Development of an interface-focused educational complex intervention

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\section*{Abstract}

\textbf{Background:} In many countries, the medical primary-secondary care interface is central to the delivery of quality patient care. There is prevailing interest in developing initiatives to improve interface working for the benefit of health care professionals and their patients. \textbf{Aim:} To describe the development of an educational intervention designed to improve working at the primary-secondary care interface in NHS Scotland (United Kingdom) within the context of the Medical Research Council framework for the development and evaluation of complex interventions. \textbf{Methods:} A primary-secondary care interface focused Practice-based Small Group Learning (PBSGL) module was developed building upon qualitative synthesis and original research. A ‘meeting of experts’ shaped the module, which was subsequently piloted with a group of interface clinicians. Reflections on the module were sought from clinicians across NHS Scotland to provide contextual information from other areas. \textbf{Findings:} The PBSGL approach can be usefully applied to the development of a primary-secondary care interface-focused medical educational intervention.

\section*{What is already known in this area}

Medical education is a complex intervention as defined in the MRC framework for the development and evaluation of complex interventions.

\section*{What this work adds}

Practice-based Small Group Learning (PBSGL), a validated educational method, may be usefully applied to the development and evaluation of a health service focused medical education intervention.

\section*{Suggestions for future research}

To explore the impact of an interface-focused medical education intervention and to determine valid and feasible outcomes for a randomised trial.

\section*{Background}

Primary care is the usual first point of contact for patients with a medical complaint, with some subsequently requiring more specialised secondary care [1]. Internationally, there are diverse expressions of this primary-secondary care interface, however similarities can be identified in most health care systems [2,3]. Primary and secondary care clinicians often have different perspectives and can act in separate ‘professional tribes’ [4].

Research has highlighted the importance of these clinician relationships and their potential to influence patient care, with clinicians viewing education as a tool for developing such interactions. Specialists are keen to stress that joint educational events with General Practitioners (GPs) should reflect ‘shared learning’ and not duplicate the traditional hierarchical process [5]. Interactive learning approaches have been shown to be effective in changing practice, particularly when involving small peer groups that cultivate trust, promote discussion of evidence focused on real cases, and with emphasis on integration of new knowledge into the practice environment [6,7]. Practice-based Small Group Learning (PBSGL) is an international not-for-profit programme centered on facilitating discussions between peers who understand the context in which patient care is practised, enabling a focus on the challenge of integrating evidence-based care with...
the complexity in which real patient problems present [8]. Key components of the programme include discussion with a concentration on reflection on practice, strategies to enhance change in practice, and commitment to practice change, all with the aim of improving patient care [9].

Medical educational interventions such as PBSGL, have more than one component part and meet the definition of a complex intervention (refer Table 1) [10,11]. The Medical Research Council (MRC) framework for the development and evaluation of complex interventions is a recognised model for developing clinical interventions. Whether it can be applied to a medical educational setting is an area of emergent interest. The innate complexity of medical education is recognised. M thinks et al. have thus called for medical education researchers to work within a complex interventions methodological framework [11].

From the outset, we have conceptualised our programme of work at the primary/secondary care interface within the MRC framework. This paper aims to improve the operation of the primary/secondary care interface by applying a PBSGL based educational intervention and elaborating a logic model for its subsequent development and evaluation.

