KNOWLEDGE TRANSFER

PRACTICES, TYPES AND CHALLENGES

Dragan Ilic
Editor

Education in a Competitive and Globalizing World

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EDUCATION IN A COMPETITIVE AND GLOBALIZING WORLD

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PREFACE

The discipline of knowledge transfer has existed for many years across disciplines, but has more recently gained exposure within the health care field including medicine, nursing, health sciences, public health and health services research. Knowledge transfer is a complex iterative process that aims to implement high quality evidence into practice ensuring that better health outcomes are achieved across different levels including patients, health professionals, health systems and policy makers. This book provides an introduction to the field of knowledge transfer, examining the different approaches to knowledge transfer as well as detailing challenges to its implementation in practice. This book examines what knowledge transfer is, and how it may differ across different contexts and settings.

Chapter 1 - Knowledge transfer aims to close the gap between evidence and practice. It aims to identify and implement knowledge into practice in a timely manner to ensure that optimal outcomes are met. The methods to close the 'evidence to practice' gap form the framework for knowledge transfer. In order to bridge this gap, acknowledge transfer framework needs to identify information gaps, create new knowledge (or obtain existing knowledge), effectively implement it into the relevant setting and evaluate its effectiveness. This chapter will provide a commentary defining the concept of knowledge transfer and outline the development of the DIER knowledge transfer framework.

Chapter 2 - Alliances as a form of inter-organizational cooperation are increasing in number and importance on the global business scale, and numerous reasons can be given to explain this. Among other benefits that alliances can bring to those who create them, organizational learning and knowledge transfer have become particularly important. Alliances are used as a means of achieving both single and double loop learning, for exploration as well as for the exploitation purposes, and are thought to be particularly powerful in tacit knowledge transfer. Theoretical review in this chapter addresses: first, the issues of knowledge transfer and organizational learning in strategic alliances, next, it identifies potential research gaps and finally, it gives propositions that might help future research in this field.

Chapter 3 - Knowledge brokers such as health care professionals and consumer group peer support leaders experience many challenges in transferring and exchanging knowledge for persons with chronic pain and those with work injuries. Meeting the needs of end users and their preferences for considering and integrating knowledge into decision making is not easy. This chapter will provide an overview of the barriers to KT and offer strategies to facilitate ways to meet the needs of end users such as persons with chronic pain that is also

sensitive to the contextual and social cultural expectations of the end users. Readers will be introduced to an Interactive Knowledge Transfer Process that can enable formal and informal knowledge brokers to create spaces and opportunities for practical knowledge exchange of research, procedural and health information needed to manage daily and work activities while living with pain. This chapter will also have a focus on what knowledge brokers need to know to help end users successfully appraise information available on the internet.

Chapter 4 - The principles of evidence based practice focus on providing users with the skills to identify, evaluate and implement evidence within a clinical setting. A similar process is also apparent with knowledge transfer, which also takes into account barriers and facilitators of evidence uptake by stakeholders. This chapter will explore how the principles of evidence based practice may be utilized by individuals to facilitate knowledge transfer from a user's perspective.

Chapter 5 - When a statistical model is designed in a prediction purpose, a major assumption is the absence of evolution in the modeled phenomenon between the training and the prediction stages. Thus, training and future data must be in the same feature space and must have the same distribution. Unfortunately, this assumption turns out to be often false in real-world applications. For instance, biological motivations could lead to classify individuals from a given species when only individuals from another species are available for training. In regression, we would sometimes use a predictive model for data having not exactly the same distribution that the training data used for estimating the model. This chapter presents techniques for transfering a statistical model estimated from a source population to a target population. Three tasks of statistical learning are considered: Probabilistic classification (parametric and semi-parametric), linear regression (includingmixture of regressions) and model-based clustering (Gaussian and Student). In each situation, the knowledge transfer is carried out by introducing parametric links between both populations. The use of such transfer techniques would improve the performance of learning by avoiding much expensive data labeling efforts.

Chapter 6 - The biotechnology industry is characterized by a high intensity in knowledge creation and innovation. Biotechnology companies are constantly affected by knowledge flows so this industry is an interesting field to study knowledge transfer strategies. In this chapter the authors analyze the knowledge transfer strategies of three Spanish biotechnology companies, PharmaMar, Neocodex and Digna Biotech. With this aim an exploratory case study was carried out by the authors, which is based on the model of technological knowledge transfer developed by Bozeman (2000). The results of this study provide a comprehensive overview of the aspects that characterize different ways to understand a knowledge transfer strategy and the results that are obtained from its application.

