Supplementary file 4

Examples and quotes in support of Context-Mechanism-Outcome-Configurations (CMOCs) and programme theory

	Examples
Supporting and preparing the visitor, engaging clinicians	
Programme design 1. When programme developers undertake to understand the needs of educational visits (EV) recipients (C) programmes can be designed to have greater relevance for the target audience (O) because they meet needs and address potential barriers (M). 2. When programmes are designed to meet the needs of specific clinicians (C) they are more likely to engage (O) because personal relevance is increased (M). 3. When visits take place in a clinician's practice environment (C), they are more likely to participate (O) because participation is convenient (M).	Topics are selected by surveying FPs [family physician], by scanning the literature for areas of interest, and to complement other provincial health initiatives. For users, the 3 factors that most encouraged the use of academic detailing (AD) were the relevance of the topic.[43] The delivery of care for RA has been shown to be suboptimal. In British Columbia (BC), we found low rates of DMARD use and referral to rheumatologists. Previous studies revealed that many FPs lacked confidence to undertake early diagnoses of RA, and prescription of DMARDs, as well as the need for a shift in approaching RA care. … FPs discussed the importance of ensuring that the content of the AD visit was relevant to their needs and clinical practice. Most FPs felt the topic was relevant because they had some RA patients, and relatively little knowledge of recent treatment guidelines and hence felt the need for updates.[46] Before developing the academic detailing interventions, we carried out a focus group among 8 practicing physicians from the 3 HCHP administrative divisions.[48] FP identified features the valued: Aspects of AD found convenient by participating FPs included: the flexibility of AD, the ability to incorporate CME into their working hours and plan visits according to their clinic schedules; not having to take time off or cancel their clinics; not having to travel for CME and the short duration of AD visits compared to other CME events.[38] Participants highlighted the convenience of the academic detailing session being carried out in their working environment.[50]
Evidence-based approach, credibility of programme and visitor 1. When a programme and visitors are affiliated with an organisation respected by clinicians (C1) and/or build on evidence that has been rigorously and transparently developed (C2) and/or has been endorsed by peers or experts	We research the evidence for each topic with the help of a drug evaluation pharmacist. A specialist physician and advisory board of 4 FPs ensure that the evidence-based information is clinically relevant. / For users and non-users, the 3 factors that most encouraged the use of AD were the evidence-based approach adopted in academic detailing, and the usefulness of the handout material.[43] Most providers appreciated having a service that would allow them to receive evidence-based assistance from qualified peers.[64]

(C3) and/or when participants do not suspect a programme has a 'hidden agenda' (C4) their credibility with and acceptance by clinicians increases (O) because both are perceived as independent, and free of bias and vested interests (M). 2. When information is balanced and controversy and uncertainty around latest evidence are acknowledged and discussed (C), the credibility of programmes and visitors is enhanced (O) because it demonstrates an understanding of complexity in clinical decision-making (M). 3. A discussion of synthesised, appraised evidence during visits (C), makes the visit useful for clinicians (O) because they are perceived as a time efficient way to gain knowledge and access to information (M).	When contrasting their own prescribing behavior with the EBM recommendations, the mismatches trigger them [GPs] to reflect on it.[12] We conducted one-on-one educational outreach meetings establishing - presenting both sides of controversial issues.[48] Even-handed acknowledgement of alternative points of view and uncertainty in clinical practice was a hallmark of each encounter.[52]
Practical recommendations 4. When evidence and data are presented to clinicians in a format that relates them to their practice (C), they are more likely to act on it (O), because it is clearer to the clinician what they could do (M). 5. When evidence and data that are relevant to clinicians clearly indicate a change in practice is needed that they were unaware of (C) clinicians may initiate change (O) because of cognitive dissonance (M).	We demonstrated the mismatch between patients' expectations and GPs' perceptions of these, stressing that the latter are described as important determinants favouring antibiotic prescribing, and we instructed the GPs on how to make patients' expectations regarding antibiotic prescribing explicit, and provided different strategies for different patient expectations. To overcome an uncomfortable prescribing decision made for GP-related reasons, we stated that watchful waiting would prevent complications more effectively than antibiotics, and would not jeopardize the doctor–patient relationship. … We thus tailored the interventions to overcome identified barriers.[39] FPs valued practical, as opposed to theoretical, information. The recent changes in RA guidelines were presented as practical "how to" information. Some FPs regarded the resource kit as facilitating information sharing with patients and increasing their involvement in care.[38] Each guideline contains clear recommendations for action linked explicitly to the best available evidence.[65]

