Training in motivational interviewing improves cattle veterinarians' communication skills for herd health management

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Abstract

Background Communication skills to promote changes in management routines are especially important in veterinary herd health management (VHHM). Motivational interviewing (MI) is a communication methodology shown to be effective in stimulating client behaviour change. This study aimed to evaluate a 6-month MI-training programme for veterinarians.

Methods Thirty-eight cattle veterinarians gathered in groups of four to eight at six workshops separated by 3–4 weeks, during which they read literature and practised their skills. MI skills were evaluated before and after training using audio recordings of role-play conversations with professional actors. Recordings were coded using the MI Treatment Integrity Code (MITI) V.4.2.1. The effect of training was evaluated by 16 regression models. Participants filled in questionnaires about their experiences.

Results All participants improved their MI skills after training in at least one parameter and significant improvements were found in all but 3 of the 16 statistically evaluated MITI variables. The mean (25th–75th percentiles) ratings of the veterinarians' perceived relevance of MI skills in their work was 4.9 (4.0–6.0) and of their satisfaction with the programme was 5.1 (5.0–6.0) on a 6-point Likert scale.

Conclusions Results show that MI training was perceived to be useful and relevant and successfully improved veterinarians' communication skills in VHHM.

Introduction

The importance of communication skills in the veterinary profession,[1–3] and of communication training in veterinary education[4 5] and continuing professional development[6–8] is increasingly being acknowledged. Graduate education has largely focused on training students how to take a history and communicate recommendations to clients on treatment and follow-up care. The Calgary-Cambridge method, a guide to effective physician–patient communication originally developed within human medicine to provide evidence-based structure for teaching communication, is often advocated in such training.[5] Simulation exercises are being used increasingly,[9] and students report that interactive discussions in small groups and review sessions using recorded conversations are valuable.[10]

The importance of addressing farmer motives and supporting farmer participation and shared decision-making has been stressed in veterinary herd health management (VHHM),[11–13] and advisory services have adopted more and more of this approach.[14–16] However, veterinarians involved in VHHM showed little solicitation of client opinion, made few attempts to acknowledge the clients' rights to make decisions, but rather tried to persuade them to take the actions perceived by veterinarians to be most suitable.[17 18] This suggests a need to develop educational concepts to successfully train veterinarians in client-orientated communication skills. Communication skills to

support changes in management routines on farms (ie, behaviour change) are of special importance in VHHM. Such skills may have received less focus in veterinary education.[5]

Motivational interviewing (MI) is a client-oriented communication methodology shown to be effective in stimulating client behaviour change (eg, to reduce tobacco use, alcohol abuse or to adopt lifestyle changes)[19 20] and thus may be of relevance in VHHM. MI aims to facilitate the client's internal motivation to change. It builds on two equally important pillars: relational skills that help to form a work alliance with the client and technical skills that serve to evoke and support the client's own motives and plans for behaviour change.[21]

Training programmes to develop skills in MI in different disciplines are usually offered as workshops (2–4 days) with short lectures, demonstrations and experiential exercises.[22] Recently, a MI-training concept using a stretched-out design and including coaching and specific feedback was developed for use in animal welfare, food safety and health safety inspectors; this method of training was found by participants to be highly relevant and helpful in their work situations.[23]

The aims of this study were to evaluate an educational concept for training MI skills with regards to (1) the effect of the MI training on veterinarians' communication skills in VHHM, and (2) the dairy cattle veterinarians' perceptions of the relevance of MI skills for their profession and their perceptions about the usefulness of the educational concept.

Materials and methods

The study design involved a 6-month MI-training programme, with participants' MI skills being evaluated before and after training using audio recordings of role-play conversations with professional actors. During the programme, participants filled in questionnaires about their experiences of the workshops. Before the first role-play session, participants provided written consent to the use of recordings and questionnaires by the research team and completed a web questionnaire detailing their characteristics including number of years they had been practising VHHM (https://www.netigate.net/sv/).

Participants were a convenience sample of volunteers from the three largest employment groups of Swedish veterinarians involved in VHHM on dairy herds: (1) the District Veterinarians (Swedish Board of Agriculture), (2) the regional dairy associations and (3) self-employed dairy cattle veterinarians. The recruitment process has previously been described in detail.[18] Altogether, 42 veterinarians, 37 per cent of all Swedish veterinarians involved in VHHM in the three groups, accepted participation in the project and the MI training. Due to lack of time, four of these terminated their participation before their training started.

