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Bridging the research to practice gap in transfusion – the need for a multidisciplinary and evidence-based approach

Lorencatto, F.[1], Stanworth, S.[2], & Gould, N.J[1]

[1]Division of Health Services Research and Management, City University London, UK
[2]Department of Haematology, John Radcliffe Hospital, University of Oxford, UK.

Gaps between high quality evidence and current clinical practice have been identified across a range of clinical contexts (Grol & Grimshaw, 2003), and transfusion medicine is no exception (Murphy et al. 2013). This gap formed the background to the research published in this month's issue of ***Transfusion*** by Voorn and colleagues (Voorn et al. 2013; Voorn et al. 2014). The reasons for an evidence-practice gap in transfusion are variable and do not appear to be based only on relevant clinical factors, such as patient age, peri-operative blood loss or specific thresholds of haemoglobin concentration for red cell transfusion (Murphy et al. 2011; Sanguis Study Group, 1994). It has been argued that as the evidence base for transfusion medicine continues to advance, there is a need to dedicate further resources to understanding how to promote the uptake of evidence and effectively change transfusion clinical practice (Murphy et al. 2011).

Implementation science is an emerging field of study focusing on the investigation of methods for promoting and facilitating the systematic uptake of evidence into routine clinical practice (Eccles et al, 2009). Implementation science has played a central role in developing and evaluating interventions to change clinical practice and minimize the evidence-practice gap (Grimshaw et al. 2012). In the context of blood transfusion, systematic reviews highlight the range of intervention strategies that have been applied to date to change transfusion practice, from education to audit and feedback (Tinmouth et al. 2005; Wilson et al. 2002). The conclusions from these reviews are consistent: overall, many interventions are effective in changing transfusion practice. However, there is unexplained heterogeneity in outcomes that when coupled with the high levels of variation in study design and quality, preclude any clarity as to what specifically drives this effectiveness, or makes one intervention strategy more effective than the other (Tinmouth et al. 2005).

So how can we better bridge the evidence-practice gap in blood transfusion? Approaches to changing clinical practice are often based on intuitive beliefs (i.e. 'hunches' or 'best guesses') of 'what' influences health care professionals' behaviour (Michie & Abraham, 2004), or the fact that a particular intervention strategy has been done before and appears feasible or interesting (Colquhoun, et al. 2013). Rather than base the design of interventions to optimize transfusion practice on such 'gut instincts,' we propose the argument first articulated by Grol (1997) that evidence-based medicine should be complemented by evidence-based implementation. We will ultimately learn more about how interventions work to change transfusion practice if they are based on relevant evidence and theory.

Adopting an evidence-based approach

As an example, audit and feedback (A&F) has been extensively used as an intervention strategy to improve healthcare, and is widely used in transfusion (Tinmouth et al. 2005). In England, national audits of transfusion practice are conducted annually by NHS Blood Transplant (NHSBT). Yet, findings from these audits continue to highlight variability in transfusion practice and enduring discrepancies with clinical guidelines; raising in turn real questions about the effectiveness of current A&F strategies in the context of blood transfusion. It is generally recognized that systematic reviews are an invaluable source of information from which to obtain a comprehensive and integrated overview of the relevant evidence base for the intervention and context of interest (Mulrow, 1994; Murphy et al. 2011). The process of optimising A&F in blood transfusion may therefore be guided by evidence from systematic reviews from the wider literature regarding the effectiveness of A&F strategies across healthcare contexts (Ivers et al. 2012; Gardner et al. 2010; Jamdvet et al. 2006).

Early Cochrane reviews of A&F indicate small, albeit worthwhile, effects of 6-16% on clinical practice and patient outcomes (Jamtvedt et al. 2006). However, outcomes across A&F trials were found to also be heterogeneous, and the reasons for this heterogeneity were unclear (Jamtvedt et al. 2006). A recent, updated, Cochrane review of A&F interventions (Ivers et al. 2012) aimed to systematically disentangle this heterogeneity by examining multiple theory-informed A&F design characteristics in order to establish which specific intervention characteristics and components contribute to more effective

A&F interventions. Ivers et al. identified that A&F is more effective at changing practice when baseline performance is low, feedback is provided over multiple occasions, by colleagues or supervisors, in verbal and written formats, and includes explicit targets and action plans to change behaviour in light of feedback; thereby clarifying which intervention components contribute to the effectiveness of A&F (i.e. the 'active ingredients'). These findings provide an evidence-based rationale for selecting one A&F strategy over another in order to maximise likely effectiveness, and could inform how best to design (and *not* to design) future A&F interventions.

