies for finding Medical Information on the Internet

Most novices are surprised at how easy it is to use web browsers to find information on the Internet. However,
much of it is irrelevant, inaccurate or misleading. Table I shows the differences between using a general Internet search engine, the tool to find Internet information, such as Altavista and two specialist health sites, Organising Medical Networked Information (OMNI) and Health on the Net (HON) Foundation. The Altavista search engine found 315,783 websites containing the word ‘orthopaedics’, an impossibly large number to assess. OMNI and HON both found a browsable number of sites of peer-reviewed information.

Strategies for Identifying Quality Trauma and Orthopaedic Information on the Internet

Information may be available from a leading expert with excellent documentation and a complete bibliography or in the form of encouragement from a friendly online support group. This makes it difficult for the user to determine its value. There is a wealth of material available but no guarantee of its quality. In trauma and orthopaedic surgery it is now impossible to identify the total number of websites providing specialist information.

The HON Foundation is a non-profit organisation based in Switzerland, which is dedicated to “realising the benefits of the Internet and related technologies in the fields of medicine and health care.” It has developed its own Code of Conduct for medical and health websites which emphasises that medical information “must only be given by medically trained and qualified professionals.” The Internet sites which comply with this Code are granted the right to display the HON logo on their pages. It is a mistake to assume that only those sites which comply with the Code are worth using. Nevertheless, its development has been a very useful contribution to the evaluation of information on the Internet.

The OMNI site describes itself as “United Kingdom’s gateway to high quality biomedical Internet resources”. OMNI has a comprehensive set of quality guidelines. The site details how resources are evaluated for inclusion in its own database. Thus, sites which are listed with OMNI have been positively vetted and a brief review is attached to each weblink. While this approach sounds highly appropriate, there has been no attempt to make a comprehensive collection of all eligible sites. Indeed, the process of review is so time-intensive that the Internet grows faster than OMNI and HON can review sites. If a site is not listed with OMNI it is because it does not meet the quality criteria or because it has not been evaluated? There is no way to tell. Only a combination of comprehensive search and review will be effective in promoting good quality. It is probable that the experience that OMNI has gained will be of much value in eventually solving the problem. Until then, searchers for information on the Internet will be attracted to the most comprehensive collections, not to those providing the most information about quality. In 1998 the British Orthopaedic Association website fulfilled the HON Code of Conduct and at the same time was evaluated by OMNI as a high-quality biomedical resource. Specific collections of orthopaedic internet information have developed. The Orthopaedic Web Links (OWL) has now over 3000 links and was begun in 1995 by Dr Myles Clough, an orthopaedic surgeon in Kamloops, Canada. In 1998 the first gateway site in trauma and orthopaedic surgery, Orthogate, was formed. This aims to be a one-stop resource to find all quality information on trauma and orthopaedics on the Internet. Orthogate is a conglomeration of the world’s best websites and is edited by a global editorial board of orthopaedic surgeons. In an attempt to find information faster and more easily, specific search engines related to trauma and orthopaedics, such as Orthosearch and Orthotraining, have developed.

It is surprising how few options for regulation have been proposed considering that the quality of information on the medical Internet is such a concern to so many people. The instinct to ‘control’ the Internet and in some way ensure quality by denying access to ‘poor quality’, runs up against the reality that there is no effective way of preventing people from posting whatever they want. Closed webs with limited access to the Internet are perhaps the answer for a limited group of users. The National Health Service in the United Kingdom is developing such a network, the NHSnet. It remains to be seen whether medical information of good quality will be available on the NHSnet or whether the best sites will be hampered by restrictions.

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Table I. Comparison of the Internet webpages found using a general Internet search engine (Altavista) compared with two specialist health gateway sites (HON and OMNI) searching for the words: orthopaedics, trauma, hip replacement and femur fracture. Site searched November 1998.

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Education Funding Councils and the Department of Education for Northern Ireland, fund the running of the Orthopod
lists. A group of Indian orthopaedic surgeons has developed
IndiaOrth, an advanced electronic mailing list based on
Orthopod. In November 1998, the Orthopod lists had
a membership of over 1250 from more than 40 countries and
have increased by ten members per day on average. A
review of Orthopod showed that the list had a respectable
academic content, with an average of 54% of message
threads containing at least one academic reference and with
more than 77% having input from senior orthopaedic staff.
The Orthopod Mailbase academic electronic mailing lists
provide a unique international electronic forum for trauma
and orthopaedic surgeons. One of the greatest benefits of
electronic mailing lists has been to encourage surgeons to
use e-mail effectively.

