Chapter 20
Management and Operations of Transfusion Medicine:
Impact of Policy, Planning, and Leadership on Bridging the Knowledge Gap

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ABSTRACT

Healthcare includes supportive services like blood transfusion. To manage blood supply and transfusion services, leadership development is paramount. E-learning has become a common global approach in teaching. However, there are limitations. Some are difficult to influence and eliminate. E-learning packages are promoted to effectively deliver education but are still not penetrated in clinical transfusion. Most clinicians have little knowledge of risks and benefits of hemotherapy. E-learning found its way into the field of blood transfusion. However, audits of clinical transfusion practice have demonstrated deficiencies in knowledge and practice that impact patient safety and in some cases result in death. WHO initiated a post-academic master course, “Management of Transfusion Medicine,” focused on leadership in restricted economy countries. This chapter focuses on bridging the knowledge gap in management and operations of transfusion medicine.

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INTRODUCTION

To manage blood supply centres or establishments and hospital blood transfusion services, leadership development is paramount especially in the area of e-learning. However, there are still limitations of which some are difficult to influence and eliminate, because they are an integral part of less developed societies.

E-learning packages are increasingly being promoted as an effective way of delivering training within the National Health Service in Europe (especially the UK), North America and Australia. One alternative to the traditional lecture format is the use of online technology in continuing nursing education, also known as eLearning continuing nursing education (Gerkin, Taylor & Weatherby, 2009). This is because technology has revolutionized the ability to facilitate professional clinicians and nursing competence through the use of online education. In fact, the use of e-learning in the staff development environment has only recently been explored (Benson, 2004; Bernhardt, Runyan, Bou-Saada & Felter, 2003). Although they are being promoted increasingly as an effective way of delivering education, they have still not really penetrated the clinical transfusion practice illustrating that the importance of adequate knowledge and competence of blood prescribing clinicians is still not well recognized (Smit Sibinga & Oladejo, 2013).

According to Lundvall and Borras (1999), the global on-going revolution in Information and Communication Technologies (ICTs) has given rise to a learning economy wherein the capability to learn how to create new knowledge and adapt to changing conditions now determines the performance of individuals, institutions, regions, and countries. This has led to an increase in the demand for e-learning both in the organizational and the educational sector. Thus, the biggest growth in the Internet, and the area that will prove to be one of the biggest agents of change, will be in e-learning (Rosenberg, 2001). In view of this, the demand for a well-educated workforce has driven many countries to rethink their education systems towards e-learning. E-learning is defined as learning facilitated and supported through the utilization of information and communication technologies (Jenkins & Hanson, 2003). Thus, e-learning includes use of ICTs (e.g., Internet, computer and tablet, mobile phone and video) to support teaching and learning activities.

TRANSFUSION MEDICINE

Transfusion Medicine is a bridging science dealing with the vein-to-vein events of blood transfusion. From the public oriented marketing and motivation sciences through the technical provision of acquiring source material, manufacturing, and distribution to the clinical science of bedside transfusion practice and handling adverse events.

Smit Sibinga and Pitman (2011) presented a broad overview of the various states of development of Transfusion Medicine. The focus is on how to bridge the existing knowledge gaps. Observations in various countries in different parts of the world have demonstrated the need for adequate and competent human capacity development and retention. A state of development in Transfusion Medicine is not in the first place dependent on upgraded equipment, technologies and methodologies, but on the accessibility of education (teaching and training) – a competent human capacity. Globally, clinicians prioritize clinical work, and extra time away would be a serious imposition. However, the need for education in clinical use of blood (in-hospital transfusion chain) is not only restricted to low and medium Human Development Index (HDI) countries, but stretches well into high and even very high HDI countries (UNDP HDI).
The Knowledge Gap in Transfusion Medicine