Participation in the study was voluntary and participants were assured that all information would be treated anonymously and that they could withdraw from the study at any time. They were also assured that data would be stored at the Swedish University of Agricultural Sciences and that no unauthorised person would be able to access the data.

Training programme

The veterinarians followed one of two identical training programmes given during 2016–2017 (n=20) and 2017–2018 (n=18), respectively. Veterinarians located within the same geographical region gathered in study groups of four to eight persons (six groups in total) at six workshops, comprising in total 36 hours and spread out over a period of 6–7 months. The training programme, together with evaluating role-play conversations, is outlined in figure 1 and was implemented in collaboration with the coding laboratory MIC Lab AB, Stockholm.

Workshops consisted of theoretical introductions mixed with experiential exercises of different MI skills as well as discussions and feedback on participant recordings of conversations. Themes of workshops are shown in table 1, together with a description of
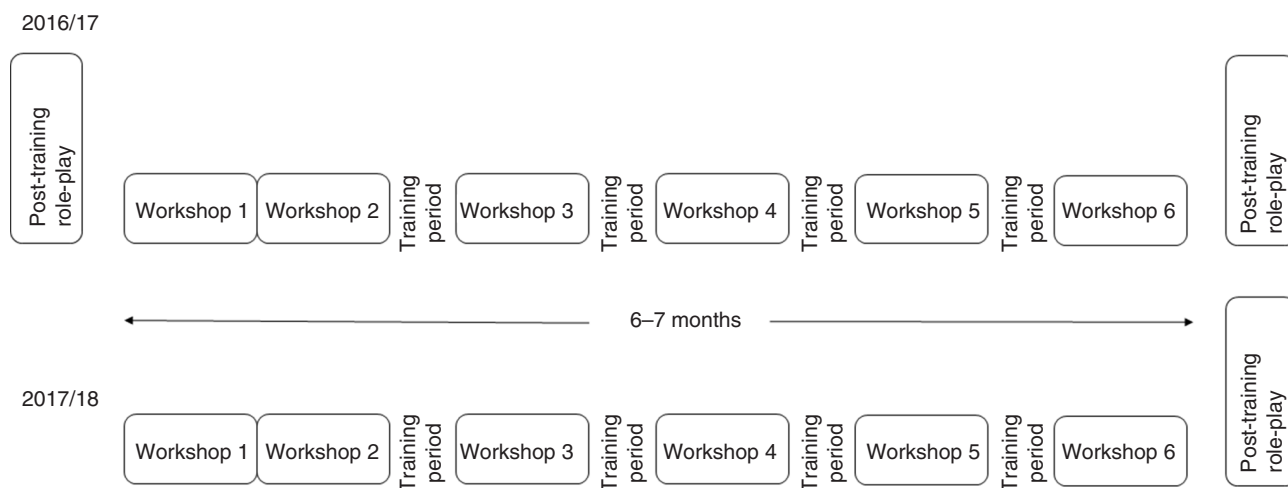

Figure 1 Outline of training programme in motivational interviewing for 38 Swedish dairy cattle veterinarians evaluated using role-play conversations.

Table 1 Themes, conversations recorded and their use as feedback at each of 6 workshops in a training programme in motivational interviewing (MI) for 38 Swedish dairy cattle veterinarians

Workshop	Theme	Conversations and feedback
1	*To listen and to communicate collaboration* ▶ To understand the meaning of MI, 4 processes ▶ To convey collaboration and equality ▶ To emphasise autonomy ▶ To use empathic listening ▶ To avoid MI-non-adherent utterances ▶ To cultivate MI-adherent utterances ▶ To ask questions, make reflections and summarise	
2	*To reinforce positive client behaviours* ▶ To recognise, elicit and strengthen Change Talk ▶ To recognise and soften Sustain Talk ▶ To use the coding results as feedback	5–10 min conversation *with another participant* at workshop 1
3	*To make efforts to understand the perspectives and motives of the other* ▶ To recognise, elicit and strengthen Change Talk ▶ To recognise and soften Sustain Talk ▶ To construct reflections	▶ 10–20 min conversation *with friend*, relative, colleague (coded and commented) ▶ 20 min role-play conversation with actor (coded and commented)
4	*To exchange information in a collaborative manner* ▶ To exchange information in a dialogue ▶ To avoid confrontation and persuasion ▶ To persuade with permission and give neutral information ▶ To emphasise autonomy	Workshops 4–6 3 *professional* conversations, each 20 min 2 coded with comments 1 verbatim transcription, not coded
5	*To adjust communication to the level of motivation* ▶ To explore readiness to change and ambivalence ▶ To go from cultivating motivation to planning action ▶ To meet and roll with resistance/dissonance ▶ To develop experience of discrepancy	
6	*To use MI in daily veterinary practice* ▶ To summarise the MI-training programme ▶ To form a personal plan for upholding MI proficiency	