Developing a theory-based, multidisciplinary approach

The benefit of designing behaviour change interventions that target the specific, causal determinants of behaviour is increasingly recognized (Michie & Abraham, 2004; Craig et al. 2008). The use of theory offers a basis for generalizing lessons learned from one clinical context to another (Michie et al. 2008), and emerging evidence highlights that theory-based interventions are more effective than those that are not (Albarracin et al. 2005; Noar et al. 2005). Clinical practice is fundamentally a form of human behaviour, and may thus be examined and understood using behaviour change theory (Foy et al. 2007). Health psychology offers a range of theories and frameworks for understanding the causal determinants of behaviour and promoting behaviour change (Francis et al., 2012).

However, there are a plethora of theories available and it is not always clear which theory will be of relevance to explaining a specific target behaviour (Francis et al., 2012). There is also limited rationale to guide the selection of one theory over another (Patey et al. 2012). To address this, Michie et al. (2005) utilized an expert-consensus approach to systematically synthesize 128 constructs (i.e. concepts) from 33 distinct behaviour change theories. This synthesis resulted in the integrated Theoretical Domains Framework (TDF), which consists of 12 'theoretical domains' (Michie et al. 2005; Cane et al. 2012). Each domain represents a range of related constructs that potentially influence behaviour change. For example, the 'social influences' domain includes the constructs 'social support,' 'group norms' and 'social comparisons.' The TDF thus provides an accessible synthesis of behaviour change theories, which may

serve as a systematic framework for exploring implementation and investigating the determinants of behaviour (Francis et al., 2012; Patey et al. 2012).

Two examples in transfusion illustrate this multidisciplinary approach of applying psychological theory to further our understanding of factors implicated in blood transfusion behaviour change (Voorn et al. 2014, in this issue of ***Transfusion***; Francis et al. 2009). Both studies have specifically applied the TDF to identify the determinants of two distinct transfusion behaviours. Francis et al. (2009) applied the TDF to guide the structure of interviews conducted with consultants and neonatologists to explore the domains influencing blood transfusion practice in the intensive care unit and neonatal intensive care unit. Domains emerging as key influences on transfusion practice in this context included beliefs about consequences (e.g. 'the patient's condition deteriorating is a potential disadvantage of watching and waiting instead of transfusing'), social influences (e.g. 'we often make decisions as a team'), and behavioural regulation (i.e. strategies consultants might adopt to achieve change, e.g. 'If I were to change my practice it would be on the basis of evidence from trials that my transfusion practice needs to change…it would have to be fairly convincing evidence').

Similarly, Voorn et al. 2014 utilized the TDF to guide the development of a large-scale questionnaire aiming to assess the behavioural determinants of orthopaedic surgeons' and anaesthesiologists' intention to stop using blood saving measures that have not been shown to be (cost-)effective in the context of primary elective total hip and knee arthroplasties. Voorn et al. identified that the TDF domains associated with a low intention to stop using erythropoietin included 'motivation/goals' (e.g. 'lack of interest to save money') and 'social influences' (e.g. 'the impact of other parties'). Moreover, the domains influencing intention to stop perioperative blood salvage included 'beliefs about consequences' (e.g. 'concerns about patient safety') and 'skills' (e.g. 'losing experience with the technique').

Applying theory to develop targeted interventions

Application of theory and frameworks such as the TDF therefore provide a replicable approach to identifying determinants of behaviour change. Findings from both aforementioned studies (Francis et al, 2009; Voorn et al, 2014) represent potential breakpoints where the translation of evidence into practice may halt or fail; that is,

'structural weaknesses' in the 'evidence-practice bridge' (Tansella & Thornicroft, 2009). However, the TDF is a framework still in its infancy, and although theory and such TDF analyses highlight 'what' needs to be targeted for change, they provide limited guidance on 'how' best to target and strengthen these 'structural weaknesses.' Additional research has been conducted to map intervention components, known as 'behaviour change techniques,' (Michie et al. 2013) to domains from the TDF (Cane et al. 2014; Michie et al. 2008). Behaviour change techniques (BCTs), are the observable and replicable components of an intervention that are designed to alter or redirect causal determinants of behaviours (i.e. the proposed 'active ingredients' of interventions). Examples of BCTs include setting goals, making action plans, providing feedback on behaviour or outcome of behaviour (Michie et al. 2013). BCTs may be considered alongside identified behavioural determinants to design targeted interventions to change transfusion practice; in which intervention components are explicitly selected to address the relevant theoretical determinants behaviour change (Colquhoun et al. 2013).

