Practical Neurology

Implementing clinical guidelines

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IMPLEMENTING CLINICAL GUIDELINES: HOW TO DO IT

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ABSTRACT

Clinical guidelines that support practice and improve care are essential in this era of evidence-based medicine. However, implementing this guidance often falls short in practice. Sharing knowledge and auditing practice are important, but not sufficient to implement change. This article brings together evidence from the study of behaviour, education and clinical practice and offers practical tips on how practising neurologists might bring about change in the healthcare environment. Common themes include the importance of team working, multidisciplinary engagement, taking time to identify who and what needs changing and selecting the most appropriate tool(s) for the job. Engaging with the challenge is generally more rewarding than resisting and is important for the effective provision of care.

IMPLEMENTING CLINICAL GUIDELINES: HOW TO DO IT

In this era of evidence-based medicine, there is an abundance of new or updated guidance to follow for clinical and non-clinical aspects of healthcare. Implementing change is a challenge across multiple industries (Figure 1) and often guidelines are not adhered to in clinical practice. This is despite evidence that they can improve patient outcomes (Box 1). There has been a recent explosion in educational, social and behavioural research together

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Box 1. Examples where practice has not kept pace with evidence-based guidelines

Status epilepticus: Guidelines for convulsive status epilepticus, including prompt early (<10minutes) treatment with benzodiazepines, followed by adequate doses of a second-line antiepileptic medication have been in place for over 20 years, yet all published case series and audits show that outside of a clinical trials, this is delivered in only a minority of cases. Even where there is a local champion and specific targeted education, delay and substantial underdosing is frequent (local audit HC).

Valproate in women of childbearing age: Guidelines requiring all women of childbearing age to be adequately counselled about the risks of teratogenicity have been in place in most countries for many years, and specific guidance with respect to valproate and neurodevelopmental concerns mandated by the European Medicines Agency in 2014. Despite considerable publicity and widely available tools to support implementation, patient surveys and the number of pregnancies in women taking valproate suggested that practice had not changed sufficiently, such that a more stringent "pregnancy prevention program" has now been introduced.[2]

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with technological advances, and a parallel investment in knowledge synthesis and 'implementation science'.[3] This amounts to a large body of literature describing interventions to address health professional behavioural change and improve guideline adherence.

The Cochrane Effective Practice and Organisation of Care Group (EPOC)[4] has conducted and published 110 systematic reviews and 56 protocols to aid researchers in this field. A huge evidence database for interventions has been developed (the 'Rx for Change' database, available from https://www.cadth.ca/rx-change). Only a fraction relates directly to neurology but most reflects cross-discipline principles. Arguably, this is a topic of particular importance to neurologists, given the rapidly evolving clinical evidence base in some areas; also given that we are relatively few in number, we inevitably depend on influencing practice in others to bring about meaningful changes for patients.

In this 'How to do it' article we consider strategies to aid planning of successful interventions to improve guideline adherence and discuss different interventions to modify health professional behavioural change.

What do we want to change?

Audits of practice can often easily identify areas that need improving but need to be followed by work to unpick what factor(s)—individual, institutional and/or external—underpin why a best-practice guideline is not being followed. Is there a lack of awareness or understanding about the evidence or how to apply it? Are time pressures or other priorities a barrier? Where there is a collective responsibility, who is making sure it is actually delivered? Are there local formulary or prescribing policy barriers? Does the guideline fit with local service structures and resources, and if not, what needs to change?

Whom do we need to target?

Implementing a guideline and effecting behaviour change is not something that can be done in isolation. Similarly, whilst senior expertise and support can be crucial, a top down approach can alienate the very people who need to be engaged for successful implementation. Clinicians don't like to be preached at from on high. This is particularly the case if the recommendations are supported by resources or tools to support implementation, or they perceive the guidance to have come from "ivory towers", or managers motivated by financial rather than quality incentives. Patients and family members may need to be on board as facilitators; many guidelines depend on the support of interprofessional healthcare teams, and sometimes policy makers. Even at a local level, key individuals in the pathway, including consultants, specialist trainees, allied health professionals and managers, will each have a different knowledge base and need a tailored approach.

How should we go about it?

Implementing new practices requires a change in behaviour, which needs some understanding about what is influencing current behaviour, and what might stand in the way of the desired change. There are at least 83 theories of behaviour and behaviour change, [5] and a recent Cochrane review identified 15 proposed models to change healthcare professional behaviour alone.[6] Common to all is that the starting point should be an assessment of the likely barriers (and facilitators).[3] Box 2 summarises common barriers to clinician adherence to guidelines.

Box 2. Themes from a GMC-commissioned report into factors that impact on doctors adhering to good practice.[1](8)
Goals and incentives of doctors are sometimes misaligned with the goals of patients
Habits and patterns of behaviour can impede adherence to good practice guidelines
Reconciling personal judgement with guidelines involves assessing the available evidence
Team working and human factors influence good practice behaviours
Morale, workload and resources need to be effectively managed to enable doctors to make good decisions
Organisational structure may obstruct ongoing improvement and negatively impact on patient care

There is also general agreement[6] that beyond these additional steps we should:

- select key component(s) for intervention, informed by the identified barriers
- use behavioural/educational theory and available evidence to influence the choice of intervention
- ensure user engagement throughout, including the feasibility and acceptability of the intervention

Essentially, "for a behaviour change method to be effective, it must: (1) target a determinant that predicts behaviour; (2) be able to change that determinant; (3) be translated into a practical application in a way that preserves the parameters for effectiveness and fits with the target population, culture, and context".[7]

Planning for change requires careful analysis and thought. There is no 'one size fits all' but there are several models can help to structure the approach (Box 3).

Box 3. Intervention design models Summarized from [5-9]

ADDIE	**A**nalysis (identify the target and needs); **D**evelopment (define behaviour, learning outcomes, sequence); **D**esign (Specify content and medium); **I**mplementation; **E**valuation
Plan–Do–Study–Act (PDSA)	A structured experimental learning approach to service improvement, which aims to learn as quickly as possible whether an intervention works in a particular setting, with informed adjustments on each cycle.
COM-B	Analysis of **C**apabilities (physical and psychological), **O**pportunities (physical and social) and **M**otivations (reflective and automatic) that influence **B**ehaviour. Identified target behaviour(s) can then be mapped to appropriate interventions

What potential tools are available?

