Applying the science of behaviour change to the management of strangles

The Strangles Symposium in 2019 gathered equine stakeholders from across the industry to discuss the management and prevention of strangles in the UK. The understanding of *Streptococcus equi* is increasing as is the ability to identify and treat the disease. There is real potential to reduce the incidence of the disease, as highlighted through the guidance produced by experts in 2021. It has been recognised that the preventative measures identified require the behaviour of people across the equine industry to alter. The science of human behaviour change can support the veterinary profession in applying effective, evidence-based interventions to optimise the success of these changes. Pinpointing what behaviours are or are not being performed, and researching what is motivating these behaviours, is key to forming strategies within veterinary practice and at UK policy level, to ensure a targeted and consistent approach is available for people within the equine sector.

https://doi.org/10.12968/ukve.2021.5.3.110

Jo White BA MSc, **Kayna Prescott** BSc CCAB and **Suzanne Rogers** BSc Hons. Human Behaviour Change for Animals, Norfolk, UK. jo@hbcforanimals.com

Key words: strangles | infectious disease | human behaviour change

Strangles (*Streptococcus equi*) is a disease that is endemic across the world, causing disruption and economic losses where outbreaks occur (Rendle et al, 2021). Strangles is a prevalent infectious equine disease in the UK, with a mortality rate of between 1 and 10% (Boyle et al, 2018) and it is also very challenging to manage. *Streptococcus equi* cannot survive outside the horse long, but horses can remain infectious for prolonged periods of time without showing clinical signs. *S. equi* can be transmitted through fomites and has been shown to survive in the environment for up to 3 days. It can survive longer in winter, as well as in water for 4–6 weeks. Taking these factors into account, it is imperative that the behavioural actions or inactions of people working with equids are understood if this disease is to be effectively managed and prevented.

In 2019, equine sector stakeholders took part in a workshop facilitated by Human Behaviour Change for Animals (HBCA) at the Strangles Symposium, which examined how to improve prevention and management of the disease. Many suggestions were put forward for how the veterinary and wider equestrian community could address strangles and it became clear that to make a difference, it is vital to apply the science of behaviour change. Unless we can change human behaviour, we will not achieve the desired impact regarding prevention and management of strangles (White, 2019). Following on from the symposium, sector experts joined together to develop best practice guidance on diagnosing and managing strangles (Rendle et al, 2021).

The guidance highlighted that there is the potential to eradicate strangles from the UK. We have the tools to identify the disease before it becomes infectious, we can identify and cure carrier animals, we can use effective biosecurity to reduce transmission across environments, yet strangles is still prevalent in the UK. In order to prevent the spread of strangles, four key recommendations have been identified (Rendle et al, 2021):

- Quarantine – strangles has a variable incubation period from as little as 1 day to up to 28 days. Also, a horse that has recovered from the clinical signs might remain infectious for up to 6 weeks.
- Identification of carriers – up to 75% of outbreaks result in carriers of the disease. Horses can carry the infection in their guttural pouch without clinical signs and can continue to spread the disease.
- Accurate identification of clinical signs – before becoming infectious and displaying clinical signs, a horse's temperature can become raised. Identifying and isolating a horse at this stage can prevent further infections. Initial clinical signs can present as atypical, with just nasal discharge or mild lymph node swelling, without the commonly considered symptoms of very swollen lymph nodes or abscesses. These atypical cases may go unidentified, leading to a further spread of infection.
- Vaccination – work into vaccination is ongoing. Current vaccination is into the upper lip and provides cover for 3–6 months. A new vaccination is in development, which can

be given intramuscularly, but this only offers a limited period of protection from the disease. However, strategic short-term protection is still beneficial, especially during high-risk periods such as weaning, mixing young horses or for horses that frequently travel.