conversations recorded and their use as feedback. The choices of themes were inspired by common MI practice[21 24] and previous experience in the research group from MI-training programmes for health safety,[25 26] food safety and animal welfare inspectors.[23 27] Workshops 2–6 were each separated by a training period of 3–6 weeks, during which participants were expected to read 30–70 pages related to the specific themes of the previous workshop from the main MI handbook.[24] In addition, participants were to record one conversation where they practised their newly acquired skills (table 1) and to upload this on the MIC Lab AB website (www.miclab.se). The persons involved in these conversations provided oral consent for the participating veterinarians to use the recordings in the training.

Role-play recordings

Role-play conversations were used because this methodology has shown promise in comparison with real clients.[28] Another motive was to standardise the conditions for the communication, allowing for reliable comparisons between veterinarians. Because participating veterinarians were from all over Sweden, role-play conversations were conducted via telephone.

Conversations took place from March to May 2016 (pre-training session) as well as from March to May 2017 and 2018 (post-training sessions 1 and 2). Each veterinarian performed six role-plays, three pre-training and three post-training. For practical reasons, the same actors could not be used in all pre-training and post-training sessions, but five actors

were involved. Actors 1 and 2 (female) participated in the pre-training session only; actor 3 (female) participated in all three sessions; actors 4 and 5 (male) participated in both post-training sessions. The actors were all experienced in role-play scenarios in various settings where MI had been used. Pre-training role-plays have previously been described in detail.[18]

Scenarios depicted situations of '*telephone consultations with a client whom the veterinarian previously had met on the farm when the time had been restricted and an agreement therefore had been made to continue and finish the discussion over telephone*'. They were (1) increased occurrence of displaced abomasum, (2) udder health problems and (3) calf diarrhoea problems. The pre-training and post-training role-plays involved the same three disease and farm situations (scenarios) but featured a new client character (six client characters, three in pre-training sessions, three in post-training sessions). The same scenarios were used to enhance the reliability in comparisons within and between veterinarians and at different periods. Each client character was played by the same actor throughout that role-play session, and each veterinarian performed conversations with all six client characters.

Actors were not provided with a script, but instead received a farm profile and background information to shape their character (a farmer, farm manager or animal caretaker). Actors were instructed to initially be ambivalent and to respond to the communication by the veterinarians in an appropriate and genuine manner given their assumed character, as a means to

Table 2 Brief overall description of the 14 defined Motivational Interviewing Treatment Integrity Code (MITI) 4 variables used in the assessment of motivational interviewing skills[29]

Variable	Interpretation
Frequency counts of behaviour	
Giving Information	Gives information, educates, provides feedback, or expresses a professional opinion without persuading, advising or warning (ie, does not imply the information is specifically relevant to the client or that the client must act on it)
Persuade	Overt attempts to change a client's opinions, attitudes or behaviours using tools such as logic, compelling arguments, self-disclosure, facts, biased information, advice, suggestions, tips, opinions or solutions to problems
Persuade with Permission	Emphasis on collaboration or autonomy support while using persuasion
Questions	Open or closed
Simple Reflections	Repeats, re-phrases or paraphrases the client's previous statement adding little or no meaning or emphasis to what the client has said
Complex Reflections	Repeats, re-phrases or paraphrases the client's previous statement adding substantial meaning or emphasis to what the client has said
Affirmations	States something positive about the client's strengths, efforts, intentions or worth
Seeking Collaboration	Explicitly attempts to share power or acknowledge the expertise of the client
Emphasise Autonomy	Highlights a client's sense of control, freedom of choice or self-direction over change
Confront	Directly and unambiguously disagreeing, arguing, correcting, shaming, blaming, criticising, labelling, warning, moralising, ridiculing or questioning a client's honesty
Global scores on a Likert scale from 1 ('low') to 5 ('high')	
Cultivating Change Talk	Encourages the client's own language in favour of the change goal and confidence for making that change
Softening Sustain Talk	Avoids a focus on the reasons against changing or on maintaining the status quo
Partnership	Conveys an understanding that expertise and wisdom about change reside mostly within the client and actively fosters collaboration and power-sharing
Empathy	Understands or makes an effort to grasp the client's perspective and experience. Reflective listening is an important part of this characteristic, but it encompasses *all* attempts made to understand the client and actively communicate this understanding

generate an authentic simulation of the veterinarian–client encounter. Veterinarians received detailed information via email about the farm (including the health problem the consultation was to address and management routines important for this problem) 10 minutes before they were called by the actor.