The choice of intervention(s) depends on the goal of intervention, who is the audience, and what are the barriers. Sharing new knowledge, learning new skills, raising awareness, addressing habits or altering perceptions of risk may each need different strategies.[7] In broad terms, educational/informative approaches can improve adherence to practice but there is less evidence that these alone will improve patient outcomes. Action and monitoring such as audit/feedback and checklist/reminders can improve processes and practice, with likely but uncertain effectiveness on outcome; good use of media can be important where a persuasive framework is key.[10]

Table 1 summarises the several systematic reviews on specific methods in this field. The evidence is highly varied, often with methodological problems (e.g. using different comparators, lacking definition/standardisation for the interventions, varying in how best to measure the outcome), and often of low quality. There is also likely publication bias that may overemphasise the benefits. Some interventions are rarely used alone but instead as part of a multifaceted approach. At least some of the variability (Table 1) likely reflects confounding within and across reviews, so a similarity of observed effects is perhaps not surprising. Most of the studies were powered to detect a 10–20% difference, though this does not preclude a greater effect in well-designed and tailored interventions. There is little comparative literature—most are studies of one intervention versus none (placebo)[11]—and it is often difficult to establish a control group.

Educational meetings (interactive, didactic and mixed educational meetings) are commonly used to modify health professional behaviour, and are certainly effective although this is likely to be limited to simple behavioural changes.[11] The role of *local opinion leaders,* a role "earned and maintained by technical competence, social accessibility and conformity to the systems norms",[12] is difficult to separate from the nature of the intervention, but likely of some benefit, and certainly widely use by industry whenever new trial or licensing data become available. However. such meetings can be labour intensive, with or without opinion leaders: the reliability and validity of those involved is crucial, and their cost and cost-effectiveness is largely unknown. *E-learning* is now commonplace, and employers frequently use it for mandatory training. It is at least as effective as other learning methods for improving knowledge, is cost effective and promotes self-efficacy,[13 14]. However, most of the literature is in undergraduate populations, with very few evaluating clinician behaviour and none looking at patient outcomes. Whatever the format, interventions with built-in self-assessment and simulation are likely better than those without, and well-designed live and e-simulations can also enhance skills.

Audit and feedback, now embedded in many clinical governance structures, is effective, though more so in some situations than others. Audits undertaken as part of a structured

national programme can have huge impact, especially if accompanied by sufficient funding and organisational change. Thus the Sentinel Stroke National Audit Programme (SSNAP) https://www.strokeaudit.org/ was a key driver towards the now widespread implementation of hyperacute stroke units and thrombolysis. Similarly, _reminders and checklists_ that prompt health care professionals to perform an action, can clearly modify simple behaviours. This has been shown in preventative medicine, disease management and prescribing, and in improving patient outcomes in surgical fields.[15] The proliferation of guidelines means the checklist can become unfeasibly long: with individual patients seeing multiple members of a care team over time, particularly in chronic disease management, it can become increasingly difficult to track what has and has not been addressed according to best practice. The move to _electronic records_ brings the potential for automatic individualised computerised prompts,[16][17], although sometimes the change to electronic records can be less effective than expected[16]. _Computerised decision support tools_ can improve practitioner performance, though the impact on patient outcomes is less clear. [17] For example, following a root cause analysis into treatment delays for paediatric status epilepticus—which identified substantial contributors were delayed decision making and uncertainties about timing of next steps—a computerised standard treatment protocol that prompted timed interventions very significantly (>50%) improved the time to the patient receiving both first and second line treatments.[18] Similar prompting devices also very successfully supported the delivery of recent clinical trials in status epilepticus. [19][20]

The _mass media_ is frequently targeted by those wanting to influence patients and professional behaviour. A 2002 systematic review[21] showed that using the mass media can consistently change the behaviour of both patients and health professionals. The mass media can be a force for good and harm (giving false expectations, dashing hope, provoking alarm; all of which can be divisive for therapeutic relationships), although it is difficult to measure effect size, Although there has been no more recent review, the more widespread and varied social media influences mean that the media's influence is probably now even greater.

Table 1: Interventions to influence practice and behaviour

Intervention	Definition	Summary	Effect Size
Interventions primarily targeting knowledge			
Educational Meetings	Courses, workshops, conferences or other educational meetings, attended in person (with or without additional simultaneous webcasting)	**Effective** Improved effects with: greater attendance in didactic setting; mixed interactive and didactic components and focus on outcomes perceived as serious. Unlikely effective alone for changing complex behaviours	Median adjusted risk difference (ARD) in compliance with desired practice 6% (IQR 1.8–15.9)[22]
E learning	A subtype of educational materials, but defined here as any educational intervention that is mediated electronically via the Internet asynchronously[a], including videos, podcasts, online modules	**Likely Effective** At least as effective as traditional learning methods, particularly those including interactivity, self-assessment and/or simulation, but no studies on behaviour or patient outcomes.	Insufficient data