**Table 1.** Dimensions of complexity and examples from proposed medical education based complex intervention.

<table>
<thead>
<tr>
<th>Dimension of complexity</th>
<th>Proposed medical education based complex intervention</th>
</tr>
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<tbody>
<tr>
<td>Number of and interactions between components within experimental and control interventions</td>
<td>Experience of participants in different PBSGL groups will vary depending on the nature of facilitator and facilitating style, and nature of the other participants within the group. No two group experiences will be exactly the same</td>
</tr>
<tr>
<td>Number and difficulty of behaviours required by those delivering or receiving the intervention</td>
<td>Facilitators need to help create a safe learning environment where relationships based on trust can be established, and where participants may feel able to express themselves in an honest way. Participants need to attend, and engage with peers who may not be well known to them, in a teaching format that may not be familiar to them</td>
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<tr>
<td>Number of groups or organisational levels targeted by the intervention</td>
<td>Groups of clinicians will by nature be heterogeneous, both in terms of learning style preferences, departmental culture, age and background</td>
</tr>
<tr>
<td>Number and variability of outcomes</td>
<td>Outcome measures will be based on self-reported changes in behaviour</td>
</tr>
<tr>
<td>Degree of flexibility or tailoring of the intervention permitted</td>
<td>Participants will vary in their preferred learning styles. A facilitator experienced in tailoring questions and statements according to the individual and group ‘life’ will be necessary</td>
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**Method**

**Context for the work**

The service context for this work is NHS Scotland, where GPs act as ‘gatekeepers’ to secondary care. NHS Grampian and NHS Highland (where the research was principally based) are two of the 14 regional health boards in NHS Scotland [12]. NHS Grampian is responsible for providing health and social care services to a population of over 500,000 people in the Northeast of the country, whilst NHS Highland (geographically, the largest Health Board, covering an area of 32,500 km²) serves a population of 320,000 people [13].

**PBSGL development in the context of the MRC framework**

The MRC framework sets out stages for the delivery and evaluation of complex interventions. These are (i) development (including identifying the evidence base, identifying theory, and modelling process and outcomes), (ii) feasibility/piloting (including testing procedures, estimating recruitment and retention and determining sample size), (iii) evaluation (including assessing effectiveness, understanding change process and assessing cost effectiveness) and (iv) implementation (including dissemination, surveillance and monitoring, and follow-up) [10]. These phases may not necessarily follow a linear course; evaluation will influence the process. We describe the development of the PBSGL Interface module in the context of a broader programme of work informed by the MRC Framework.

**Development stage: identifying the evidence base**

Using a meta-ethnographic method, we aimed to identify what patients perceive as important markers of care quality at the primary-secondary care interface [14,15]. The qualitative synthesis revealed key areas; barriers to care, communication, co-ordination, and ‘relationships and personal value’. These highlighted separate, but interrelating areas of patient experience and gave useful targets to guide the intervention. Patients reported tensions between primary and secondary care and that GPs and specialists were not working together [4,16,17]. We set out to explore the relationship, interactions, structures and processes of care between clinicians at the interface, the context in which they occur, and how this may be relevant to patient care. We undertook semi-structured interviews with a purposive sample of interface clinicians from both urban and rural areas [18]. Our findings suggested that the interface relationship between GPs and specialists influences patient care, and that clinicians see education as a
tool to develop such relationships [5]. Within this context a medical education based intervention could be usefully developed for use at the interface.

Development stage: identifying/developing theory

The PBSGL programme has an established pathway for developing PBSGL modules [19]. Our module development closely followed this. An initial email discussion between the module author (RS) and the module editor (RMcV) formulated the introduction and aims (see Box 1).

Box 1. Components of PBSGL module and their source

(1) Introduction and aims (established by module author and editor)
(2) Cases (scenarios developed with the help of the ‘meeting of experts’)
(3) Information section (made up of the evidence base derived from the first phase of the complex intervention development)
(4) Case Commentaries (developed by the module author and editor purposely to point participants to evidence contained in the information section)

We aimed to identify and describe the gap in clinical practice that the module and PBSGL process needed to address. Using evidence established in phase one of the complex intervention development [5,15], the author (RS) created an evidence-based information section for the module. He (RS) then facilitated a ‘meeting of experts’ from NHS Highland (four GPs, five specialists and one observer – RMcV) to share research findings and develop case scenarios, true to their practice experience. The meeting’s outcomes informed the PBSGL module case commentaries.