For example, Voorn et al. (2014) identifies 'concerns about patient safety' as a key determinant of the use of blood saving measures. By applying this mapping process, one potential approach to targeting this determinant may involve an educational intervention highlighting to physicians the evidence about the safety to patients of not performing the aforementioned blood saving measures. The design of such an intervention may involve the inclusion of the behaviour change technique 'provide information on health consequences of the behaviour' (Michie et al. 2013). Similarly, Francis' et al (2009) finding that good, new evidence from research is needed for physicians to change their practice may provide the basis for an A&F intervention in which discrepancies between current practice and emerging, good evidence are presented. The design of such an intervention would thus include the behaviour change techniques 'provide feedback on behaviour,' and 'discrepancy between current behaviour and goals' (Michie et al. 2013). Furthermore, Francis et al.'s finding that decisions are nearly always made as a team highlights the need to develop team-level interventions to change blood transfusion practice rather than individual, physician-level interventions. This is in line with the notion that behaviour change within healthcare settings is complex due to the multi-level nature of healthcare organizations,

and is therefore likely to require multi-level change at both individual physician and organizational levels (Ivers et al. 2014; Ferlie and Shortell, 2001).

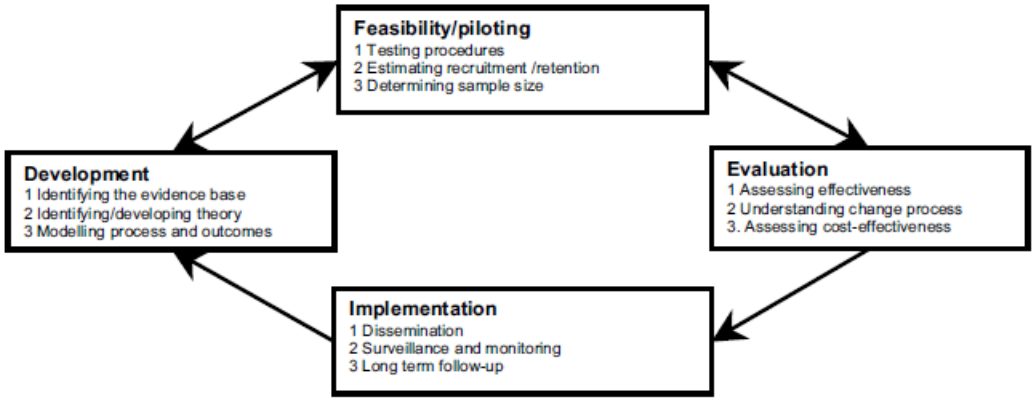
Benefits of an evidence- and theory-based multidisciplinary approach in blood transfusion

In summary, by drawing on evidence *and* theory we can start to identify what makes one behaviour change intervention more effective than another in the context of blood transfusion, and begin to shed light on the elusive 'black box' that is often used to refer to the difficulty of articulating how behaviour change interventions work (Grant et al. 2013). This equips us with the insight needed to develop a more systematic rationale and replicable approach to effectively supporting changes in blood transfusion practice. We believe that evidence and theory offer the 'nuts and bolts' needed to build a strong bridge between clinical evidence and current clinical practice. Multidisciplinary collaboration offers the range of expertise needed to effectively apply these nuts and bolts.

Thus, rather than approaching behaviour change in blood transfusion in isolation, there is potentially substantial insight to be gained, and valuable lessons to be learned, from the knowledge, experience and tools from implementation science, health psychology, and other disciplines. This systematic approach would facilitate the cumulative building of a body of knowledge about precisely 'what works' in changing transfusion practice. Voorn et al. (2014) and Francis et al. (2009) are but two examples of work being done to forge the path for evidence- and theory-based behaviour change in transfusion medicine. A further example, in the UK, is a five-year program of research, currently underway, that aims to apply evidence and theory to develop and evaluate two enhanced audit and feedback interventions to reduce unnecessary blood transfusions (i.e. the AFFINITIE study; Gould et al. 2014*).* The AFFINITIE study comprises four workstreams that draw on the systematic, methodological approach recommended in the UK Medical Research Council (MRC) guidance for developing and evaluating complex interventions (Craig et al. 2008): 1) intervention development; 2) feasibility and piloting; 3) evaluation; and 4) implementation (See Figure 1). The selection of intervention components in the initial intervention development stage will specifically draw on evidence from the Ivers et al. (2012) Cochrane review of A&F interventions,