Distribution of Educational Materials	Distribution (personally or through mass mailings) of published or printed recommendations for clinical care, including clinical practice guidelines, audio-visual materials and electronic publications.	**Can be effective (small effect) w**hen used alone, and compared to no intervention. No evidence of added benefit as part of multifaceted intervention	Median ARD guideline adherence vs no intervention 2% (IQR 0–11%)[23]
Educational Outreach visits	Personal visits by a trained person to health workers in their own settings, to provide information, which can include provider feedback, with the aim of changing practice."	**Likely effective** Alone or combined with other interventions small but potentially important effects at least on prescribing;	Median ARD in compliance with desired practice 5.6% (IQR 3–9%)[24]
Local Opinion leaders	Identifying and using identifiable people considered "educationally influential" to promote good clinical practice.	**Likely effective** Evidence limited due to heterogenous studies, with the role of the opinion leader sometimes not clearly identified	Median ARD 12% in compliance with desired practice (6–14.5%)[12]
Interventions primarily targeting process			
Audit and feedback	Any summary of clinical performance (from medical records, database, patient observations) over a specified period of time, provided with written, electronic or verbal feedback which can include specific recommendations	**Effective** (small but important effects) More effective if feedback is delivered verbally and in writing; is provided from an influential person; contains a clear action plan; is given on more than one occasion and includes both explicit targets	Median ARD in compliance with desired practice 4.3% (IQR 0.5–16%)[25]
Reminders	Manual or computerised interventions that prompt health workers to perform an action during a consultation with a patient, for example checklists, or computer decision support systems.	**Effective** Likely to be more effective if delivered automatically at the point of care, requires input from the user, and contains reference to influential source	Median improvement in processes of care 4.2% (IQR 0.8–18.8%)[16]
Financial Incentives	Financial incentives such as fee for service, target payments	**Uncertain benefit** Can be effective for improving processes of care, costs, referrals and admissions but generally ineffective for improving adherence to guidelines, and no data on patient outcomes	Insufficient data
Other			
Mass media	Communications via television, radio, papers, posters, leaflets and social media aimed at great numbers, or the population.	**Effective** but effect is limited over time	Hard to measure, can do harm and good
Multifaceted interventions	Use of two or more intervention strategies	**Uncertain benefit** Intuitively likely, but a lack of robust evidence and more costly/complex to implement	Insufficient data

Table 1: Definitions amended from published reviews[4][10]; [a]Self-directed, undertaken flexibly, and without additional human facilitation e.g. online tutorials, so excluding formal distance learning courses. ARD = adjusted risk difference.

Considering guideline adherence at the outset

If you are a guideline producer or contributor, consider early on the potential needs and values of your stakeholders, as well as potential barriers to implementation including costs. Factors that improve implementation include creating alternate versions for different purposes; providing summaries of recommendations with evidence; including information within the guidelines to aid intervention design and suggested intervention strategies; and descriptions of ways to monitor guideline use.[26] Clinical guidelines produced by NICE (National Institute for Health and Care Excellence, www.nice.org.uk) NICE for example typically include defined quality auditable standards, sometimes clinician or commissioner toolpacks, and other system-based factors to promote implementation. Including such tools does improve adherence[27] although its cost-effectiveness is largely untested.

So what should we do?

If you're now feeling as daunted by the prospect of a service improvement project as we became when reviewing the literature for this review, fret not. The first, and possibly most important message is to recognise that whilst some aspects of a service improvement or guideline implantation project can be done by one or two people, really effecting change needs a more systemic approach. Work as a team, and be sure to involve relevant local clinicians, managers, other health professionals and, where appropriate, patients from the outset. Implementation is more successful when clinicians are themselves engaged in tailoring, reflecting on, and evaluating the project, as was seen with the WHO surgical checklists.[15] Where time and resources are scarce, consider prioritising one key service improvement project at a time, with sub-packages led by different team members with a long term iterative strategy, rather than multiple individual parallel projects on different topics. Guidelines are not static and evolve over time; they accelerate the process of reducing variation in care, but need to respond to change in knowledge, innovation and accepted practice. Box 4 gives some examples of implementation in practice, and Figure 1 also illustrates some challenges and solutions. Many of the change models are simple, but that does not mean easy – it is easy to underestimate the methodological expertise, time and sustained effort required particularly for planning and reflection.[9]

For employers and organisations, ensure your workforce is educated and informed not just about best practice guidelines, but also about implementing change and design theory. There is much less evidence about how best to influence change in organisations, but an increasing recognition that leaving this to market forces, individual clinicians, or local champions is insufficient, and a more strategic considered approach is needed. The recent UK NHS "Getting it Right First Time" http://gettingitrightfirsttime.co.uk/ drive to improve patient outcomes and expanding interest in design thinking[28] are evidence of this.

Ultimately, there will always be situations where implementation cannot be delivered without substantial new investment, as with disease modifying treatments for Multiple Sclerosis (Box 4). If that is the case, but you have worked with stakeholders in an evidenced based way in reaching that conclusion, this is still better for all concerned than throwing your hands up in despair.

Figure 2: A: Illustrative Flow chart. B: Bone health example: One consultant led on the audits, creation of local guidance, leaflets and texts for general practitioners largely independently between 2008 and 2013. As shown (C: Adherence), group improvements were disappointing, with considerable individual variation (range 13–47% adherence by responsible consultant) despite consensus in the planned approach, and availability of the leaflets/texts across the group. Identified barriers included lack of understanding of the reasoning, knowledge of which team member should be responsible, and differences of opinion about the wording of leaflets. Subsequently, we delivered an educational intervention (lecture, sharing published articles); all members of the group, and the local bone health (rheumatology leads) contributed to amend guidance and leaflets; the neurology care group lead formally mandated the revised document as policy. Also under consideration are a computerised bone health prompt incorporated within hospital electronic records and/or checklists on clinic letter templates. We shall re-audit following this.

> ### Box 4. Example where guidelines have influenced practice, both evolving over time
>
> **Multiple Sclerosis:** The Association of British Neurologists (ABN) published guidelines in 1999 for using licensed treatments for multiple sclerosis (MS). These were revised in 2001, and following the implementation of the UK MS risk-sharing scheme, they formed the basis of the eligibility criteria for NHS funded treatment. Over subsequent years, revised guidelines were published as newer therapies became available. Importantly, the risk-sharing scheme included considerable investment from the pharmaceutical industry and the NHS, funding new MS nurse specialist posts in particular, without which implementation would have been impossible.
>
> In 2015, with the advent of several new treatments, a further revision summarised available evidence for treatment, but acknowledged gaps in current knowledge. Importantly, the guidelines supported individual clinician and patient decision making, within an overarching framework of appropriate action.
>
> As treatment approaches for multiple sclerosis have become established, a new treatment algorithm, this time published by NHS England, embeds the approach to MS treatment guidelines in formal multi-disciplinary team (MDT) structures, retaining decision-making flexibility, but mandating aspects of governance and outcome reporting. The guidelines explicitly ensure safe and effective prescribing, also reducing excessive variation in practice.
>
> - Guidelines evolve within a context of clinical knowledge and service delivery priorities; understanding the environment is crucial
> - Alignment of objectives (clinical and patient) with system drivers (especially funding) is a key influencer in the uptake and adherence to guidelines
> - Guidelines particularly help where there is uncertainty about best practice, and variation in care provision. The structured consensus of experts in the field, and acknowledgement of gaps in the evidence base, with a framework that promotes individual clinician and patient decision making can be very successful in reducing excessive variation in practice.