Since the United Nations’ (UN) Declaration of Human Rights was proclaimed in 1948 (UN, 1948), much has improved. However, the fundamental right of health and education is still lacking behind in large parts of the world. Since the outbreak of the HIV/AIDS epidemic, WHO has put enormous effort in controlling the epidemic. In particular, much energy has been invested in the development of safe and sustainable blood supply systems as an integral part of the health care. The Global Status Report on Blood Safety and Availability 2016 (WHO, 2017) provides a far from cheerful picture: 19% of the global population belongs to the more developed world with access to 47% (47.3 million) of all blood collected for transfusion which complies with all modern requirements of safety, and is provided by good organisations according to international standards of quality. The remaining 81% of the global population lives in countries that still have to go a long way to development. Here, only 53% (53.3 million) of the blood is collected, which often does not meet even basic requirements of safety - unsafe and unreliable donors, over 7% is not tested at all, and 32% only partially and often with poor quality reagents and inconsistent methodologies. Most important problems encountered include: lack of political will and vision, insufficient or inadequate legislation and regulations, lack of infrastructure and education, lack of voluntary regular donors, but also a lack of coordinated and structured support and development, human capacity and education, and competency of leadership. Since the 2012 UN Resolution 67/81, WHO has launched the Universal Health Coverage programme which includes availability of and access to safe blood and blood products for all in need. The programme is supported by the inclusion in 2013 of blood and blood components on the WHO Model List of Essential Medicines (EM) with Guidelines on management of blood and blood components as essential medicines (WHO Technical Report Series 1004;67, 2017) which includes ensuring the appropriate use of blood and blood components by clinicians.

Transfusion Medicine has gained much attention since the HIV/AIDS epidemic outbreak mid-1980s. For instance, WHO has developed teaching and training materials, largely based on distance learning (WHO Distance Learning Materials). The focus has been on various elements of the vein-to-vein transfusion chain – donor selection and blood collection, processing blood, testing, clinical use and quality management. However, specific educational material for potential leadership has not been developed. Additionally, the target audience has been the primary blood procurement process involved staff at various levels. These include donor motivators, nurses and laboratory technicians, and blood prescribing clinical specialists. Unfortunately so far, little attention was given to leadership development at senior managerial and executive management level and clinical use.

Clinical Use of Blood

One particular area in which e-learning has been promoted is for clinical blood transfusion training. The use of blood and blood components in treating patients who are deficient in one or more blood constituents is the ultimate goal of transfusion medicine. So far, most attention has been given to the procurement of blood – collection, processing and testing, storage and distribution, but the clinical use at the bedside has been grossly neglected. Most clinicians, nursing staff and hospitals have little knowledge of the risks and benefits of supportive hemotherapy such as indication and prescription, use of alternatives, sample collection and positive identification, compatibility testing, vital signs and ultimate transfusion at the bedside, compatibility of intravenous fluids, medication and giving sets with blood, and the necessary documentation to allow traceability and hemovigilance.
Blood prescribing clinicians and residents are deprived from valuable information that could help them close the knowledge gap, come abreast of current transfusion practices and the need to master proper prescription and bedside practice. This could result in a reduction of the current transfusion related morbidity and mortality, and the development of a balanced and evidence-based Transfusion Medicine driven by identified and established proper clinical demand and the implementation of Patient Blood Management (PBM) (AuBuchon, Puca, Saxena, Shulman & Waters, 2011; Murphy, Saxena & Smit Sibinga, 2012; Frank & Waters, 2016; Eichbaum Q, Murphy M, Liu Y, et al., 2016). Although, e-learning has found its way into the field of blood transfusion, Peterson, Robinson, Verall, Quested and Saxon (2007) reported that audits of clinical transfusion practice have consistently demonstrated deficiencies in knowledge and practice that impact on patient safety and in some cases even result in death. These deficiencies, according to Smit Sibinga (2009) include transfusion being prescribed inappropriately, administration of blood products using poor bedside practices, poor documentation and inadequate identification of potential transfusion recipients. Narayanan, Kirk and Lewis (2008) observed that one of the greatest challenges to the National Health Service in the UK at present is the delivery of effective and up-to-date training to large numbers of staff.

Programmes offered can be divided into two categories – tools and courses. Tools comprise a diversity of guidelines and instructive e-documents as well as apps for consultation of e.g., literature, differential diagnosis. EU strives to develop a series of tools to support clinicians and blood bank professionals in the development of a common quality and quality management system. The main tool is a Manual with guidelines and resources to begin the development of a quality system for the clinical transfusion process (EuBis). Aim is to improve safety and efficacy of the clinical transfusion process and promote rational use of blood products across the EU through sharing of information and best practices.