For each of these recommendations to be effective relies on human behaviour at multiple levels across the equine sector. Owners can make small changes to their daily lives to reduce the risk of transmission between horses on a yard, or choose to get their horse vaccinated. Livery yard owners can affect the opportunity for horses to be exposed to high-risk animals and control the quarantine facilities available. Professionals including farriers, equine dentists or physiotherapists moving between yards can improve their biosecurity procedures to reduce transmission by fomites. All of these are relatively small changes, yet knowledge about these key preventative actions does not always result in sustained behaviour change that has the potential to significantly reduce the transmission of strangles. It has been identified that more positive messaging about vaccinations is required (Rendle et al, 2021), but unless we have a good understanding of the behaviour that requires change, the interventions may be ineffective at best.

Human behaviour change frameworks

The science of human behaviour change incorporates a breadth and depth of different disciplines and expertise that we can learn from, first to understand behaviour and then how to change it (*Figure 1*). A systemic approach is required, as a 'one size fits all' approach to understanding and developing behaviour change interventions is likely to narrow the focus too much and reduce impact by not recognising interrelated factors. For example, it is easy to oversimplify how change happens and to believe that if we provide resources to 'increase knowledge and awareness' then behaviour change will subsequently occur. However, there is a wealth of evidence indicating that just raising awareness or increasing knowledge alone is unlikely to deliver effective and sustained behaviour change. This is because there are many influencing factors. Evidence from the field of human health research supports a theory-based approach to understanding a target behaviour and developing a suitable intervention. Indeed, the success of the intervention might increase with the number of theories included (Bluethmann et al, 2017).

Consider the owner of a competition yard that facilitates international travel for high-value horses; their motivation for the yard to remain strangles-free is likely to be high because of the potential risks to their business. In the case of strangles, support to ensure that the manager makes changes to the management of the yard and to ensure that the changes are consistently applied over time, enough to become habitual, is likely to result in sustained change. This can then be used as a case study for other people in similar positions. There are many ways that such support could be delivered, including through involvement of the yard's equine vet. A different approach would be needed for an owner who keeps their horses at home and was buying a new horse, but who had not considered quarantine in the moving process. Owners such as this might have a low perception of the risks involved and therefore not be motivated to change their plans of introducing the horses without any precautions. Monitoring and evaluating the effectiveness of interventions can inform and drive future behaviour change interventions, to support strangles prevention strategies in different areas of the country or across different levels of threat.

To bring together the body of work considering human behaviour change, HBCA developed four principles connected to understanding behaviour and developing interventions, which can be considered at the level of the individual, community or at policy level. These relate to evidence-based theories and models of behaviour and behaviour change and are as follows:

1. Change is a process: sustained change involves several steps and there are various models and frameworks that explore these stages and processes. For example, an owner may not consider strangles to be a potential threat to them on a small yard as they do not travel their horse, so they may see a campaign about improving biosecurity between horses on yards, but not feel that it applies to them and they may not change their behaviour.
2. Understanding psychology is key in driving change: understanding the psychological factors involved in behaviour change, as well as how new behaviours are developed or maintained, is necessary for planning effective projects to drive change. For example, a small livery yard owner may not have had a case of strangles for 15 years and if told to provide a quarantine area for new horses coming onto the yard to achieve a level of certification, may seek out numerous reasons why this is not financially viable or necessary based on their own personal experience and beliefs. They may reject the idea or not implement it over time. This is known as confirmation bias – people are less likely to take on information if it does not fit with their currently held beliefs and experiences.
3. The environment influences change: physical, cultural and policy-based environments influence whether or not change will occur and whether the change will be sustained. For example, if it is easy and cost-effective to include a strangles test in the pre-purchase examination, a horse owner is more likely to consent than if it is a separate test that is potentially more expensive or uncomfortable for the horse.
4. Change must be 'owned': for change to be sustainable it needs to be owned by the person who is undertaking the change, not forced upon them by others. This concept is recognised in sev-

Figure 1. The variety of disciplines and and research that help us understand human behaviour and how to change it.

eral fields, including motivational interviewing and participatory approaches. For example, a professional who has experienced strangles and travels between yards may incorporate better biosecurity and advertise it as a positive section of their business, which can positively influence others.