Conclusion

Love them or hate them, guidelines are here to stay. Ultimately we are all in the business of doing the best we can for our patients, and our practice will be measured against guidelines at some point, if not as part of our own reflective practice, then by others. Engaging with the challenge is generally more rewarding than resisting, and this has been identified as important for the effective provision of care.[1] Importantly, substantial change is possible even where there are multiple barriers, for example as has occurred in relation to managing multiple sclerosis (Box 4). So, reflect on this article, on what aspects of your local service you know could be improved, discuss with your colleagues and managers, and when you have agreed a topic, identify a pool of trainees and if available students keen to engage in service improvement. There is much to learn, but also great reward when things go well – for patients, and for those driving and delivering change.

Key points

- Work as a team and involve relevant stakeholders from the outset; do not underestimate the methodological expertise, time and sustained effort required.
- In order to inform intervention targets, identify what needs to be changed, who needs to be involved, and what factors are influencing relevant behaviour(s).
- Choose your interventions carefully to support change, using existing knowledge about behaviour, educational tools, and models for implementing change.
- Think about implementation and tools to support delivery from the beginning when creating guidelines.

Figure 1 legend. 'Making Change Happen' a sign for tea plantation workers outside Dambatenne Tea Factory, Sri Lanka, highlighting that making change happen is relevant regardless of industry, profession and geographical location

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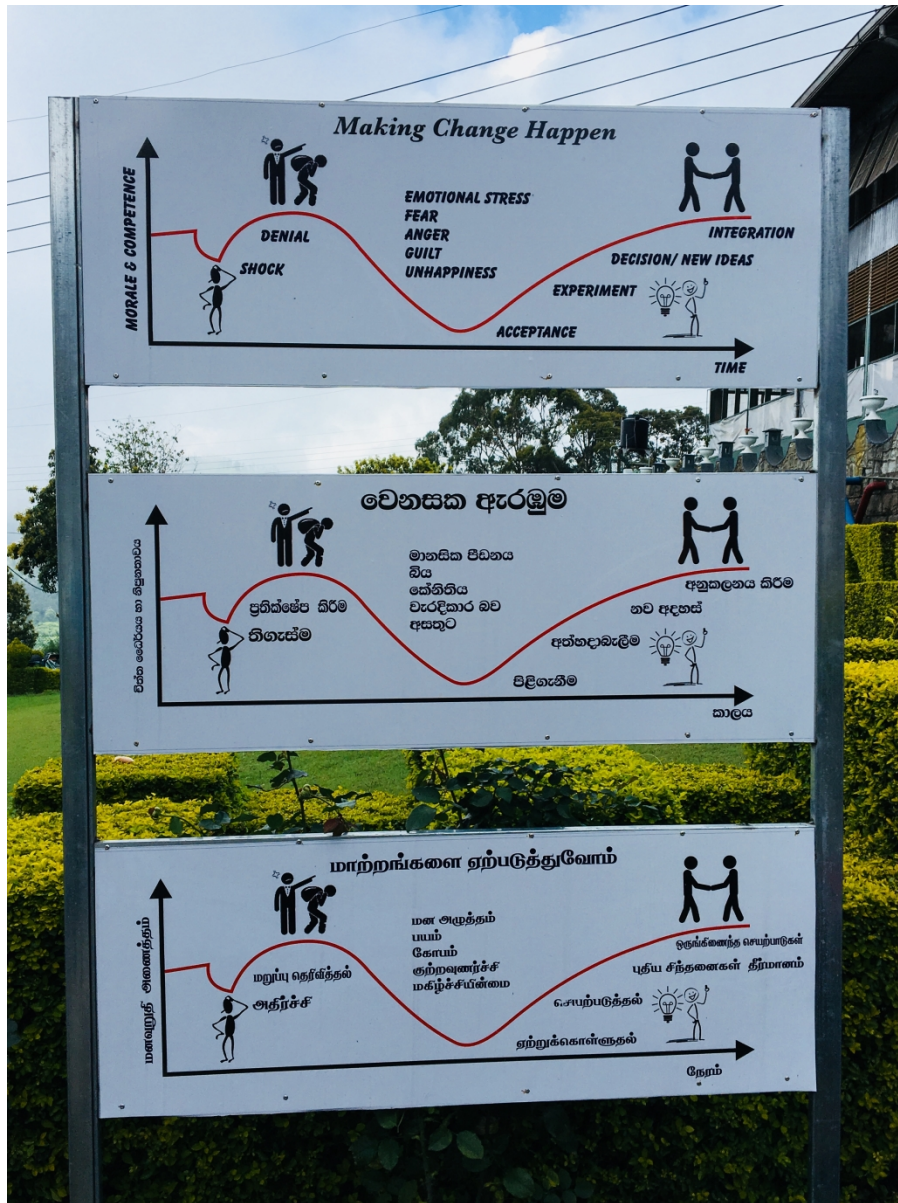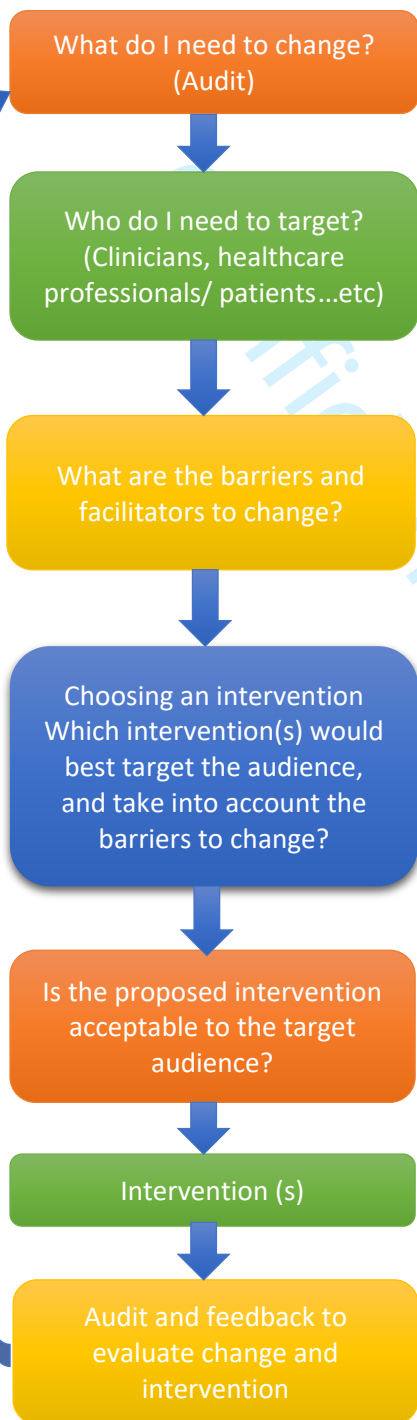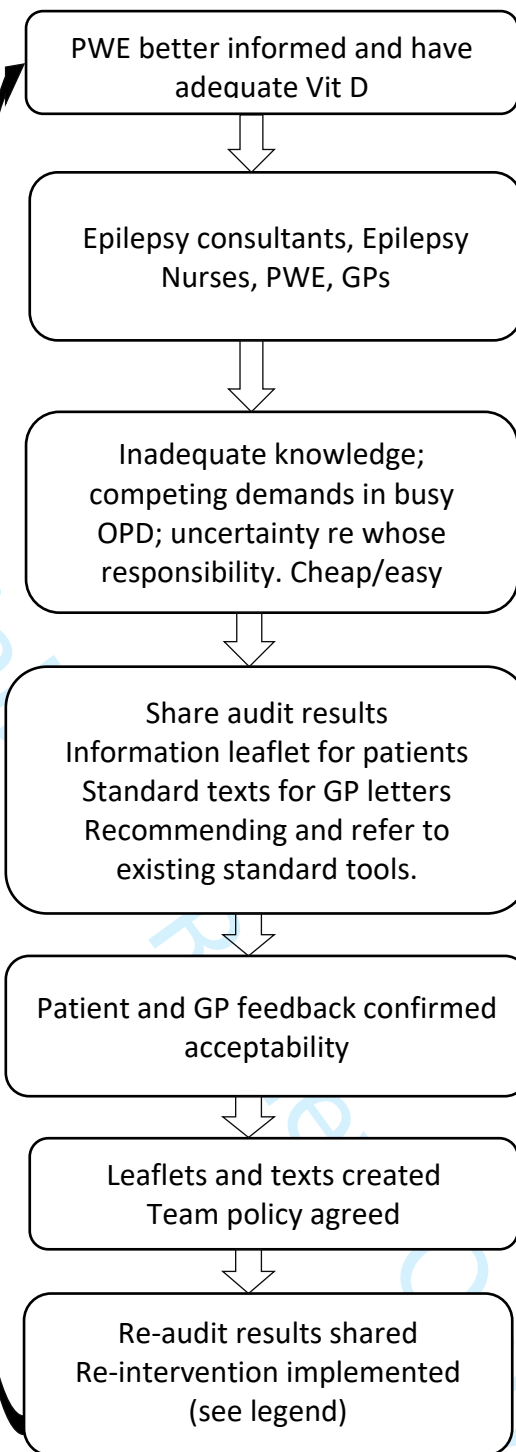
Figure 1. 'Making Change Happen' a sign for tea plantation workers outside Dambatenne Tea Factory, Sri Lanka, highlighting that making change happen is relevant regardless of industry, profession and geographical location