Courses are largely interactive and modular with inbuilt e-tests and exams. Aims are to improve patient care, reduce risk, create competent practitioners through learning about safe transfusion practice. On-line recording and assessment systems (ORAS) have been designed to allow participants to record their scores on completion of a module assessment and even print a certificate as evidence of theoretical (knowledge) and/or clinical competence. Such ORAS also allows authorized personnel of clinical care institutions to issue reports from the system that show usage, assessment and modules completed by clinical specialty, staff group or different grades. The Australian BloodSafe e-learning program (BloodSafe eLearning Australia) focuses on transfusion practice and patient blood management education with five courses – 1) Clinical transfusion practice; 2) Collecting blood specimens; 3) Transporting blood; 4) Postpartum haemorrhage; 5) Iron deficiency anaemia.

The eLearning Australia clinical transfusion practice course consists of five e-learning modules; 1) Risks and benefits – decision to transfuse, risks, benefits and informed consent; 2) Pre-transfusion samples – importance of patient identification and specimen labelling; 3) Picking up blood – transporting and storage of blood (in-hospital cold chain); 4) Administering blood; 5) Monitoring and reactions – recognizing and responding to acute adverse events. USA Blood Systems e-Learning Center promotes continuous education through a tracking system of self-study courses on Blood Banking (six courses) and Compliance (three courses). Each course has a post-test and evaluation leading to PACE1 credits (Blood Systems).

However, in spite of the challenges faced by healthcare institutions, Gerkin, Taylor and Weatherby, (2009) still maintained that the use of online technology (e-learning) to demonstrate competency for prescribing clinicians and practicing nurses in the acute care environment has just only recently been explored. For instance, an analysis of data from the World Health Organization Global Database on Blood
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Safety (2011) indicates that, globally 72% of countries cannot meet identified training needs, usually because of limited budgets, inadequate facilities, technological advancement (which the authors believe includes e-learning) and insufficient numbers of experienced teachers and trainers. Consideration of these challenges and informal needs analysis defined a web-based or online learning tool (e-learning) as being a suitable mechanism to assist hospitals to increase knowledge of staff. There is therefore, the need to explore e-learning as a means of bridging the knowledge gap in clinical transfusion medicine. This is the motivating factor to carry out the present observations with a view to extending the frontier of knowledge in the aspect of e-learning usage in clinical transfusion medicine.

NEEDS ASSESSMENT

Health care includes supportive services such as laboratory, radiology and blood transfusion. These supportive services are an essential part of the health care system and need a careful and balanced integration in the health care system. As they operate in the demand-supply chain, proper and intellectually well-equipped leadership is needed to manage these services adequately. Globally, blood safety and sustainability of the blood supply is increasingly organized. WHO (Blood Safety, 2002) and World Health Assembly (WHA63.12, 2010) advocate a nationally supported principle where regional blood procurement centres supply hospitals with safe blood and blood products. The advocated organizational structure is based on the principles of product liability (procurement of blood – collection, processing and testing, storage and distribution) and consumer rights protection (rational use of the products produced and supplied by the blood procurement organization or blood centres).

In most parts of the world, the service offered by blood procurement centres is still supply driven where the actual clinical needs should be met in a demand driven way to avoid shortages and logistic problems of supply and allow the development of rational and appropriate use of supportive haemotherapy. These parts of the world are characterized by the UN classification of Low and Medium Human Development Index (L-HDI and M-HDI). Of the 112.5 million blood donations collected globally, approximately half of these are collected in high-income countries, home to 19% of the world’s population. (Blood Safety and Availability, 2017)

Management of Transfusion Medicine (MTM)

At the turn of the 20th century, the need for an educational development programme for potential managers and leadership in blood transfusion was recognized by WHO. The question asked was how to create a specific curriculum that would provide both knowledge and managerial/leadership skills in Transfusion Medicine and also provide access to such potential all over the world without the need for a longer absence from the base in the home country. Most countries are still in a transition and have initiated developments at national level based on the Millennium and Sustainable Development Goals, WHO recommendations and the WHO Essential Health Technology Department Blood Safety Strategic Plan 2000-2003 (Blood Safety and Clinical Technology, 2001). In such situation, identified and appointed competent leadership needs to be on the spot and not so much sent abroad for a period of 2 to 3 years.