Educational materials 6. When visitors can use professionally designed material during a visit (C), clinicians are more likely to engage (O) because materials and visitors are perceived as credible (M). 7. When clinicians are guided through educational or support materials during a visit (C), they are likely to use them later in practice (O) because they become familiar and make more sense (M).	For users and non-users, the 3 factors that most encouraged the use of AD were the evidence-based approach adopted in academic detailing, and the usefulness of the handout material.[43] The FPs described the written material left behind and toolkit as useful because it reinforced their learning or could serve as future reference…. A number of FPs found the resource kit useful because it contained everything relevant to RA management, making it practical to use during clinic.[38] The distilled evidence-based material was presented in a four-page brochure. The most important content was broken down to 4–5 key messages, which were outlined on the front page of the brochure, while the rest of the brochure was used to provide the evidence behind the key messages, background information and reference citations.[11] The printed materials consist of evidence-based information on the prevalence of urinary incontinence, an overview of the pharmacological and non-pharmacological interventions, cost of drugs to treat the condition, and key messages. Participants said they liked the educational materials because they had a clear layout and were easy to follow. They reported that they valued the succinct nature of the key messages.[50]
Hiring and training of visitors 8. When visitors come from a similar professional environment or background as the clinician (C), they more easily build rapport and discuss topic content because (O) they are familiar with the clinician's practice environment and/or they have a basic understanding of each other. 9. When visitors are well prepared (C), clinicians are more likely to participate and engage in visits (O) because they perceive visitors as credible and trustworthy (M).	They [GPs] view the ADs as knowledgeable professionals regardless of their educational background and regard them as equals even though they are not necessarily GPs. Some even see it as a bonus that the academic detailers have different background as this stimulates the discussion.[12] The detailers were trained by research team members who completed formal training from National Resources Center for Academic Detailing in April 2018. The standardized training included presentations related to AD, discussions on programme aims and logistics (i.e., scheduling visits and traveling details), and procedures for administering and filling out the instruments. Training also included visit simulations where detailer skills were assessed.[44]
The visit – interaction between visitor and clinician	

Building rapport & relationships 10. When visitors establish rapport with the clinician (e.g. through active listening and empathising with their practice) (C) clinicians are at ease (O) because they feel non-judged, respected and understood (M). 11. When an EV occurs one-on-one (C), the visitor can more easily adjust communication style and establish rapport and relationships with the clinician (O) because this is easier to do on an individual basis. (M). 12. When visitors build rapport continuously throughout their visit and over time (e.g. through paying attention to clinicians' needs, dialogue, learning from each other) (C), a relationship of trust develops (O) because clinicians perceive visitors as wanting to be of service (M).	The detailers felt that building relationships while detailing made the educational process much easier.[55] The educational approach was receptive and respectful, not prescriptive—"their place, their time, their colleague". ... The interview then had three stages: personal contact was established through active listening by the visitor to the GP's views, experiences and management practices for anxiety and insomnia. Perhaps some understanding remark would be made about the doctor's difficulties.[68] Participants described the interaction between the GP and the academic detailer as being important to the success of the intervention. They reported that the session worked because it felt relaxed and free of pressure.[50] Other factors, such as establishing cooperation (rated 2) and rapport with the practices (rated 4) were also important. The pharmacists reported a good rapport in 100 (71.9%) of first visits and in 86 (86.8%) of follow-up visits. This indicated a significant improvement in rapport at the follow-up visits.[63]
Eliciting needs 13. When an EV occurs one-on-one (C) the visitor has an opportunity to gain a better understanding of the clinician's knowledge, attitudes, practice and information needs (O) because it is easier to do on an individual basis (M). 14. When the needs, knowledge and practice of a clinician are known to the visitor (C), they can increase the personal relevance	Most detailers (N=7, 70%) described the importance of allocating sufficient time to prepare for provider visits, including conducting individual needs assessments to tailor sessions to individual providers' needs and those of their patient population.[64] The educational element of this method was a dialogue about perceived barriers to adhering to the guideline, either mentioned by the GP or elicited by the facilitator.[39] Visitors were trained to elicit and understand individual practitioner's needs so that when features of key messages were presented, benefits to individual practice could be perceived by the practitioner.[52]