A: Flow chart

B: Bone health in epilepsy example

C: Guideline adherence

What do I need to change?
(Audit)

Who do I need to target?
(Clinicians, healthcare
professionals/ patients...etc)

What are the barriers and
facilitators to change?

Choosing an intervention
Which intervention(s) would
best target the audience,
and take into account the
barriers to change?

Is the proposed intervention
acceptable to the target
audience?

Intervention (s)

Audit and feedback to
evaluate change and
intervention

PWE better informed and have
adequate Vit D

Epilepsy consultants, Epilepsy
Nurses, PWE, GPs

Inadequate knowledge;
competing demands in busy
OPD; uncertainty re whose
responsibility. Cheap/easy

Share audit results
Information leaflet for patients
Standard texts for GP letters
Recommending and refer to
existing standard tools.

Patient and GP feedback confirmed
acceptability

Leaflets and texts created
Team policy agreed

Re-audit results shared
Re-intervention implemented
(see legend)

2008
16.7%

2013
31.8%

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ABSTRACT

Clinical guidelines that support practice and improve care are essential in this era of evidence-based medicine. However, implementing this guidance often falls short in practice. Sharing knowledge and auditing practice are important, but not sufficient to implement change. This article brings together evidence from the study of behaviour, education and clinical practice and offers practical tips on how practising neurologists might bring about change in the healthcare environment. Common themes include the importance of team working, multidisciplinary engagement, taking time to identify who and what needs changing, and selecting the most appropriate tool(s) for the job. Engaging with the challenge is generally more rewarding than resisting, and is important for the effective provision of care.

IMPLEMENTING CLINICAL GUIDELINES: HOW TO DO IT

In this era of evidence-based medicine, there is an abundance of new or updated guidance to follow for clinical and non-clinical aspects of healthcare. Implementing change is a challenge across multiple industries (Figure 1) and often guidelines are not adhered to in clinical practice. This is despite evidence that they can improve patient outcomes (Box 1). There has been a recent explosion in educational, social and behavioural research together

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Box 1. Examples where practice has not kept pace with evidence-based guidelines

Status epilepticus: Guidelines for convulsive status epilepticus, including prompt early (<10minutes) treatment with benzodiazepines, followed by adequate doses of a second-line antiepileptic medication have been in place for over 20 years, yet all published case series and audits show that outside of a clinical trials, this is delivered in only a minority of cases. Even where there is a local champion and specific targeted education, delay and substantial underdosing is frequent (local audit HC).