Chapter 7 - Poster presentations are a common-place feature of many modern academic and professional settings. Based upon the wide range of professional groups that utilise the medium and the multitude of local, national and international meetings at which they are presented, it may be fair to estimate that millions are undertaken every year. As a stand-alone medium however, they are not best suited to facilitate knowledge transfer. This chapter looks at how we can make the most of the many opportunities for poster presentation and use facilitated dialogue to increase the potential to communicate our findings, opinions and research to others. In particular, it considers those aspects of knowledge transfer commonly found in both the business and conference setting; namely the concepts of knowledge / research dissemination and its subsequent utilization by the receiver. In considering these

aspects, this chapter looks to demonstrate that although the academic poster is a favoured medium of visualising knowledge, there are further considerations to be made, if we are to effectively transfer that knowledge to others.

Chapter 8 - This chapter is a practical guide to developing an evidence based guideline (EBG). It begins with a discussion about EBGs, their place within health information overall, why they are important and why it is important that they are developed in a rigorous and systematic way. While EBG development guidance is available, there is inconsistency in the amount of detail across this guidance and it has been suggested that practical information to complement existing resources may be helpful. Therefore, logistics of EBG development and practical step by step information about their development is discussed using an example of a nationally approved EBG in the area of polycystic ovary syndrome (PCOS). The authors also provide directions to other helpful resources, tools and templates for each step. Practical concepts covered include establishing a multidisciplinary evidence based guideline development group (EBGDG); clinical question development and prioritisation; evidence review and synthesis; drafting of recommendations; obtaining consensus among the EBGDG; and preparing and finalising the EBG for dissemination.

Chapter 9 - Effective knowledge transfer between researchers, educators, and clinicians is essential for maintaining best practice in the health disciplines. It is the method by which we aim to enhance the health service delivery for our communities. This chapter examines methods of knowledge transfer for supporting health professional clinical performance. Competent clinical skills are a combination of theoretical knowledge, manual handling, and effective communication, encapsulated in the clinician-client interaction. Training for optimum performance of clinical skills is a complex and enduring task. Health professional education is a continuum, beginning from entry into an undergraduate program, and continues until the health professional leaves their chosen discipline. This chapter focuses on innovative methods utilised within an undergraduate clinical skills program, techniques for supporting transfer of knowledge to a clinical environment, and the continuing education of health professionals. It tackles issues relating to access and utilisation of educational technologies, and facilitation of a successful knowledge transfer culture.

Chapter 10 - Journal clubs have been operating in various formats for over 100 years in the medical field. Journal clubs aim to promote effective knowledge transfer of medical evidence to clinicians and subsequent uptake into the clinical setting. Clinician awareness, agreement, adoption and adherence of evidence may all act as barriers when translating high quality evidence into practice. This chapter will provide a commentary on the use of journal clubs in knowledge transfer and also proposes a method of utilizing journal clubs as complex interventions as a strategy to translate evidence into practice effectively.

CONTENTS

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Chapter 1

WHAT IS KNOWLEDGE TRANSFER?

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ABSTRACT

Knowledge transfer aims to close the gap between evidence and practice. It aims to identify and implement knowledge into practice in a timely manner to ensure that optimal outcomes are met. The methods to close the 'evidence to practice' gap form the framework for knowledge transfer. In order to bridge this gap, acknowledge transfer framework needs to identify information gaps, create new knowledge (or obtain existing knowledge), effectively implement it into the relevant setting and evaluate its effectiveness. This chapter will provide a commentary defining the concept of knowledge transfer and outline the development of the DIER knowledge transfer framework.

INTRODUCTION

James Lind was a Scottish physician, who in 1747 conducted the first clinical trial to investigate the hypothesis that the consumption of citrus fruits could cure scurvy. [1]. As a surgeon on the *HMS Salisbury*, Dr Lind hypothesized that the lack of Vitamin C intake by sailors, due to the lack of suitable food on board the ship for the period of time, was directly linked to the increased outbreak of scurvy on board the *HMS Salisbury*. To answer this clinical question, Dr Lind divided 12 sailors into six groups. Each of the sailors received the same diet, but each group were supplemented with; cider, sulphuric acid, vinegar, seawater, oranges and lemons, and barley water. After approximately one-week of treatment, only the sailors allocated to receiving oranges and lemons were fit for duty. In 1753 Dr Lind published these results; however the findings were not translated into practice until 1795.