Strategies for Coping with Information Technology Overload

Trauma and orthopaedic surgeons have only a limited
amount of time to use IT. It is very easy to become
overloaded because of too much information, an inability to
understand or find the appropriate information or difficulty
in validation. When surgeons encounter information over-
load they tend to avoid using a particular resource, use it
badly, waste time or increase their own stress levels. Elec-
tronic mailing lists are particularly liable to create informa-
tion overload since they may either take up time, encounter
irrelevant or ‘spam’ messages, create long download times
due to large image file attachments, be insulting due to
‘flames’, contain frivolous chat or repeat basic questions. E-
mail lists can be improved by users carefully considering
their replies and only sending them after due consideration
of their content and readership. Orthopaedic surgeons who
use mailing lists need to learn how to manage their com-
puter and to use the appropriate software and hardware to
handle messages effectively. Coping with the time it takes
to answer e-mail often involves learning how to ‘let go’. It
may be possible to prioritise and delegate, especially when
the surgeon has a secretary with a reasonable level of
computer literacy. A well-kept electronic address book will
help to locate e-mail addresses. E-mail distribution lists will
save time in sending messages to the same frequently used
group. Careful use of directories to store files on the
computer and the use of a virus protection program will
help to guard against the loss of data.

Future Problems and Developments on the Internet in Trauma and Orthopaedics

Many of the changes which the Internet brings may take a
generation to implement as a new group of IT-enabled
surgeons introduces the new technologies into the work-
place. There is still a scarcity of surgeons with credible IT
skills to support developments. The inauguration of The
Internet Society for Orthopaedic Surgery and Trauma in 1998
will help to develop a worldwide group of surgeons
proficient in IT. The ease of writing and posting material on
the Internet implies that there is unnecessary reduplication
of resources and information. Once a webpage is posted it
becomes a global resource. The fugitive nature of the
Internet means that pages which are here today may not be
around tomorrow. Redundant pages can be minimised by
resources such as helpful gateway sites.

Other forms of public communication such as print and
broadcasting have the same potential to disseminate false or
misleading information as the Internet. The difference,
perhaps, is that the latter has the ability to bring individuals
into direct communication in a way that has not been
possible in the past. If consumers do choose to use the
Internet to find health-related information, it may be best
for them to approach sites which place together background
data in relation to trauma and orthopaedics. It is now
becoming increasingly common to be confronted in out-
patient clinics with reams of information from patients and
even their own Medline searches. Patients can use this
information as the basis for a more informed approach to
the health-care provided for them. As the public becomes
better informed online patient education material may
lengthen the times of consultation, since the role of the
surgeon will change to that of being more of an advocate.

There will be many new developments on the Internet.
The accrediting online Continual Medical Education (CME) material of the Royal Colleges will be available on a
pay-per-view basis. There will be a greater number of
online electronic journals, many of which will be avail-
able with full text online on payment. Some journals have
discovered that it is cheaper to publish on the Internet and
have found, paradoxically, that the circulation of the index
journal in hard-copy has increased. Given recent expecta-
tions about the Internet as a potential source of income for
electronic journal publication, orthopaedic distance learn-
ing material and orthopaedic CME, lengthy legal discus-
sions are likely concerning issues of copyright.

Decision-support systems that are Internet-based and use
artificial-intelligence (AI) algorithms will be introduced.
These will be far more sophisticated than the TraumaAID
system currently using AI to assist in managing gunshot
and penetrating injuries. Web-based simulation, virtual
reality, and surgical planning laboratories will become
available over the Internet. Telemedicine will evolve
through medical informatics to be an everyday phenom-
on. Although computer telematic services will be widely
available it will be the job of the clinician to ensure that
they are clinically useful and cost-effective.

The most pertinent question to ask is “What is the impact
of the Internet on trauma and orthopaedic patient care?” At
present this question remains unanswered. The new mil-

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lennium with its promise of giant advances in IT may give us a better quality of data on trauma and orthopaedics. Surgeons will need to take a greater view of IT which will allow them to provide faster responses and better outcomes for their patients.

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