In 2000, WHO requested the Faculty of Medical Sciences, University of Groningen to create an Academic Institute for International Development of Transfusion Medicine that would develop a post-academic Master course for Management of Transfusion Medicine (MTM), focused on potential leader-
ship and senior management staff in particular in economy restricted countries. The second objective of this Academic Institute would be the development of transfusion medicine-oriented health sciences research. The concept did match the then WHO Department of Essential Health Technologies initiative to develop an educational e-Health programme (Aide Mémoire e-Health for Health-care Delivery, 2006). Supported by Exencia Pharma Academy Ltd, the Academic Institute has developed an E-Academy to offer the desired post-academic MTM Master course that includes health sciences research in the field of transfusion medicine to be presented as a post-academic thesis for graduation. Since 2012 this course has been integrated in the Graduate School of Medical Sciences (GSMS) of the Faculty of Medical Sciences at the University of Groningen. The course is designed to accommodate advanced higher education for academically qualified potentials largely on an e-learning basis. The e-Academy started with an operational e-coordinator and an MTM course leader who communicated electronically with the fellows; e-questions and comments are responded to within 24 to 48 hours. The technical structure was built by Exencia Pharma Academy Ltd, a firm with an excellent track record in e-learning at higher educational level (Exencia Pharma Academy). The design is based on a meticulous analysis of steps, laid down in a flow chart (Figure 1), and followed two closely related pathways –

- Technical construction or architecture of the e-Academy, and the electronic flow and control of the educational programme;
- Composition of the e-books, self-tests and e-exams.

The architecture itself and its operational access seem to be more important than the contextual module configuration and lay-out to secure a satisfying e-learning environment conveniently. A local infrastructure needed for a smooth and uninterrupted electronic communication is paramount for a successful e-learning programme in a stimulating virtual environment.

However, most of the preparation time was spent on design and writing of modules, and structuring the self-test and e-exam questions in a sound multiple choice fashion. Transformation of this material into e-books, however, took relatively short time. Once an e-book has been created, a structured validation is performed in two or three rounds before opening the e-book to any registered and authorised fellow. A growing e-Academic Library was offered, besides an electronic access to the academic library of the University Medical Centre Groningen for electronic access to references and books to be studied. Since September 2007, the first fellows from economy restricted countries that had registered electronically, have entered the course.

A web site that accommodates a public domain with all basic information about the Academic Institute, and the e-Academy as a restricted access domain was constructed and is currently replaced by the e-access system of the GSMS.

The Master course is spread over two years and composed of 8 modular e-books, each for a study period of 4-6 weeks, followed by an e-exam, that can be repeated maximally two times (at two weeks intervals). The modules were written by a selected academic faculty of experts and transformed into e-books.

The current 8 e-modules (12 months) are organized in an introductory module and two specific clusters –

- Four general managerial elements, e.g. organization and structure, legal and regulatory aspects, human resource management, and economical aspects and costing.
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- Four managerial aspects of the core business in transfusion medicine, e.g. societal interface, clinical interface, process and quality management.

Being a higher education programme at post-academic level, the threshold for passing the exams is set relatively high. However, fellows are allowed to repeat the e-exams two more times with a two week interval. When the second re-exam also fails, the module has to be repeated completely. The fellow applies electronically for an e-exam, which has to be done within two weeks, following the completion of the module. This is monitored and communicated automatically and electronically. The material is user friendly organized: off-line e-books can be studied and e-exams taken.

The steps towards the final thesis are threefold –

1. Preparation of the research question, preferably focused on an existing problem in the home country;
2. Research proposal and start of data collection, writing;
3. Completion of data collection, analysis, final writing and presentation of the thesis.

Following the completion of the e-modules and successful e-exams, the fellow is invited to continue for a real-time exposure in an operational blood centre environment, while following 4 more modules in a classic face-to-face tutorial system. The MTM course is completed with a Master Thesis and a final graduation ceremony. The construction of the e-Academy took relatively little time as it followed the standard design of such e-Academies developed by Exencia Pharma Academy Ltd. Over the first years, the public domain was further extended to accommodate a mature website with the necessary public information about the Academic Institute and its activities. However, the Academic Institute has closed its website and offered the domain name for sale.