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The case of Dr James Lind was an early case of how knowledge transferworks. Dr Lin was presented with an information gap, new knowledge is created (or existing knowledge is collated if possible), with findings implemented into practice with the aim of changing behaviour and improving outcomes. However, knowledge transfer is not always an easy process – with a number of potential obstacles hindering uptake of evidence into practice. A variety of factors may influence why high quality evidence is not implemented in practice [2]. Subsequently, many users, and patients within the healthcare system, will receive ineffectual care. This inefficient care has the potential to place great strain on the healthcare system.

This chapter will provide a commentary defining the concept of knowledge transfer and introduce the DIER knowledge transfer framework. It will provide an overview of the various steps associated with this knowledge transfer framework, and how it may be effectively implemented across various settings.

What is Knowledge Transfer?

Knowledge transfer is a term that has existed for many years, but more recently gained great prominence across a variety of health disciplines including public health, medicine, nursing and allied health. [3]Knowledge transfer aims to close the information gap between evidence, be it existing or newly created, and practice.

Table I. Definition of terms relating to knowledge transfer

Term	Definition
Knowledge transfer	A term used in healthcare, as well as fields outside of healthcare. The focus is on providing all relevant stakeholders with high quality evidence (usually research based).
Knowledge translation	Similar to knowledge transfer, with the focus on addressing the gap between knowledge, and the implementation of this knowledge by stakeholders.
Knowledge exchange	Highlights the differences in organisational culture, which may act as barriers to the implementation of knowledge in practice. Knowledge exchange brings together researchers and users in an attempt to override barriers, and promote knowledge exchange to the stakeholders and end-users.
Research utilisation	A term that has been entrenched in the nursing field. Research utilisation focuses on moving research findings into practice within the appropriate clinical setting.
Implementation science	Implementation science has a greater focus on the methods used to promote the uptake of research findings into practice.

* Adapted from Graham et al. [2].

This information is then implemented, via any form of tailored intervention, to the target audience in a timely manner to ensure optimal uptake of services or products. The methods used to facilitate this process can generally be defined as 'knowledge transfer'. [3]

One of the confusing issues within the field of knowledge transfer is the terminology associated with the discipline itself. Table 1 illustrates the variety of terms that have been used to define knowledge transfer. Whilst all of those terms are grounded in the definition of knowledge transfer, certain differences should be noted. Translational research focusses on the transfer of basic science into clinical applications – the 'bench to bedside' phenomenon. [2]. It should also be noted that any continuing education or continuing professional development interpretations should not be confused with knowledge transfer – since these formats focus on the increasing individual competence rather than a broader spectrum that includes a wide range of stakeholders. [2]

Why is Knowledge Transfer Important?

In healthcare a verse from the Hippocratic Oath read, *'I will prescribe regimens for the good of my patients according to my ability and my judgment and never do harm to anyone'*. Whilst it may seem that this would common sense, the implications of failing to use research evidence to inform decision making are still apparent.

The case of Dr James Lind probably was not the first, and not the last, time that research evidence has not reached users in'reasonable' time. In 1946 Dr Benjamin Spock, an American pediatrician, first published his book entitled, *'Baby and child care'*, which provided advise for parents on how to care for their babies, infants and children. By 1998 it is estimated that the book sold in excess of 50,000,000 copies worldwide. During that period, all editions of the book recommended that 'babies should be put to sleep on their fronts…'.[4]In his book, Dr Spock reasoned that this approach would reduce the risk of infants choking on their own vomit. However, research evidence from the 1970s suggested that this practice may be harmful, and be linked to sudden infant death syndrome (SIDS). Furthermore, it was not until the late 1980s and early 1990s that the advice was revised, with parents advised to put their babies to sleep on their back. During this time it is estimated that over 50,000 babies worldwide died from SIDS.

In Australia during the 1980s researchers identified that maternal dietary and supplemental folate intake around the time of conception protects against neural tube defects (NTDs). [5]Subsequent studies also confirmed up to 70% protective effect. However, it was not until 1992 that dedicated health promotion activities were implemented, which resulted in an increase of 30% in women taking folate, and 29% fall in NTDs. [6, 7] Conversely, there examples where evidence that indicates that a particular treatment is not beneficial still gets consumed due to habit. For example, evidence from systematic reviews has identified benefit of consuming Vitamin C for preventing and treating the common cold. [8]Despite this evidence, a large international demand for Vitamin C remains from the public, who still believe in a beneficial effect through its consumption.