Valproate in women of childbearing age: Guidelines requiring all women of childbearing age to be adequately counselled about the risks of teratogenicity have been in place in most countries for many years, and specific guidance with respect to valproate and neurodevelopmental concerns mandated by the European Medicines Agency in 2014. Despite considerable publicity and widely available tools to support implementation, patient surveys and the number of pregnancies in women taking valproate suggested that practice had not changed sufficiently, such that a more stringent "pregnancy prevention program" has now been introduced.[2]

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with technological advances, and a parallel investment in knowledge synthesis and 'implementation science'.[3] This amounts to a large body of literature describing interventions to address health professional behavioural change and improve guideline adherence.

The Cochrane Effective Practice and Organisation of Care Group (EPOC)[4] has conducted and published 110 systematic reviews and 56 protocols to aid researchers in this field. A huge evidence database for interventions has been developed (the 'Rx for Change' database, available from https://www.cadth.ca/rx-change). Only a fraction relates directly to neurology but most reflects cross-discipline principles. Arguably, this is a topic of particular importance to neurologists, given the rapidly evolving clinical evidence base in some areas; also given that we are relatively few in number, we inevitably depend on influencing practice in others to bring about meaningful changes for patients.

In this 'How to do it' article we consider strategies to aid planning of successful interventions to improve guideline adherence and discuss different interventions to modify health professional behavioural change.

What do we want to change?

Audits of practice can often easily identify areas that need improving but need to be followed by work to unpick what factor(s)—individual, institutional and/or external—underpin why a best-practice guideline is not being followed. Is there a lack of awareness or understanding about the evidence or how to apply it? Are time pressures or other priorities a barrier? Where there is a collective responsibility, who is making sure it is actually delivered? Are there local formulary or prescribing policy barriers? Does the guideline fit with local service structures and resources, and if not, what needs to change?

Whom do we need to target?

Implementing a guideline and effecting behaviour change is not something that can be done in isolation. Similarly, whilst senior expertise and support can be crucial, a top down approach can alienate the very people who need to be engaged for successful implementation. Clinicians don't like to be preached at from on high. This is particularly the case if the recommendations are supported by resources or tools to support implementation, or they perceive the guidance to have come from "ivory towers", or managers motivated by financial rather than quality incentives. Patients and family members may need to be on board as facilitators; many guidelines depend on the support of interprofessional healthcare teams, and sometimes policy makers. Even at a local level, key individuals in the pathway, including consultants, specialist trainees, allied health professionals and managers, will each have a different knowledge base and need a tailored approach.

How should we go about it?

Implementing new practices requires a change in behaviour, which needs some understanding about what is influencing current behaviour, and what might stand in the way of the desired change. There are at least 83 theories of behaviour and behaviour change, [5] and a recent Cochrane review identified 15 proposed models to change healthcare professional behaviour alone.[6] Common to all is that the starting point should be an assessment of the likely barriers (and facilitators).[3] Box 2 summarises common barriers to clinician adherence to guidelines.

Box 2. Themes from a GMC-commissioned report into factors that impact on doctors adhering to good practice.[1](8)
Goals and incentives of doctors are sometimes misaligned with the goals of patients
Habits and patterns of behaviour can impede adherence to good practice guidelines
Reconciling personal judgement with guidelines involves assessing the available evidence
Team working and human factors influence good practice behaviours
Morale, workload and resources need to be effectively managed to enable doctors to make good decisions
Organisational structure may obstruct ongoing improvement and negatively impact on patient care

There is also general agreement[6] that beyond these additional steps we should:

- select key component(s) for intervention, informed by the identified barriers
- use behavioural/educational theory and available evidence to influence the choice of intervention
- ensure user engagement throughout, including the feasibility and acceptability of the intervention

Essentially, "for a behaviour change method to be effective, it must: (1) target a determinant that predicts behaviour; (2) be able to change that determinant; (3) be translated into a practical application in a way that preserves the parameters for effectiveness and fits with the target population, culture, and context".[7]

Planning for change requires careful analysis and thought. There is no 'one size fits all' but there are several models can help to structure the approach (Box 3).

Box 3. Intervention design models Summarized from [5-9]

ADDIE	**A**nalysis (identify the target and needs); **D**evelopment (define behaviour, learning outcomes, sequence); **D**esign (Specify content and medium); **I**mplementation; **E**valuation
Plan–Do–Study–Act (PDSA)	A structured experimental learning approach to service improvement, which aims to learn as quickly as possible whether an intervention works in a particular setting, with informed adjustments on each cycle.
COM-B	Analysis of **C**apabilities (physical and psychological), **O**pportunities (physical and social) and **M**otivations (reflective and automatic) that influence **B**ehaviour. Identified target behaviour(s) can then be mapped to appropriate interventions

What potential tools are available?

The choice of intervention(s) depends on the goal of intervention, who is the audience, and what are the barriers. Sharing new knowledge, learning new skills, raising awareness, addressing habits or altering perceptions of risk may each need different strategies.[7] In broad terms, educational/informative approaches can improve adherence to practice but there is less evidence that these alone will improve patient outcomes. Action and monitoring such as audit/feedback and checklist/reminders can improve processes and practice, with likely but uncertain effectiveness on outcome; good use of media can be important where a persuasive framework is key.[10]

Table 1 summarises the several systematic reviews on specific methods in this field. The evidence is highly varied, often with methodological problems (e.g. using different comparators, lacking definition/standardisation for the interventions, varying in how best to measure the outcome), and often of low quality. There is also likely publication bias that may overemphasise the benefits. Some interventions are rarely used alone but instead as part of a multifaceted approach. At least some of the variability (Table 1) likely reflects confounding within and across reviews, so a similarity of observed effects is perhaps not surprising. Most of the studies were powered to detect a 10–20% difference, though this does not preclude a greater effect in well-designed and tailored interventions. There is little comparative literature—most are studies of one intervention versus none (placebo)[11]—and it is often difficult to establish a control group.