the Francis et al. (2009) TDF study and additional TDF-based interviews to be conducted with the range of healthcare professionals involved in the blood transfusion A&F process. The AFFINITIE research team is multidisciplinary, comprising haematologists, trialists, clinical audit teams, health psychologists, social scientists, statisticians, health economists, and patient representatives. Approaching blood transfusion behaviour change more systematically, and working across disciplines, holds the potential to increase the rate of uptake of emerging evidence in clinical practice. This will in turn help realize the potential to save costs, conserve resources, and improve patient outcomes.

Figure 1. Key elements of the MRC Guidance for developing and evaluating complex interventions.



REFERENCES

Albarracín, D., Gillette, J., Earl, A., Glasman, L., Durantini, M., & Ho, M. (2005). A test of major assumptions about behavior change: a comprehensive look at the effects of passive and active HIV prevention interventions since the beginning of the epidemic. *Psychol Bull,* vol. 131(6):856-97.

Cane, J., Richardson, M., Johnston, M., Ladha, R., & Michie, S. (2014). From lists of behaviour change techniques (BCTs) to structured hierarchies: Comparison of two methods of developing a hierarchy of BCTs. *British Journal of Health Psychology,* In press.

Cane, J., O'Connor, D., & Michie, S. (2012). Validation of the theoretical domains framework for use in behavior change and implementation research. *Implement Sci* vol. **7**:37.

Colquhoun, H., Grimshaw, J., & Wensing. (2013). Mapping KT interventions to barriers and faciltiators. In *Knowledge Translation in Healthcare: moving from evidence to practice.* Edited by Straus, S., Tetroe, J., & Graham, I. 2nd Ed. BMJ Books, Wiley Blackwell: Oxford, UK.

Craig, P., Dieppe, P., Macintyre, S., Michie, S., Nazareth, I., Petticrew, M. (2008)., Medical Research Council: Developing and evaluating complex interventions: the new Medical Research Council guidance**.** *BMJ*, vol. 337:a1655.

Eccles, M. P., Armstrong, D., Baker, R., et al. (2009). An implementation research agenda. *Implement Sci, 4*, 18. doi: 10.1186/1748-5908-4-18

Ferlie, E., Shortell S. (2001). Improving the quality of health care in the United Kingdom and the United States: a framework for change. *Milbank Q*, vol. 79(2): 281-315.

Foy, R., Francis, J. J., Johnston, M., Eccles, M., Lecouturier, J., Bamford, C., & Grimshaw, J. (2007). The development of a theory-based intervention to promote appropriate disclosure of a diagnosis of dementia. *BMC Health Serv Res, 7*, 207. doi: 10.1186/1472-6963-7-207

Francis, J., O'Connor, D, Curran, J. (2012). Theories of behaviour change synthesized into a set of theoretical groupings: introducing a thematic series on the theoretical domains framework. *Implement Sci* vol. 7:35

Francis, J., Stockton, C., Eccles, M. et al. (2009). Evidence-based selection of theories for designing behaviour change interventions: Using methods based on theoretical construct domains to understand clinicians' blood transfusion behaviour. *British Journal of Health Psychology*, vol. 14(4):625-646

Gardner, B., Whittington, C., McAteer, J., Eccles, M. P., & Michie, S. (2010). Using theory to synthesise evidence from behaviour change interventions: the example of audit and

feedback. *Soc Sci Med, 70*(10), 1618-1625. doi: 10.1016/j.socscimed.2010.01.039

Gould, N. J., Lorencatto, F., Stanworth, S. J., Michie, S., Prior, M. E., Glidewell, L., ... & Francis, J. J. (2014). Application of theory to enhance audit and feedback interventions to increase the uptake of evidence-based transfusion practice: an intervention development protocol. *Implementation Science*, *9*(1), 92.Grol, R., & Grimshaw, J. (2003). From best evidence to best practice: Effective implementation of change in patients' care. *Lancet, 362*(9391), 1225-1230. doi:10.1016/s0140-6736(03)14546-1

Grol, R. (1997). Beliefs and evidence in changing clinical practice. *BMJ*, vol. 315: 418-425.