Such cases have promoted a greater emphasis on knowledge transfer in healthcare to change user (clinicians, patient and policy maker) behaviour. However, changing behaviour is not a simple process. It involves the evaluation of the entire organizational structure, with specific intervention tailored to various stakeholders in a bid to change behaviour. [9]

The DIER Knowledge Transfer Framework

A variety of knowledge transfer models have been created. [2, 3, 9-11]The DIER knowledge transfer framework builds on these existing models but also places an emphasis on the knowledge transfer process being iterative in nature. Figure 1 illustrates the DIER knowledge transfer framework, with a description of each step as follows;

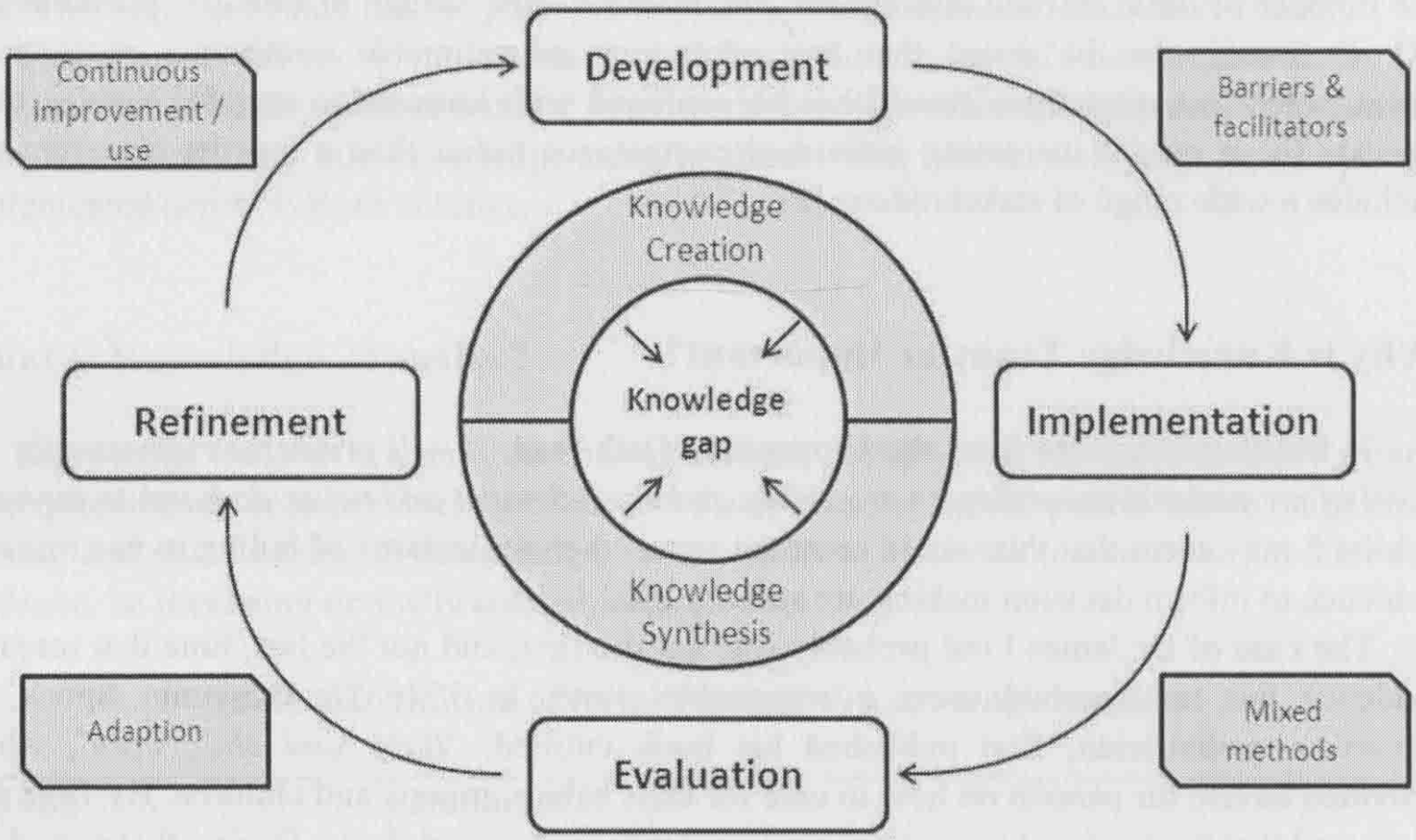

Figure 1. The DIER knowledge transfer framework.