Educational meetings (interactive, didactic and mixed educational meetings) are commonly used to modify health professional behaviour, and are certainly effective although this is likely to be limited to simple behavioural changes.[11] The role of *local opinion leaders,* a role "earned and maintained by technical competence, social accessibility and conformity to the systems norms",[12] is difficult to separate from the nature of the intervention, but likely of some benefit, and certainly widely use by industry whenever new trial or licensing data become available. However. such meetings can be labour intensive, with or without opinion leaders: the reliability and validity of those involved is crucial, and their cost and cost-effectiveness is largely unknown. *E-learning* is now commonplace, and employers frequently use it for mandatory training. It is at least as effective as other learning methods for improving knowledge, is cost effective and promotes self-efficacy,[13][14]. However, most of the literature is in undergraduate populations, with very few evaluating clinician behaviour and none looking at patient outcomes. Whatever the format, interventions with built-in self-assessment and simulation are likely better than those without, and well-designed live and e-simulations can also enhance skills.

Audit and feedback, now embedded in many clinical governance structures, is effective, though more so in some situations than others. Audits undertaken as part of a structured

national programme can have huge impact, especially if accompanied by sufficient funding and organisational change. Thus the Sentinel Stroke National Audit Programme (SSNAP) https://www.strokeaudit.org/ was a key driver towards the now widespread implementation of hyperacute stroke units and thrombolysis. Similarly, _reminders and checklists_ that prompt health care professionals to perform an action, can clearly modify simple behaviours. This has been shown in preventative medicine, disease management and prescribing, and in improving patient outcomes in surgical fields.[15] The proliferation of guidelines means the checklist can become unfeasibly long: with individual patients seeing multiple members of a care team over time, particularly in chronic disease management, it can become increasingly difficult to track what has and has not been addressed according to best practice. The move to _electronic records_ brings the potential for automatic individualised computerised prompts,[16 17], although sometimes the change to electronic records can be less effective than expected[16]. _Computerised decision support tools_ can improve practitioner performance, though the impact on patient outcomes is less clear. [17] For example, following a root cause analysis into treatment delays for paediatric status epilepticus—which identified substantial contributors were delayed decision making and uncertainties about timing of next steps—a computerised standard treatment protocol that prompted timed interventions very significantly (>50%) improved the time to the patient receiving both first and second line treatments.[18] Similar prompting devices also very successfully supported the delivery of recent clinical trials in status epilepticus. [19 20]

The _mass media_ is frequently targeted by those wanting to influence patients and professional behaviour. A 2002 systematic review[21] showed that using the mass media can consistently change the behaviour of both patients and health professionals. The mass media can be a force for good and harm (giving false expectations, dashing hope, provoking alarm; all of which can be divisive for therapeutic relationships), although it is difficult to measure effect size, Although there has been no more recent review, the more widespread and varied social media influences mean that the media's influence is probably now even greater.

Table 1: Interventions to influence practice and behaviour

Intervention	Definition	Summary	Effect Size
Interventions primarily targeting knowledge			
Educational Meetings	Courses, workshops, conferences or other educational meetings, attended in person (with or without additional simultaneous webcasting)	**Effective** Improved effects with: greater attendance in didactic setting; mixed interactive and didactic components and focus on outcomes perceived as serious. Unlikely effective alone for changing complex behaviours	Median adjusted risk difference (ARD) in compliance with desired practice 6% (IQR 1.8–15.9)[22]
E learning	A subtype of educational materials, but defined here as any educational intervention that is mediated electronically via the Internet asynchronously[a], including videos, podcasts, online modules	**Likely Effective** At least as effective as traditional learning methods, particularly those including interactivity, self-assessment and/or simulation, but no studies on behaviour or patient outcomes.	Insufficient data

Distribution of Educational Materials	Distribution (personally or through mass mailings) of published or printed recommendations for clinical care, including clinical practice guidelines, audio-visual materials and electronic publications.	**Can be effective (small effect) w**hen used alone, and compared to no intervention. No evidence of added benefit as part of multifaceted intervention	Median ARD guideline adherence vs no intervention 2% (IQR 0–11%)[23]
Educational Outreach visits	Personal visits by a trained person to health workers in their own settings, to provide information, which can include provider feedback, with the aim of changing practice."	**Likely effective** Alone or combined with other interventions small but potentially important effects at least on prescribing;	Median ARD in compliance with desired practice 5.6% (IQR 3–9%)[24]
Local Opinion leaders	Identifying and using identifiable people considered "educationally influential" to promote good clinical practice.	**Likely effective** Evidence limited due to heterogenous studies, with the role of the opinion leader sometimes not clearly identified	Median ARD 12% in compliance with desired practice (6–14.5%)[12]
Interventions primarily targeting process			
Audit and feedback	Any summary of clinical performance (from medical records, database, patient observations) over a specified period of time, provided with written, electronic or verbal feedback which can include specific recommendations	**Effective** (small but important effects) More effective if feedback is delivered verbally and in writing; is provided from an influential person; contains a clear action plan; is given on more than one occasion and includes both explicit targets	Median ARD in compliance with desired practice 4.3% (IQR 0.5–16%)[25]
Reminders	Manual or computerised interventions that prompt health workers to perform an action during a consultation with a patient, for example checklists, or computer decision support systems.	**Effective** Likely to be more effective if delivered automatically at the point of care, requires input from the user, and contains reference to influential source	Median improvement in processes of care 4.2% (IQR 0.8–18.8%)[16]
Financial Incentives	Financial incentives such as fee for service, target payments	**Uncertain benefit** Can be effective for improving processes of care, costs, referrals and admissions but generally ineffective for improving adherence to guidelines, and no data on patient outcomes	Insufficient data
Other			
Mass media	Communications via television, radio, papers, posters, leaflets and social media aimed at great numbers, or the population.	**Effective** but effect is limited over time	Hard to measure, can do harm and good
Multifaceted interventions	Use of two or more intervention strategies	**Uncertain benefit** Intuitively likely, but a lack of robust evidence and more costly/complex to implement	Insufficient data

Table 1: Definitions amended from published reviews[4 10]; [a]Self-directed, undertaken flexibly, and without additional human facilitation e.g. online tutorials, so excluding formal distance learning courses. ARD = adjusted risk difference.