Grant, A., Treweek, S., Dreischulte, T., Foy, R., & Guthrie, B. (2013). Process evaluations for cluster-randomised trials of complex interventions: a proposed framework for design and reporting. *Trials, 14*, 15. doi: 10.1186/1745-6215-14-15

Grimshaw, J., Eccles, M., Lavis, J., Hill, S., & Squires, J. (2012). Knowledge translation of research findings. *Implement Sci*. vol 7(1):50

Ivers N., Jamtvedt G., Flottorp S., et al. (2012). Audit and feedback: effects on professional practice and healthcare outcomes. *Cochrane Database Syst Rev*, 6:CD000259.

Jamtvedt, G., Young, J. M., Kristoffersen, D. T., O'Brien, M. A., & Oxman, A. D. (2006). Audit and feedback: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*(2), CD000259. doi: 10.1002/14651858.CD000259.pub2

Michie, S., Richardson, M., Johnston, M., et al. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of behavioral medicine* 2013, vol. 46(1):81-95

Michie, S., Johnston, M., Francis, J., Hardeman, W., & Eccles, M. (2008). From theory to intervention: mapping theoretically derived behavioural determinants to behaviour change techniques**.** *Applied Psychology: an International Review* vol. 57**:**660-680.

Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D.. Walker, A. "Psychological Theory" Group. (2005). Making psychological theory useful for implementing evidence based practice: a consensus approach. *Quality & Safety in Health Care* 2005, vol. 14(1):26-33.

Michie, S., & Abraham, C. (2004). Interventions to change health behaviours: Evidence-based or Evidence-inspired? *Psychol Health, 19*.

Mulrow, C. (1994). Rationale for systematic reviews. *BMJ,* vol. 309 (6954):597-599.

Murphy, M., Waters, J., Wood, E., & Yazer, M. (2013). Transfusing blood safely and appropriately. *BMJ*, vol. 347, f4303.

Murphy M., Stanworth S., & Yazer, M. (2011). Transfusion practice and safety: current status and possibilities for improvement. *Vox Sang,* vol. 100:46-59.

Noar, S., & Zimmerman, R. (2005). Health behavior theory and cumulative knowledge regarding health behaviours: are we moving in the right direction? *Health Ed Res Theory Pract,* vol. 20: 275–290.

Patey, AM, Islam, R, Francis, JJ, Bryson, GL, Grimshaw, JM. (2012). For the Canada PRIME Plus Team. 2012. Anesthesiologists' and surgeons' perceptions about routine pre-operative testing in low-risk patients: application of the Theoretical Domains Framework (TDF) to identify factors that influence physicians' decisions to order pre-operative tests. *Implement Sci*. vol. 7:52

Sanguis Study Group. (1994). Use of blood products for elective surgery in 43 European hospitals*. Transfusion Medicine,* vol. 4: 251–268*.*

Tansella, M., & Thornicroft, G. (2009). Implementation science: understanding the translation of evidence into practice. *The British Journal of Psychiatry,* vol. 195: 283-285.

Tinmouth, A.*,* Macdougall, L.*,* Fergusson, D.*,* Amin, M.*,* Graham, I.D.*,* Hebert, P.C. *&* Wilson, K. (2005) Reducing the amount of blood transfused: a systematic review of behavioral interventions to change physicians' transfusion practices*. Archives of Internal Medicine,* vol. 165*,* 845–852*.*

Voorn, M., Maranag-van de Mheen, P., Wentink, M., et al. (2014). Perceived barriers among physicians for stopping non-cost effective blood saving measures in total hip and total knee arthroplasties. *Transfusion*, *In press*.

Voorn, M., Maranag-van de Mheen, P., Wentink, M., et al. (2013). Frequent use of blood saving measures in elective orthopaedic surgery: a 202 Dutch blood management survey. BMC Musculoskelet. Disord, vol. 14 (1): 230.

Wilson K, MacDougall L, Fergusson D, et al. (2002). The effectiveness of interventions to reduce physician's levels of inappropriate transfusion: what can be learned from a systematic review of the literature. *Transfusion,* vol. 42:1224-9.