Knowledge Gap

The DIER knowledge transfer framework begins with the knowledge, or information, gap. It is this knowledge gap that will facilitate the DIER knowledge transfer process. The knowledge gap may be answered either by the creation of new knowledge (through new research findings), or the synthesis of existing knowledge from original studies, systematic reviews (and likewise synthesis) or other third party synopses and appraisals. [3]It is important to note that in some circumstances there will not be sufficient evidence to answer the knowledge gap.

This type of 'information' is still useful in the DIER knowledge transfer framework, as it provides useful transfer of information gaps within the evidence to key stakeholders. For example, the issue of screening for prostate cancer generated strong debate within the medical community as there was insufficient evidence from high quality evidence to support, or refute, the merits of screening. [12]

This knowledge was important to transfer to key stakeholders (in this case men, clinicians and policy makers) since there was no evidence to support that screening would decrease the risk of prostate cancer mortality, but also no evidence that it would increase the harms associated with screening (e.g. over-diagnosis).

Effectively transferring this knowledge to stakeholders transformed the manner in which prostate cancer screening was discussed – with shared decision making on the merits of screening discussed between patient and doctor promoted in the absence of solid evidence.

Development

Once the knowledge gap has answered, the intervention that will be used to implement the 'new' knowledge must be developed. In tailoring the intervention, it is essential that all key stakeholders are consulted in order to establish barriers and facilitators to the intervention.

This will permit the intervention to be tailored to meet the needs of the various target audience. Issues such as framing of information, mode of delivery and the timing of the intervention will all impact upon the relative success of the knowledge transfer. For example, clinicians might prefer a 15 minute academic detailing session, which is supplemented by information on a website to facilitate the knowledge transfer due to time commitments.

Conversely, the same information delivered to a policy maker might consist of a full-day workshop. Regardless of how the intervention is delivered across stakeholders, it is essential that the information across all versions remains constant, whilst the intervention itself is adapted to suit the environment in which it will be implemented.

Whilst it is important to consider what type of intervention will most succeed in promoting knowledge transfer, it is also important to understand the cost implications and potential limitations presented. It might well be desirable to develop a multifocal intervention, however practical and cost issues may dictate a more pragmatic intervention.

Implementation

Pilot testing of the intervention is required before its implementation. A key step in the pilot testing of the implementation phase is discussion with key stakeholders about the practical barriers and facilitators to the implementation of the intervention. Key consideration must be given to the different levels to which the intervention will be implemented e.g. individual/team, patient/health professional, clinical/administrative and disciplines (e.g. medicine, nursing, allied health etc.).

Each stakeholder will have different barriers and facilitators that require the intervention be adapted to in order to be implemented within the local context presented.

Evaluation

Once implemented it is important to evaluate the effectiveness of the intervention in promoting the knowledge transfer. Endpoints for evaluation include examining the effectiveness of the implementation strategy for the intervention, monitoring uptake of the knowledge/intervention in practice, examining primary and surrogate outcomes and evaluating stakeholder satisfaction. Any evaluation plan should incorporate a mixed-methods approach, which incorporates both quantitative as well as qualitative methodologies.

Quantitative methodologies may consist of questionnaires, audits and data analysis – whilst qualitative methodologies may include individual interviews, focus group discussions or field observations.

Refinement

Evaluation of the implementation phase will provide useful feedback regarding the effectiveness of the intervention and implementation strategies. The intervention and implementation strategies should be adapted according to the evaluation before the DIER cycle begins again. This refinement phase should be undertaken consistently, even in the event that the original evaluation is positive, in order to ensure continuous improvement, and use of the intervention by the desired stakeholders.

CONCLUSION

The discipline of knowledge transfer aims to convey knowledge into action, however ensuring that this process is efficient and effective remains challenging. The development of models such as the DIER knowledge transfer framework provides users with a structure on which to draw upon when devising methods of knowledge transfer relative to their specific contexts. Knowledge transfer can facilitate the exchange of knowledge and ideas only when local barriers and facilitators are recognized and adapted to.

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