Mobile Phones in Haematology

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INTRODUCTION

Pathology tests have a relatively small presence in terms of visibility in healthcare but the impact is nonetheless undeniable. It is estimated that 70% of healthcare decisions affecting diagnosis or treatment involve a pathology investigation, often initiated as a test request from a clinician to a laboratory to analyse specimens and await the return of results to form a balanced decision, Carter (2006). The haematology laboratory often located on a hospital site provides an important service to clinical areas in terms of analysing blood samples for disease diagnosis, monitoring and screening. Quantitative and qualitative results are produced from frequently requested tests such as the full blood count (FBC) and blood film morphology. The FBC test provides valuable information on the number and type of white cells, red cells and platelets in a patient. This is of particular importance when diagnosing and monitoring infection, leukaemia and anaemia. The blood film is often requested as a reflex test in response to a FBC report or clinical indication. The blood film report can validate the FBC report with a visual representation of the numerical data and it can also highlight significant abnormalities that could go undetected if the FBC report is considered in isolation such as various types of lymphoma, myelodysplastic syndromes and pathogens (e.g. malaria). Due to the subjective nature of interpreting a blood film it is recommended that its review is performed by an experienced laboratory scientist or a medically trained haematologist or pathologist, Bain (2005). The Royal College of Pathologists draw attention to the relationship between the laboratory and the clinician by emphasising the need for an onsite 24/7 consultant haematologist in hospitals that service acute medicine, surgery, orthopaedic, trauma, obstetrics and paediatrics. The prompt communication of urgent results is of paramount importance for effective healthcare management. In a modern healthcare environment this is facilitated by transmission of results from a laboratory information management system (LIMS) to a hospital information system (HIS) or a remote location e.g. GP surgery. Communicating results via secure electronic networks is the preferred method of delivery, Dacie & Lewis (2012). Prior to this system and still widely in use is the delivery of results as paper reports.

Despite the assurances these pathways provide in the delivery of information, there are situations where verbal communication of results is required to relay urgent information or life threatening results to a clinician. Verbal communication of results is considered a risk management issue due to the possibility of mishearing, misinterpretation or transcription errors, IBMS (2011).

Challenges to the haematology laboratory may present in low income healthcare environments or rural areas where limited resources have an impact on the quality of service, Dacie & Lewis (2012). Tests may be carried out by non-laboratory staff with basic training or the equipment in use may require technical support and finally interpretation of results. A key component of improving the quality of under resourced laboratories is establishing effective connectivity with centres able to provide support in terms of diagnosis and problem solv-

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ing. A 2012 World Bank Report suggests three quarters of the world inhabitants have access to a mobile phone, the developing world has seen a rapid rise in the uptake of mobile phones which appear to have a higher penetration than traditional fixed landlines.

Telehaematology is the transmission of haematological images and data for the purpose of diagnosis or teaching. As mobile phones have progressed beyond the capability of voice transmission to now incorporate cameras, multimedia messaging and email, the possibility to expand its use in haematology has diversified.

The term mobile application (mobile app) has been defined by Rouse & Wigmore (2013) as "a software application developed specifically for use on small, wireless computing devices, such as smartphones and tablets, rather than desktop or laptop computers." Furthermore, mobile apps may utilise the built in functionality of a mobile device. An app could, for example, use the accelerometer within an iPhone in order run a game on the mobile device.

A smartphone can be defined as a mobile phone with added capabilities such as a built-in camera, voice recorder and GPS (Rouse, 2007). Smartphones have the added ability of internet connectivity which allows users to perform functions such as web browsing, emailing as well as downloading applications, videos, images, audio files and text files.

OVERVIEW

The specific use of mobile phones in haematology aside from verbal communication is a relatively new area with pioneering scholars identified as Godse *et al* (2008) and leading scholars identified as Breslauer *et al* (2009), McLean *et al* (2009) and Bellina and Missoni (2009). Mobile phones have featured in telepathology with studies documenting their role in remote diagnosis, Braun *et al* (2005) and acquisition of images from a microscope described by Frean (2007). The concept of using mobile phones in haematology for image transmission is also relatively new as described by Godse *et al* (2008), Bellina and Missoni (2009), McLean *et al* (2009), Breslauer *et al* (2009) and Tuijn *et al* (2011). Key indicators for using mobile phones in haematology are patient safety to relay information that may initiate clinical intervention, the support of the service to the clinician and the connectivity of remote laboratories with field experts to aid diagnosis and education. The majority of studies involving a mobile phone application in haematology are focused on supporting point of care testing or laboratory diagnosis in limited resource areas e.g. Africa and India. Mobile phones and microscopy applications have consistently featured malaria diagnosis as it is a prevalent disease in tropical and subtropical countries with microscopy as the gold standard technique for diagnosis. As with all channels of communication involving patient data, policies are developed for guidance on how, when and to whom communication should take place with.

VERBAL COMMUNICATION

In 2007 the Royal College of Pathologists issued guidance on out of hours reporting of markedly abnormal test results. The responsibility of communicating a markedly abnormal result to a clinician is placed upon the laboratory staff. The challenges to communication are highlighted by lack of contact details and a General Practitioner (GP) surgery closed out of hours. The primary care trust has the responsibility of ensuring an adequate mechanism is in place to communicate results to a GP surgery or out of hours service Williams (2007).

In a review of healthcare communication the mobility of medical staff to fulfil their role was noted as the geographic environment of a hospital and also between hospitals or clinics often required