of the visit for the clinician (O) because they have the ability to tailor topics and messages accordingly (M).	As part of the designed academic detailing educational outreach visit, a needs assessment was performed by the academic detailer to identify any gaps in knowledge or barriers to prescribing behavior change related to this topic.[74] During each visit, detailers assessed the physician's educational needs and used these to tailor the delivery of educational contents.[53]
Tailoring content 15. When visitors have elicited baseline knowledge and practice (C), they can assist individual clinicians to find suitable solutions to potential barriers (O) because they know what is relevant and achievable in a clinician's practice (M). 16. When visitors provide clinicians with evidence-based options for action that are feasible and reasonable for the individual (C) action is more likely to occur (O) because clinicians perceive these as achievable (M). 17. When a visit is tailored to a clinician's need and addresses potential barriers (C), commitment to change is more likely (O) because they are encouraged to elaborate on what and how they may change.	Detailing discussions were not fixed but rather adapted to the interests of the provider receiving the detailing.[61] The structure of visits was always flexible and designed to meet needs of practitioners. Key message presentation was not didactic in nature but tailored to specific interests and needs of practitioners.[52] They [GPs] do find the structured suggestions in the presentation easy to apply in daily practice but acknowledge that GPs always need to balance out and discuss with their patient what is achievable or acceptable for them.[12] About two out of three physicians (67%) thought the academic detailer should give guidelines for practice.[5] Users also indicated they had made practice changes based on information from academic detailers.[43] Once mutual respect and rapport was established, the visitor could then introduce educational material, starting from items of interest to the GP. Generally they tried to make no more than three points.[68] During each visit, detailers assessed the physician's educational needs and used these to tailor the delivery of educational contents.[53] Some FPs commented on the usefulness of the balanced and targeted information, in contrast to other CMEs where they felt over-loaded with information. … FPs valued practical, as opposed to theoretical, information.[38]
Interactive discussions of topic, uncertainty and controversy 18. When visitors create interactivity of discussion in their visits (C), visitor and clinician can learn from each other (O)	The educational approach was receptive rather than prescriptive: general Practitioners gave their own views on benzodiazepines and other topics.[66] The focus of this dialogue was, however, on dealing with barriers within the individual prescriber, especially in dealing with diagnostic uncertainty.[39] The ADs view their role as providing an accurate, up-to-date synthesis of relevant information on a particular topic in a balanced and preferably engaging way. … ADs put a lot of emphasis on

because they construct knowledge together (M). 19. When visitors encourage and engage in discussion on areas of controversy with clinicians (C), they increase their credibility (O) because the clinicians perceive them as open-minded, informed and independent (M). 20. When clinicians are encouraged to think critically about a topic (C), they are engaged with the visit and the topic (O) because they are participating actively (M). 21. When visitor and clinician openly and constructively discuss evidence, controversial issues and uncertainties in practice (C), it fosters a critical attitude and culture of critical thinking (O) because clinicians get used to elaborate and form their own opinions (M).	informing GPs, making the evidence available to them and educating them in how to interpret the evidence. Encouraging a culture of critical thinking, they inform GPs of uncertainties and controversies in the interpretation of the evidence.[12] Even-handed acknowledgement of alternative points of view and uncertainty in clinical practice was a hallmark of each encounter.[52] The physician would be given the opportunity to present objections, which were addressed by the detailer.[53] … We explain these terms to the physicians and let them decide about the final two As (Apply the information as they think appropriate, and Assess the results.) Our goal is similar to that of Habraken et al whose underlying aim was to stimulate a critical attitude in physicians by discussing the results of studies.[43] Both sides of controversial issues were presented before recommendations were made.[2]
Commitment to change 22. When topic messages are repeated by visitors at follow up visits (C), a sense of continuity and familiarity is created (O) because clinicians are reminded of previous visits and commitments. 23. When visitors are able to elicit a commitment to change (C), clinicians are more likely to actually change practice	The second round of visits provided an opportunity for coverage of aspects of the topic of particular interest to the practitioner and allowed subtle reinforcement of elements of key messages delivered at initial visits.[52] One high-exposure provider mentioned they were motivated to take action before meeting the detailer, but was a nice catalyst to help it come to fruition, enhance my motivation to bring forth a performance.[64] 89% felt they would make changes that would benefit patients, 97% stated that they increased their use of ACEs/ARBs, or were already using them, and 98% felt the information was useful. All detailers reported a marked increase in their own use of ACEs/ARBs for their own patients.[55]

(O) because their intention precedes behaviour (M).	The visitor obtained GPs' agreement to review five patients on long-term benzodiazepines; they also agreed to be telephoned 1 month later to give their assessment of the material and the patient review.[68] The AD intervention consisted of 2 scheduled face-to-face visits, approximately 6 weeks apart. The second AD visit was … to reinforce the AD components delivered in the initial visit.[59]
After the visit	
Provision of resources 24. When visitors perceive clinicians may need help with actioning practice change (C) where possible they will provide them with resources (O) because they want to make the change as easy as possible for the clinician (M). 25. When questions left unanswered during visits are followed up later (C), credibility of visitors and their service is increased (O) because they demonstrate reliability and commitment (M).	In a follow-up visit, the message of the first visit was repeated, questions asked during the first visit were answered, and the physician was asked for his opinion about the information given on NSAIDs.[60] If the academic detailer had been unable to answer specific questions during the visit, he or she brought the question back to the center to review the literature and/or discuss it with the team. Thereafter the answer was forwarded to the GP either by phone or by e-mail.[11] Questions raised by clinicians during the initial AD visit were collected by the detailers and shared with health system leadership to develop responses and provide an opportunity for system-wide improvements. The second AD visit was used as an opportunity to convey the health system leadership's responses to clinicians' questions and reinforce the AD components delivered in the initial visit.[2]