This post-academic Transfusion Medicine Masters course, focussed on management and based largely on e-learning, has to comply with a number of requirements, such as sufficiently high academic level of the modular contents; a coverage of all aspects of management, a local learning environment that allows an easy access and exploration of the material offered; a user friendly ambiance and appetising presentation of the course; reliability of, and access to supportive technical services for the electronic structure; a guaranteed distance communication with the e-book teachers through an e-tutorial mechanism; and full access to an e-library to study references and literature.

Impact on the Quality of the Medical Education

Factors that do have an impact on personal success when following such electronic distance learning education focussed on management rather than medical-technical and operational aspects, require the ability of the fellow to think and work at a more abstract level. The experience has learned that an academic graduate master degree is no guarantee to such abstract level of thinking and working, particularly not when the learning is done through an electronic medium, rather than in a face-to-face setting. Combined with a different education culture and related personal discipline to self-work with material that in principle is not fully familiar to the participant, creates a special challenge for both the consumer as well as the provider of the course contents. This implicates the embedding of the e-learning environment in an adequate and alert communication setting to allow prompt and supportive communication between teachers, course management and fellow. Teachers and course management need to understand the restrictive conditions in many a developing situation that should be met with flexibility and elasticity.
Figure 1. Flow chart of the MTM process
Source: Smit Sibinga & de Gunst (2008)
The technical support involved in the architecture of the e-academy and e-library should also be familiar with the technical restrictions at local level and act with creativity and professionalism to rapidly identify and solve problems that may arise, whatever remote the situation might be. A delayed or non-response to a request for help does have an immediate de-motivating effect and therefore a loss of interest and sustained discipline in the learning phase. In some instances, it was observed that the expectations of fellows of the course were distinctly deviating from the course objectives and based on indirect or direct personal experiences with ‘advanced’ education (Smit Sibinga, 2009).

Local constraints in available time to spend on the e-learning modules and preparation for the e-exams form another limiting factor. These constraints quite often are experienced as a different priority and therefore, not communicated with the course management. The consequence is a lapse of time before a question on progress is communicated and responded to. Some of these constraints are caused by budget problems, especially when the admission to the course is part and parcel of a donor financed project. Shortages of staff due to unexpected moving around of personnel from one position in the health care (e.g., a blood centre) to another (e.g., a hospital laboratory) due to lack or absence of control over staff of the employing institution has also contributed to a slow-down of expected progress.

A variety of relatively known factors such as changes in personal hardware (Laptop and PC) used; changes in internet providers and their nationally controlled and sometimes censored access criteria; and most frequently, fluctuations and unpredictable interruptions of power supply, especially during the on-line e-exam episodes were experienced, and were not really observed in the set up and validation of the course system and structure. In particular, the problem of electronic incompatibility when a change in hardware has occurred, created a technical puzzle for the electronic support service offered. When service has been provided to solve problems, it is of importance to have an inbuilt verification and confirmation protocol for the restoration of the operations, documented to allow analysis and evaluation.

There have been no serious technical problems encountered. Fellows are able to access through internet once they have received their personal e-book or e-exam access code. However, one experience encountered was caused by introduction of a local firewall system in Eritrea, which blocked access to e-books and e-exams. This problem was solved through the technical guidance and advice of the technical coordinator.