Coding of role-play recordings

Coding of audio-recorded conversations was conducted by professional coders at MIC Lab AB in accordance with the MITI V.4.2.1 manual,[29] translated into Swedish. Conversations were encrypted during uploading to the MIC Lab web page and registered in a database at a protected server. Coders did not know the identities of veterinarians or actors. To sustain coders' competence, coders met every week for 2-hour training sessions. Inter-rater reliability between coders was calculated and checked twice a year; reliability of codings in the present study were performed in June 2017 and June 2018 and the intraclass correlations of the different MITI variables were 0.61–0.97 and 0.52–0.93, respectively.

For each recording, the 20 different MITI variables specified in the manual[29] were calculated based on 20 minutes of conversation: 14 original variables (4 global scores and frequency counts of 10 verbal behaviours, table 2) and 6 summary measurements derived from the 14 original variables. The six summary measurements were calculated according to the following formulae:

▶ *Relational* = (*Partnership* + *Empathy*) / 2
▶ *Technical* = (*Cultivating Change Talk* + *Softening Sustain Talk*) / 2
▶ *MI-non-adherent Behaviours* = *Persuade* + *Confront*
▶ *MI-adherent Behaviours* = *Emphasise Autonomy* + *Seeking Collaboration* + *Affirmations*

▶ *Reflection to Question Ratio* = (*Simple Reflections* + *Complex Reflections*) / Total *Questions*
▶ *Percent Complex Reflections* = *Complex Reflections* / (*Simple Reflections* + *Complex Reflections*)

Questionnaires

At the end of each of the six workshops, participants were requested to fill in a brief questionnaire. The questionnaire was adapted from those used by the research group in previous MI-training programmes for other types of professionals. The first part contained four questions where participants used a 6-point Likert scale to grade their experiences with regards to (1) feedback on recorded conversations (not applicable to workshop 1), (2) usefulness of the theoretical introductions and exercises, (3) the relevance in their work of their newly gained knowledge and (4) their satisfaction with the workshop as a whole. A 6-point Likert scale was chosen to force participants to indicate a negative (1–3) or positive (4–6) view. The second part of the questionnaire contained open fields where the participants were requested to describe (1) aspects of the workshop that they particularly appreciated, aspects with which they were less satisfied and aspects that they found useful in their work as veterinarians, as well as (2) their recommendations for future training programmes intended for veterinarians. Questionnaires were marked with workshop number and location but were otherwise anonymous.

Data editing and statistical analysis

Descriptive analyses

Descriptive statistics were calculated using Microsoft Excel (2016). For each veterinarian, a mean value (standard deviation, 25th and 75th percentiles) from the post-training recordings was calculated for each

of the 20 MITI variables. In addition, the proportion of veterinarians reaching 'fair competency' and 'good competency' were calculated, as suggested by Moyers *et al*,[29] using the following thresholds: *Relational* ≥3.5 and ≥4, respectively; *Technical* ≥3 and ≥4, respectively; *Reflection to Question Ratio* ≥1:1 and ≥2:1, respectively; *Percent Complex Reflections* ≥40 per cent and ≥50 per cent, respectively. Alternative thresholds defining 'moderate competency' and 'above moderate competency' were suggested as *Relational* ≥3.5 and ≥4, respectively, *Cultivating Change Talk* ≥3 and ≥4, and *MI-non-adherent Behaviours* ≤2 and ≤1. 'Near moderate competency' was defined as *Relational* ≥3.5+*Cultivating Change Talk* ≥2.7+*MI-non-adherent Behaviours* <4. Proportions of veterinarians reaching suggested thresholds were calculated.