Applying the science of human behaviour change can enhance the impact and achieve better results in day-to-day practice. Achieving a greater understanding of why a client may not comply with the advice and instructions given, such as ways to improve their biosecurity when travelling to shows, can lead to more effective interventions by correctly framing communications regarding the person's values and beliefs. It is also important to note the role of motivation in ensuring that the desired behaviour is performed, together with working to develop positive routines and habitual behaviour that will deliver sustained change, as well as to achieve a better understanding of when to turn to other intervention approaches such as modelling, coercion or environmental restructuring, for example.

HBCA's approach focuses on three stages: understand, change and impact (*Figure 2*). The phases outline the approach to the development of the resource and comprise of the following elements:

- Understand: using an evidence assessment, reviewing the literature and data available, or undertaking relevant research to gain further insight.
- Change: frame the findings, together with behaviour change frameworks and evidence-based models, to identify opportunities for change.
- Impact: ensure that recommendations or proposals are evidence-based and can be developed further, to ensure that the impact of any resulting interventions is assessed.

From beginning to end, monitoring and evaluation is included, as well as research and development, to ensure lessons are learned, innovation can take place and impact is measured.

Transtheoretical model of change

The transtheoretical model of change (Prochaska and DiClemente, 1984; Prochaska et al, 1992) is a stages of change model that suggests that a person's decision-making process and intentional behavioural change occurs by moving through stages and is not a single movement from one way of behaving to another. Developed to identify an individual's readiness for changing their current behaviour, it enables target groups to be split into categories depending on their state of preparedness for change. The transtheoretical model of change is made up of five sequential stages that an individual transitions through as they change from one behaviour to another: pre-contemplation, contemplation, preparation, action, and maintenance. It also recognises that a person may relapse and move back to a former stage at any point. The early stages of the transtheoretical model of change relate to an intention to change (pre-contemplation, contemplation, and preparation) whereas the later stages focus on the actual behaviour change (action, maintenance and termination) (Prochaska et al, 1992; Kowalski et al, 2014).

When we consider these stages in relation to strangles prevention and management, we can start to consider how we can be more targeted with the resources and information practices can provide.

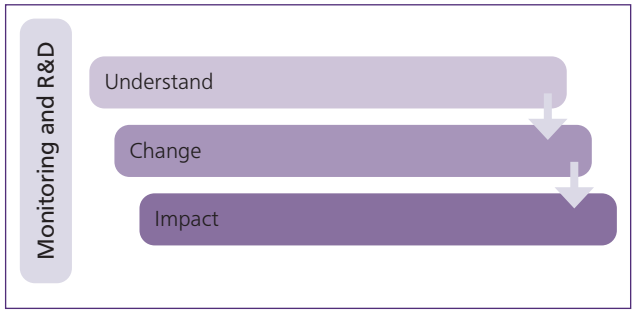

Figure 2. Stages of a project, campaign or programme. R&D = research and development.

If an area has very low rates of strangles and horse owners or livery yard owners have little knowledge about the threat of strangles or the impact it could have, then they are at the pre-contemplation stage. Therefore, providing educational material in newsletters or engaging in a strangles awareness week on social media may be beneficial to move the owner to the contemplation stage of considering their options. However, this approach might not be as effective with people who are at the stage of preparation, as these individuals are aware of the potential threat and are poised with the intention to act and change their behaviour, perhaps by researching potential actions on the internet. At this stage, positive engagement, to explore the options they could implement in their own unique situation, could work towards enabling them to form positive biosecurity behaviours or more closely monitor the horses' health by taking their temperature regularly. Ultimately these behaviours would become routine and habitual as the person moves into the maintenance stage. Encouraging clients to provide their own solutions, with suitable information and evidence to guide them, is indicated to have better success at behaviour change than a solution-led process (Miller and Rollnick, 2013).