**MAJOR OBSTACLES EXPERIENCED**

Accessibility and awareness are not yet really developed (Smit Sibinga, 2010, Smit Sibinga, Oladejo, Adejumo, et al. 2017). Most of the fellows come from developing parts of the world, predominantly Sub-Saharan Africa, where financing was provided through the PEPFAR programme of the US HHS Department. There are distinct differences in country infrastructure and e-environment which contribute to the access and operational continuity of an e-learning based programme. Although, academically qualified (in-country University diploma’s), a majority of fellows is not familiar with e-technology and computer handling other than some internet browsing and basic office functions like Word and PPT. Besides, differences were experienced in personal attitudes and culture once the e-learning has started (Smit Sibinga, 2010). Hardware used is not always guaranteed and in many a situation of second or even more hand nature. The e-learning programme is not public but highly individualised with an electronic match between the master system and e-academy and the personal laptop or PC at home. Changes in hardware need a renewal of the match to allow smooth continuation of the access.
In different countries, different grades of e-learning environmental and climate conditions were observed, but these are essentially variations of the same theme. One element needs to be added based on the observations, and that is the personal discipline of the fellows, caused by a variety of conditions e.g., limited career perspectives; micro-economical situation (family income); and paucity of academic interest and motivation. The differences observed can be classified into differences in academic level of the fellows (Smit Sibinga, 2010) and differences in environment and climate needed for a smooth and problem free operation and performance of the e-learning part of the cours. The prime entrance criterion is an academic education to be evidenced by a University Masters of Science diploma and the period over which the academic education has been followed. All fellows have met this criterion. However, during the e-learning period, it was observed that the education levels differ. Most of the fellows (e.g., Eritrea, Uganda, Tanzania, Qatar, Zambia, but also Singapore) have a difficulty with the post-academic level of the module contents and this is particularly demonstrated in the level of comprehension of the modules on Organisation and Structure and on Finance and Economy. Also, the module on Process and Quality Management showed some difficulties of comprehension at intellectual level. This was more prominent with those from the African continent and Qatar than with the fellow from Singapore.

Major obstacles encountered are –

1. Inconsistent internet access due to supplier problems;
2. Unreliable power supply and poor infrastructure;
3. Virus contamination of laptops and pcs due to frequent uncontrolled use of memory sticks in internet cafés and through friends and relatives;
4. Poor and not maintained firewall conditions;
5. Mediocre computer literacy, particularly when skills beyond basic office functions are required; and
6. Laptop and pc breakdown due to uncontrolled working conditions and improper working environments.

Besides, the differences in levels come very clearly to life with the design of the thesis project, the project proposal and the applied scientific work to be done for the thesis. Some fellows are acceptably familiar, but others show quite some difficulties in the design and writing of the research proposal (e.g., Uganda, Zambia, Tanzania and Qatar). Apparently, the academic education in these countries does not prepare for an academic level attitude and curiosity, and does not foresee in basic intellectual training for scientific research work to be done.

**E-Environment and E-Climate**

Despite the presence and availability of modern communication technology, there are differences in accessibility of particularly internet due to inconsistent and unreliable providers of internet services. Some countries (e.g., Eritrea) allow only one supplier, controlled through the authorities, others have more local suppliers. As the services depend on power supply, this factor becomes a key in the access to internet. With the exception of Singapore, the countries where most of the fellows live (Sub-Sahara Africa, Middle East and the Caribbean) experience regular and unpredictable power supply problems. These power supply problems also are unpredictably long, sometimes even a full day or more, which happens particularly in the tropical raining season. A variety of virus contaminations has been observed which has an impact the software and therefore, the operations and performance of the e-learning programme.
Most of these contaminations are picked up when the laptop is used in internet cafés or through exchange of USB memory sticks and diskettes. Most of these have been observed in Uganda and Zambia, but also in Eritrea and Tanzania. Fellows lack the knowledge and discipline about virus contamination prevention and elimination. USB memory sticks are regularly exchanged without scanning for contamination. Most of the fellows do not have a fire wall system on their laptop or PC. If so, there are scarcely updates done and regular scanning does not belong to the cyber culture of most of the fellows, particularly in Africa, the Middle East and the Caribbean. Given the diversity of questions asked to the help desk, there is a limited computer literacy with most of the fellows. The laptop and/or PC have become part of modern life, but without sufficient knowledge of even the basics of information technology, leaving them with poor to absent literacy of how to handle basic computer programmes, e-mail and electronic documents. Another observation is in the quality and operations of the hardware used. Most common laptops and PC are bought on the market without reference and second or even more hand, with as a consequence poor quality batteries, limited memory capacity and technical failures, including breakdowns and crashes. Absence of repair and maintenance services aggravate the situation as do limited working space. In one situation, a laptop was placed in front of an open window. When a sudden rain shower took place, the laptop was soaked and evidently no longer usable. In another situation, fellows who had registered and been accepted into the course, suddenly claimed the right to be given for free a laptop and appropriate software.