Considering guideline adherence at the outset

If you are a guideline producer or contributor, consider early on the potential needs and values of your stakeholders, as well as potential barriers to implementation including costs. Factors that improve implementation include creating alternate versions for different purposes; providing summaries of recommendations with evidence; including information within the guidelines to aid intervention design and suggested intervention strategies; and descriptions of ways to monitor guideline use.[26] Clinical guidelines produced by NICE (National Institute for Health and Care Excellence, www.nice.org.uk) NICE for example typically include defined quality auditable standards, sometimes clinician or commissioner toolpacks, and other system-based factors to promote implementation. Including such tools does improve adherence[27] although its cost-effectiveness is largely untested.

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So what should we do?

If you're now feeling as daunted by the prospect of a service improvement project as we became when reviewing the literature for this review, fret not. The first, and possibly most important message is to recognise that whilst some aspects of a service improvement or guideline implantation project can be done by one or two people, really effecting change needs a more systemic approach. Work as a team, and be sure to involve relevant local clinicians, managers, other health professionals and, where appropriate, patients from the outset. Implementation is more successful when clinicians are themselves engaged in tailoring, reflecting on, and evaluating the project, as was seen with the WHO surgical checklists.[15] Where time and resources are scarce, consider prioritising one key service improvement project at a time, with sub-packages led by different team members with a long term iterative strategy, rather than multiple individual parallel projects on different topics. Guidelines are not static, and evolve over time; they accelerate the process of reducing variation in care, but need to respond to change in knowledge, innovation and accepted practice. Box 4 gives some examples of implementation in practice, and Figure 1 also illustrates some challenges and solutions. Many of the change models are simple, but that does not mean easy – it is easy to underestimate the methodological expertise, time and sustained effort required particularly for planning and reflection.[9]

For employers and organisations, ensure your workforce is educated and informed not just about best practice guidelines, but also about implementing change and design theory. There is much less evidence about how best to influence change in organisations, but an increasing recognition that leaving this to market forces, individual clinicians, or local champions is insufficient, and a more strategic considered approach is needed. The recent UK NHS "Getting it Right First Time" http://gettingitrightfirsttime.co.uk/ drive to improve patient outcomes and expanding interest in design thinking[28] are evidence of this.

Ultimately, there will always be situations where implementation cannot be delivered without substantial new investment, as with disease modifying treatments for Multiple Sclerosis (Box 4). If that is the case, but you have worked with stakeholders in an evidenced based way in reaching that conclusion, this is still better for all concerned than throwing your hands up in despair.

Figure 2: A: Illustrative Flow chart. B: Bone health example: One consultant led on the audits, creation of local guidance, leaflets and texts for general practitioners largely independently between 2008 and 2013. As shown (C: Adherence), group improvements were disappointing, with considerable individual variation (range 13–47% adherence by responsible consultant) despite consensus in the planned approach, and availability of the leaflets/texts across the group. Identified barriers included lack of understanding of the reasoning, knowledge of which team member should be responsible, and differences of opinion about the wording of leaflets. Subsequently, we delivered an educational intervention (lecture, sharing published articles); all members of the group, and the local

bone health (rheumatology leads) contributed to amend guidance and leaflets; the neurology care group lead formally mandated the revised document as policy. Also under consideration are a computerised bone health prompt incorporated within hospital electronic records and/or checklists on clinic letter templates. We shall re-audit following this.

Box 4. Example where guidelines have influenced practice, both evolving over time

Multiple Sclerosis: The Association of British Neurologists (ABN) published guidelines in 1999 for using licensed treatments for multiple sclerosis (MS). These were revised in 2001, and following the implementation of the UK MS risk-sharing scheme, they formed the basis of the eligibility criteria for NHS funded treatment. Over subsequent years, revised guidelines were published as newer therapies became available. Importantly, the risk-sharing scheme included considerable investment from the pharmaceutical industry and the NHS, funding new MS nurse specialist posts in particular, without which implementation would have been impossible.

In 2015, with the advent of several new treatments, a further revision summarised available evidence for treatment, but acknowledged gaps in current knowledge. Importantly, the guidelines supported individual clinician and patient decision making, within an overarching framework of appropriate action.

As treatment approaches for multiple sclerosis have become established, a new treatment algorithm, this time published by NHS England, embeds the approach to MS treatment guidelines in formal multi-disciplinary team (MDT) structures, retaining decision-making flexibility, but mandating aspects of governance and outcome reporting. The guidelines explicitly ensure safe and effective prescribing, also reducing excessive variation in practice.

- Guidelines evolve within a context of clinical knowledge and service delivery priorities; understanding the environment is crucial
- Alignment of objectives (clinical and patient) with system drivers (especially funding) is a key influencer in the uptake and adherence to guidelines
- Guidelines particularly help where there is uncertainty about best practice, and variation in care provision. The structured consensus of experts in the field, and acknowledgement of gaps in the evidence base, with a framework that promotes individual clinician and patient decision making can be very successful in reducing excessive variation in practice.

Conclusion

Love them or hate them, guidelines are here to stay. Ultimately we are all in the business of doing the best we can for our patients, and our practice will be measured against guidelines at some point, if not as part of our own reflective practice, then by others. Engaging with the challenge is generally more rewarding than resisting, and this has been identified as important for the effective provision of care.[1] Importantly, substantial change is possible even where there are multiple barriers, for example as has occurred in relation to managing multiple sclerosis (Box 4). So, reflect on this article, on what aspects of your local service you know could be improved, discuss with your colleagues and managers, and when you have agreed a topic, identify a pool of trainees and if available students keen to engage in service improvement. There is much to learn, but also great reward when things go well – for patients, and for those driving and delivering change.

Key points

- Work as a team and involve relevant stakeholders from the outset; do not underestimate the methodological expertise, time and sustained effort required.

- In order to inform intervention targets, identify what needs to be changed, who needs to be involved, and what factors are influencing relevant behaviour(s).
- Choose your interventions carefully to support change, using existing knowledge about behaviour, educational tools, and models for implementing change.
- Think about implementation and tools to support delivery from the beginning when creating guidelines.

Figure 1 legend. 'Making Change Happen' a sign for tea plantation workers outside Dambatenne Tea Factory, Sri Lanka, highlighting that making change happen is relevant regardless of industry, profession and geographical location

Provenance and peer review. Commissioned. Externally peer reviewed by Paul Cooper, Manchester, UK.

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