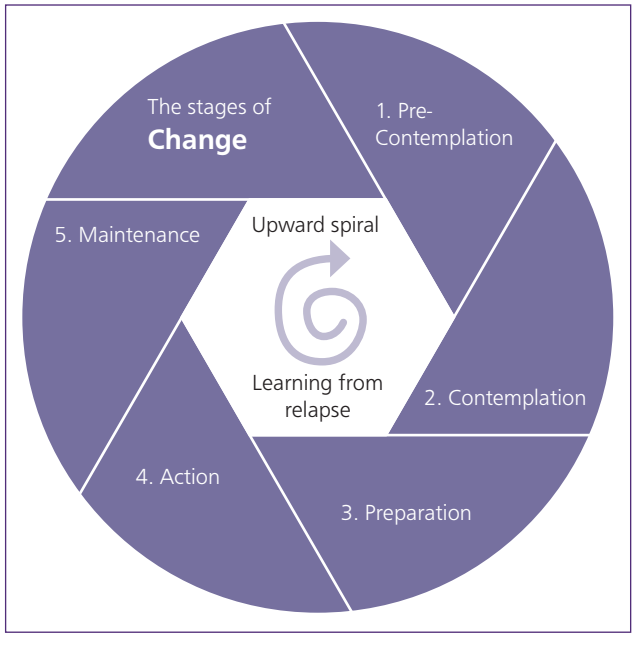

Figure 3. Transtheoretical model of change by Prochaska and DiClemente (1984).

It must be remembered that relapse is possible at every stage for numerous reasons, including psychological or environmental factors. To support the process of change through the stages, and to reduce relapse, people need to learn from their own and other's experiences. In practice, if a vet is in dialogue with an owner and can recognise which stage the owner is in, through what the owner is saying and how they are behaving, the vet will be able to target their information or approach accordingly, and the chance of compliance will be more likely than if a more generalised approach to providing information is taken.

KEY POINTS

- The science of human behaviour change can support the veterinary profession in improving owner compliance for infectious disease prevention.
- Increasing client compliance in implementing biosecurity measures between horses can prevent the spread of infectious disease.
- The veterinary profession can use the science of human behaviour change to provide evidence-based interventions for their clients when preventing and managing infectious disease.

COM-B and the behaviour change wheel

The capability, opportunity and motivation behaviour change (COM-B) model (Michie et al, 2014a) encourages understanding of the behaviour by considering these characteristics in a person or organisation, regarding the target behaviour. According to Michie et al (2014a) the "COM-B model conceptualises behaviour as a part of a system of interacting elements that also involves capability, opportunity and motivation. For any behaviour to occur at a given moment, there must be the capability and opportunity to engage in the behaviour, and the strength of motivation to engage in it must be greater than for any competing behaviours. Capability may be physical or psychological, opportunity may be social or physical and motivation may be 'reflective' or 'automatic'."

To develop this understanding of the factors required to enable change, we can use the behaviour change wheel in conjunction with the COM-B model to address the issue of connecting the analysis of a target behaviour with an appropriate, evidence-based intervention function, which can then be used to design and implement appropriate and impactful interventions (Michie et al, 2014b). The behaviour change wheel and the COM-B model are evidence-based approaches that provide a comprehensive understanding, while enabling the mapping of the next stage of intervention design, behaviour change techniques and then modes of implementation. This can be used effectively to provide a consistent approach and structure to your work, where other theories and models are then used to provide a more in-depth understanding and specific information.

For any behaviour to occur, the interacting elements of capability, opportunity and motivation will be involved, to enable one behaviour to occur instead of another competing one.

For example, the COM-B model:

- Capability: a person's physical and psychological ability to enact the behaviour. For example, quarantining new horses onto a yard.
  - Physical capability: skill, strength and stamina. For example, the ability to effectively care for the horse in quarantine.
  - Psychological capability: the knowledge and psychological skills to do the behaviour and the strength and stamina to do the required cognitive processes (comprehension and reasoning). For example, the owner knows and understands why the quarantine is important for the health of the other horses on the yard.
- Opportunity: the physical and social environment. This covers the factors external to the individual that trigger the behaviour or enable the performance of the behaviour:
  - Physical opportunities: this relates to the external environment (resources like time, money or other triggers). For example, the owner has the time and is supported in providing the extra care for the horse in quarantine and has suitable facilities that meet the horse's needs.
  - Social opportunities: these are created by the social and cultural environment (influences, cues, norms) influence the way we think. For example, other owners on the yard are supportive of the new horse being in quarantine and appreciate the protection it affords their horse.
- Motivation: the mental processes that energise, focus or automate the behaviour:
  - Reflective motivation: self-conscious reflective process involving intentions and plans, rationale, analytical decision-making involving evaluation of beliefs. For example, the owner believes that the yard has good biosecurity and feels secure for the horse's long-term health and wellbeing.
  - Automatic: formed habitual behaviour, linked to emotional responses and cues that are natural or developed through associative learning. For example, daily routine of quarantine is well facilitated by the yard owner and eases maintenance of biosecurity routines.

Each one of these elements can influence the other. For example, if the person is highly motivated but does not have the opportunity because the yard has limited quarantine facilities available, then it is more likely that the resulting behaviour will be no quarantine, or ineffective quarantine. Effectively this will be the same as someone who is not motivated to quarantine their new horse, but the intervention for each person needs to be very different to achieve the same behaviour.

Conclusions

The human behaviour change models discussed can support veterinary professionals when addressing owner compliance with preventative measures. They can guide interventions used at practice level and provide evidence for potential changes in policy or collaboration between organisations for effective national strategies. Increased research into the motivation of behaviour from sectors of the equine industry, including owners, livery yard managers and breeders, can provide evidence to allow veterinary practices and policymakers to use interventions at the legislative or national policy level. The 2019 Strangles Symposium recognised that human behaviour change can influence the incidence of strangles within the UK and even small changes made by individuals have the potential to limit the spread of *S. equi*.

Conflicts of interest

The authors have no conflicts of interest to declare.

Acknowledgments

Figure 3 was redrawn, with permission, by Human Behaviour Change for Animals.

References

Bluethmann S, Bartholomew LK, Murphy CC, Vernon SW. Use of theory in behaviour change interventions: an analysis of programs to increase physical activity in ost-treatment breast cancer survivors. Health Educ Behav. 2017;44(2):245–253. https://doi.org/10.1177/1090198116647712

Boyle AG, Timoney JF, Newton JR et al. *Streptococcus equi* infections in horses: Guidelines for treatment, control, and prevention of strangles-revised consensus statement. J Vet Intern Med. 2018;32(2):633-647. https://doi.org/10.1111/jvim.15043

Kowalski K, Jeznach A, Tuokko HA. Stages of driving behaviour change within the Transtheoretical Model (TM). J Safety Res. 2014;50:17-25. https://doi.org/10.1016/j.jsr.2014.01.002

Michie S, Campbell R, Brown J, West R, Gainforth H. ABC of Behaviour Change Theories. Sutton: Silverback Publishing; 2014a.

Michie S, Atkins L, West R. The Behaviour Change Wheel: A Guide to Designing interventions. London: Silverback Publishing; 2014b.

Miller W, Rollnick S. Motivational Interviewing: helping people change. 3rd edition, Surrey, UK: Guildford Press; 2013

Prochaska JO, DiClemente CC. The Transtheoretical Approach: Towards a Systematic Eclectic Framework. Homewood, IL: Dow Jones Irwin; 1984

Prochaska JO, DiClemente CC, Norcross JC. In search of how people change: Applications to the addictive behaviors. Am Psychol. 1992;47(9):1102-1114. https://doi.org/10.1037//0003-066x.47.9.1102

Rendle D, de Brauwere N, Hallowell G et al. *Streptococcus equi* infections: current best practice in the diagnosis and management of 'strangles'. UKVE. 2021;5(2). https://doi.org/10.12968/ukve.2021.5.2.S.3

White, J. Strangles Symposium Report: Working Together to Stamp Out Strangles. 2019. https://www.redwings.org.uk/sites/default/files/Report%20for%20Strangles%20Symposium__FINAL.pdf (Accessed 4 May 2021)