**STRATEGIC APPROACHES**

Post-graduate continuing education of medical, nursing and other staff involved in the in-hospital transfusion chain can be difficult when there is inadequate access to the much needed knowledge. Consideration of this difficulty might pave the way for a web-based or on-line learning tool (e-learning) as being a suitable mechanism to assist hospitals to increase knowledge of staff. Such programmes have been developed in advanced situations like the US (AABB), Australia (ARC) and the UK (BBTS). Therefore, additional focus has been on critical examination of possible contributions of e-learning in bridging the knowledge gap in clinical transfusion medicine with its attendant policy implications. The combination of classroom computers and the Internet is often considered together broadly within the concept of e-learning. As highlighted in Expression of Interest Integrated Project (2003), e-learning is where the knowledge is delivered via electronic media (Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV, CD-ROM). The use of the Australian eLearning to provide continuing medical education has many benefits, including user convenience; programme design flexibility; easy access to information; adherence to adult learning principles; and accommodation of multiple learning styles. However, an extensive internet search showed that most of the e-learning programmes identified focus on the procurement part of the transfusion chain with limited attention on the in-hospital bedside practice. Also, there were limited programmes detected that focus exclusively on the bedside practice to support prescribing clinicians. Given the paucity of non e-learning programmes, except World Health Organization’s few distance learning materials on clinical use of blood on CD-ROM, it illustrates that the importance of adequate knowledge and competence of blood prescribing clinicians as a specific supportive haemotherapy is still not well recognized. E-learning as an easy to access and universal education tool has not yet penetrated the clinical transfusion practice.
Globally the clinical interface and in-hospital transfusion practice still are the weakest link in the vein-to-vein transfusion chain. Since the mystery of incompatibility was unveiled by Karl Landsteiner (1901), attention was driven away from the direct patient treatment into immuno-haematology and in particular blood group serology as the major key to blood safety. With the recognition of transmissibility of infectious agents by blood, starting with syphilis in the 1940s, followed by Malaria, Hepatitis B and non-A non-B or C, in the early 1980s HIV and HTLV, and prions in the 1990s, many more have emerged (Smit Sibinga & Dodd, 2002). That initiated an epoque with a focus on laboratory detection and technical quality control, and assumed inactivation of these infectious agents driven by the hypothetic paradigm of zero-risk. During the last decades more focused attention for the bedside aspects of Transfusion Medicine has started to develop as reflected in the publication of textbooks on clinical practice of blood transfusion and the development of specific teaching material such as the WHO DLM on clinical use of blood (DL Module 2002; Aide Mémoire, 2003; Aide Mémoire, 2010; WHO Distance Learning Materials; WHO/BTC/BTS/01.3, 2001; Handbook, 2002) published in different languages, and the series of proceedings (since 1980) of the Groningen Symposia on Blood Transfusion published (Martinus Nijhoff, Kluwer Academic Publishers and Springer) between 1980 and 2004 in the series Developments in Hematology and Immunology (Springer). These symposia always concluded with a session on the clinical application of the highlighted theme. The obvious reason was in the globally observed and experienced knowledge gap in the peer group of prescribing clinicians and transfusion involved nursing staff. Despite the fact that over these decades an increasing volume of printed and e-learning education material has been published and offered, and a rapidly spreading dogma on patient blood management is occurring, key weaknesses still are awareness, accessibility and utilization of the material. This is reflected in the outcome of the survey, with differences between the clinical transfusion practitioners in the various HDI clusters of countries (Smit Sibinga et al. 2017).

Policy Considerations

Smit Sibinga and Pitman (2011) and Abdella, Hajjeh and Smit Sibinga (2017) observed that in many developing countries, blood transfusion in the vein-to-vein concept is still in its first or second generation stage. This means that blood is most often collected and transfused in the absence of a formal policy environment and without adequate regulatory controls or standards. There should therefore be some clear cut policy statements that will promote an effective e-learning environment in the field of transfusion medicine. Findings from the present observations have certain policy implications for future e-learning practice in Transfusion Medicine as it has an impact on young clinicians. Essentially, there should be a policy formulation that will address:

- Development of competency assessment software for different skills;
- Introduction and accessibility of advanced technology;
- Proper e-training of prescribing clinicians and transfusion safety officers (tsos);
- Development of a uniform management information system (MIS) for blood programs in all blood prescribing and consuming hospitals;
- The clinical risk management committee, through the Hospital Transfusion Committee, needs to oversee, develop and implement all issues and procedures related to blood transfusion.
To ensure effective implementation of these policies, Smit Sibinga and Pitman (2011) recommended the establishment of Hospital Transfusion Committees and a system for reporting adverse transfusion reactions in each hospital to implement the national policy and guidelines, and to monitor the safe and rational use of blood and blood products at the local level.