Development stage: modelling process and outcomes

Modelling a complex intervention prior to a full-scale evaluation can inform the design of both the intervention and the evaluation [20,21]. A logic model was developed to assess the causal relationships between the elements of our proposed intervention. Logic models are usually a graphical depiction of the relationships between the resources, activities, outputs and outcomes of a process [22].

Feasibility/piloting

A reviewer from secondary care (chosen for his reputation as a clinician ‘active’ at the interface, and to balance the author’s GP perspective) appraised the work, and suggested amendments. The module editor then reviewed the module making further suggestions for improvement. At this stage the module was complete and ready for content validation through piloting. The content reflected areas relevant to the interface offering cases for discussion which included communication, work transfer, education, relationships, and the role of the wider clinical team.

GPs and specialists in NHS Grampian, who previously expressed an interest in improving operation of the primary-secondary care interface (n = 141), were invited by email to take part in the content validation. Those accepting were asked to read the PBSGL module before attending a peer-facilitated small group meeting of interface clinicians. We aimed for equal numbers of GPs and specialists with a total group size of no more than ten. The group provided verbal and written feedback on the PBSGL module content.

Evaluation

The small group session, consisting of three GPs, three specialists, and a trained PBSGL facilitator, was audio-recorded to provide information to ‘shape’ the module. RS observed the meeting and took field notes, paying attention to clinician communication and behaviours. Participants’ views on the module content were sought at the end of the meeting using a bespoke evaluation questionnaire (Appendix 1). The module author and editor reflected upon participant feedback and made subsequent changes to the case scenarios.

Directors of Medical Education (DMEs) of the 14 Scottish Regional Health Boards (excluding the two DMEs covering NHS Highland and NHS Grampian, where the initial research was carried out) were asked by email to identify a GP and a specialist willing to provide contextual feedback on the authenticity of the case scenarios in reflecting their regional context). An example feedback from another Scottish Health Board is:

So, in summary, think Case 1 and 3 are fine. Case 2 ok, but not sure how much chat it would generate, and case 4 may need reworded for us locally

The module author and editor reflected on this feedback, and made subsequent changes to the module. This helped ensure the module was generalisable beyond the regions where the primary research had taken place.

We sought validation of our logic model from clinicians (GPs and specialists active at the interface), individuals involved in medical education (small group Facilitators, and educational leads within NHS Education for Scotland), medical education research (including a Dean for Learning and Teaching, and local ‘Research and Development’ Manager and Director), and individuals
with several of these roles asking, ‘Does it make sense?’ An example respondent quote which led to model modification is:

I wondered if the outcomes should really be potential outcomes. You still have to generate realistic and achievable outcomes via the pilot study and so the outcomes are potential at present – they are hoped for outcomes but may not be achieved.

A summary of our methodology, and how this links with MRC complex intervention guidance, is shown in Figure 1.

**Discussion**

**Summary**

The MRC complex intervention framework, qualitative synthesis and original research provided the evidence foundation, from which a ‘meeting of experts’ then developed a primary-secondary care focussed educational intervention (the PBSGL module). As part of the module development process, a logic model was created to help place the module in a wider research programme context. The PBSGL module was piloted with interface-based clinicians, and broader contextual shaping of the module took place involving clinicians across NHS Scotland.

**Is our intervention a complex intervention?**

Our intervention (the PBSGL module, used in a small group of interface clinicians) is a complex intervention as defined in the MRC framework [10], and meets all five possible aspects of complexity specified (Table 1) [11].

**Why the need for a complex intervention framework?**

The majority of medical education research is focused on developing theory or determining effectiveness; little research considers process, outcomes, cost-effectiveness, dissemination, monitoring or long-term follow up [11]. In a research context, viewing medical education as a complex intervention, may help investigators gain novel insights and design approaches to evaluation [11]. Further (as per the MRC framework), by identifying the evidence base at development stage (in our case by carrying out qualitative synthesis alongside original research), awareness of this relevant theory may be more likely to result in an effective intervention than a purely empirical or pragmatic approach [20,23].