How to Move Forward

The WHO initiated idea to create a special management oriented higher education for potential leadership in Transfusion Medicine has come to a stage of maturation- e-learning combined with real time exposure to match the academic theoretical knowledge in detail with the day-to-day management of a large blood supply organisation. In principle the e-Academy course did fill the gap observed around the year 2000 and provided an easy accessible e-learning environment at post-academic level to potential leadership in economy restricted countries. The impact of such policy, planning and leadership development will certainly contribute to the creation of an important intellectual capacity and network paramount to achieve sustainability of the ultimate care in Transfusion Medicine as a respectable element in Universal Health Coverage.

Health Coverage

E-learning has become a common approach in teaching and training in many parts of the world. However, there are still limitations of which some are difficult to influence and eliminate, because they are an integral part of less developed societies in different parts of the world. To guarantee continuous motivation and discipline of a fellow prerequisites are paramount. Ideally, there should be a personal and local contact and face familiarity between the course management and the fellow, to allow optimal communication in mutual understanding and respect. As fellows are scattered around the world, and live largely in developing societies with a limited e- and ICT teaching infrastructure and culture, it would be appropriate to include in the e-learning package an instructive e-module on how to handle and manage the e-learning tools, how to manage day-to-day problems of access and downloading, as well as re-access for e.g. e-exams and access to new modules in the course. Such instructive e-module would contribute to a better accessibility and awareness leading to a much easier and customer friendly e-access. It would also be appropriate to stimulate the development of essential computer literacy among this group of academics that were not exposed during their academic education at the respective universities or medical schools. The design, validation and implementation of a high level advanced post-academic e-learning programme focussed primarily on developing countries, needs more background information and analysis of the real learning environment and conditions than originally anticipated. A tailor-made and personal guidance and advice of the fellow by an academic and experienced course management is highly recommendable, besides a competent and technically creative and inventive back up service to allow a minimum of operational interruption of the course progress.

Regarding the clinical use of blood, clinicians are confronted with the challenge of acquiring relevant and effective basic and continuing education programmes in an increasingly complex healthcare environment. Although, the challenge of ensuring competence for clinicians and nursing staff might appear complex, educational programmes that are designed using an online format provide a positive
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Educational medium for learning. The developments underscored that the e-learning medium provides a satisfactory and effective alternative for clinicians to bridge the knowledge gap in Transfusion Medicine. The observations provide further support for existing literature which confirms that clinicians and nursing staff can benefit maximally in an online environment to acquire more knowledge and keep abreast of the latest developments in their profession if certain policies are put in place.

Prospects for the Future

It is important to develop similar e-learning courses for the clinical staff with self-tests and e-exams to further develop knowledge and managerial information. This is to optimize the clinical transfusion chain including the introduction of a patient centred blood management system (PBM) (AuBuchon, Puca, Saxena, Shulman & Waters, 2011; Murphy, Saxena & Smit Sibinga, 2012; Frank & Waters, 2016; Eichbaum Q, Murphy M, Liu Y, et al., 2016).

To accommodate the earlier expressed needs that come largely from Anglophone countries, so far English has been used predominantly. However, an initial explorative study to accommodate the Chinese market of higher education in Transfusion Medicine has been done in partnerships with the Chinese authorities, Universities and blood centres. By the time this exploration is completed and the road map for implementation designed, the e-Academy will have to host a Chinese section to accommodate the Mandarin speaking community. Next on the list would then be the development of a Francophone, Russian, Spanish and Arabic section of the e-Academy and the e-learning material.

Simultaneously, an electronic monitoring and evaluation tool that will give room for the assessment of the opinions and critics of those interested as well as those who follow and have completed a course could be developed. Such tool could best be built into the public domain of an institutional website and should have an automatic electronic statistical package to allow immediate update of the outcome.

Equally important is a strategy for funding selected potential fellows needs to be designed to explore the major funding agencies that focus on higher education and human capacity building (leadership development) in restricted economy countries.

References


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ENDNOTE

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