**Why choose the MRC framework?**

The MRC framework is influential internationally, and has been widely cited [10]. Other approaches (e.g. normalisation process theory [24], or ‘multilevel interventions’ [25], or Hardemans ‘Causal modeling’ approach [26]) focus on specific aspects of intervention development and evaluation. The MRC framework provides clear, accessible guidance on how to take a step-by-step approach in the

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**Figure 1. Summary of methodology.**
development, testing and implementation of the whole non-linear complex intervention process.

**How applicable was the MRC complex intervention framework within a medical education setting?**

Campbell et al, in the context of complex intervention research, found it 'helpful to consider phases 0 (Preclinical or theoretical (why should this intervention work?)), 1 (Modelling (how does it work?)), and 2 (Exploratory or pilot trial (optimising trial measures)) of the stepwise approach as part of one larger iterative activity rather than as sequential stages [20]'. Similarly, the production of our module was progressed in a non-linear fashion, with the intervention development (the PBSGL module) taking place in tandem with the development of its evaluation. This approach helped stress the importance of understanding context, and doing groundwork prior to 'racing ahead [20]'. This is particularly important given the financial constraints within medical education evaluation and research [27].

**Strengths and weaknesses**

The original qualitative research (carried out to help identify the evidence base) was based in a single Health Board region. However pilot work in another Health Board region and feedback from other Scottish Health Board regions supported generalisability beyond the original study area. Evidence from qualitative synthesis (which formed part of the foundation upon which the module was built) offered an international perspective. The module may need modification for use in other countries.

This PBSGL module may benefit clinicians working at the primary secondary care interface. Enabling factors include project funding, support of primary and secondary care, support of NHS health boards, supportive collaboration of PBSGL, and use of NHS accommodation. ‘Limiting’ factors may include lack of financial resource, ‘limiting’ attitudes of potential participants, and the organisational contexts. Previous work has questioned the extent to which PBSGL modules influence the participant engagement [28]. By ensuring that interface clinicians

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**Figure 2.** A logic model illustrating the development of an interface-focused medical education based complex intervention, and the potential outcomes from its use.
were an integral part of the development and evaluation process, we aimed to influence participant engagement positively to enable its utilisation in a planned larger scale pilot.

The logic model (see Figure 2) helped to clarify the contribution of the module components to its expected outputs by assisting planning, process, and defining specific impact or outcome measures. Seeking confirmation of the logic model from those involved in medical education, and medical education research, led to small suggestions making logic model fit for purpose.

**Future work**

**In terms of the module**

Would similar work in another country produce similar results i.e. to what extent did clinicians and the specific work environment contribute to the intervention’s development?

Prior to the use of the PBSGL module in a definitive RCT, research to determine feasibility and acceptability is necessary. Involving several groups of interface clinicians, to gain further evaluation information, and determine impact may help in the creation of potential measurable outcome measures, to be tested and refined by an exploratory RCT.

**In terms of the use of the MRC framework in a medical education setting**

Exploration of the role of the MRC framework in developing educational interventions in other settings or interfaces is recommended. Additional research may help determine whether there are features unique to medical education that would merit development of its own construct within the complex intervention paradigm. Future research is needed to explore the cost of implementing a complex intervention framework setting versus a more pragmatic approach.

**Conclusion**

The MRC framework for complex intervention development serves as a useful guide for health service based medical education interventions. The development of the module is a significant point on a journey; future work will involve pilot implementation of the module to help determine definitive outcomes in preparation for a randomised trial.

**Conflicts of interest**

Professor Ronald MacVicar is project lead for the Practice Based Small Group Learning Project in the United Kingdom, co-developer of the educational intervention, and Dr Rod Sampson’s PhD co-supervisor. There is therefore some potential for conflicting interest given RMV’s substantial efforts in developing PBSGL methodology. PW is RS’s co-supervisor and has no conflicting interests to declare.

**Ethical approval**

The study gained University of Aberdeen College ethics Review Board approval (Reference number CERB/2015/10/1251).

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