Multivariable analyses

To evaluate the effect of training on MI skills, 16 different hierarchical regression models were used and corrected for the multiple measurement for veterinarians, the effect of actor (n=5) and the effect of scenario (displaced abomasum, udder health, calf diarrhoea). To investigate whether the training effect was different due to previous experience in VHHM or to MI skills pre-training, models included interactions with a categorised variable *Years in VHHM* (<1, 1−5, 5−15, >15) and mean scores for *Empathy* pre-training (although not in the model with *Empathy* as an outcome). Linear regression models were used to model the outcomes *Cultivating Change Talk, Partnership, Empathy, Relational, MI-non-adherent Behaviours* and *MI-adherent Behaviours,* while logistic regression models were used for *Emphasise Autonomy* and *Confront*. Negative binomial models were used for *Giving Information, Persuade, Persuade with Permission, Questions, Simple Reflections, Complex Reflections, Affirmations* and *Seeking Collaboration*. The same basic model was used for all analyses:

MITI = Training + Years in VHHM + Empathy PT + Training × Years in VHHM + Training × Empathy PT + Vet (random) + Actor (random) + Scenario (fixed)

Non-significant interaction effects of *Years in VHHM* and *Empathy* pre-training were removed, but all main effects were retained even if non-significant. Multicollinearity between the explanatory variables was assessed by variance inflation factors, but no multicollinearity was present. The goodness-of-fit of the linear regression models was checked by graphically assessing the residuals for normal distribution by q−q plots and of the logistic regression models by using the Hosmer-Lemeshow test; all models showed satisfactory fit. All statistical analyses were performed using SAS V.9.4 (SAS Institute, Cary, NC, USA).

Questionnaire data

Data from the questionnaires were transferred to MS Excel and separated into two files—one file for Likert-scale questions and one for qualitative data from open-field questions; both files were stratified for workshop number and year. For qualitative data, full answers were incorporated. For each question, a list of codes was established by one of the first authors (CS) reading through the texts. Listed codes highlighted the areas of the comments provided by participants: learning environment, course design, technical issues, course literature, MI theory, specific MI skills and specific course elements (eg, exercises, feedback and listening to conversation). The same author used this list to further code the text, labelling similar *meaning units* (single words, whole sentences, parts of sentences that expressed a distinct and coherent meaning corresponding to one particular feature or aspect) with the same codes and thereby grouping the aspects highlighted by the participants into categories.

Results

Of the 38 veterinarians, 32 completed the training programme and 31 recorded role-play sessions both before and after the training (16 District Veterinarians, 11 regional dairy association veterinarians and 4 self-employed veterinarians). The audio recordings from three conversations were lost due to technical problems. Hence, the audio-recording material consisted of 92 pre-training and 91 post-training role-play recordings from 31 veterinarians. After each workshop, all participating veterinarians filled in a questionnaire. The number of responses for workshops 1 to 6 was 38, 38, 36, 33, 32 and 35, respectively, equalling a total of 212 questionnaires.

MITI before and after training and results of multivariable analyses

The MI skills described by the original MITI variables before and after training are shown in table 3, together with the proportion of participants who numerically improved their skills after training.

All participants improved their MI skills after training in at least one parameter. Furthermore, the proportion of veterinarians who had very low skills reduced after training; 5 (16 per cent) veterinarians had a score of ≤2 for *Empathy* before training but only 2 (6 per cent) had a similarly low score after training; 22 (71 per cent) veterinarians demonstrated high numbers of *MI-non-adherent Behaviours* (more than 8 statements per 20 minutes) before training whereas none reached this level after training.

Table 4 illustrates participants' MI skills described by the six summary measurements and the proportions of veterinarians who improved their skills after training and reached suggested thresholds for MI competence. Two (6 per cent), 9 (29 per cent) and 14 (45 per cent) of the veterinarians reached all criteria for 'above moderate competency', 'moderate competency' and 'near moderate competency', respectively, after

Table 3 Descriptive statistics of 14 original variables (frequency counts and global scores) describing motivational interviewing (MI) skills in 31 Swedish dairy cattle veterinarians before and after a 6-month MI-training programme each recording 3 herd health management role-play conversations

Frequency counts per 20 min conversation				Global scores: Likert scale 1–5			
	Mean (SD; 25th–75th PC)		% Improved		Mean (SD; 25th–75th PC)		% Improved
	Before	After			Before	After	
Giving Information	15.1 (3.59; 12.2–17.4)	9.4 (2.35; 7.8–11.0)	93.5	Cultivating Change Talk	2.5 (0.49; 2.0–2.7)	2.8 (0.63; 2.3–3.3)	58.1
Persuade	8.9 (2.79; 7.2–10.8)	3.7 (2.29; 2.0–5.5)	96.8	Softening Sustain Talk	3.7 (0.33; 3.6–4.0)	3.6 (0.43; 3.3–4.0)	32.6
Persuade with Permission	1.8 (0.97; 1.2–2.7)	4.5 (2.14; 3.0–5.7)	87.1	Partnership	2.9 (0.57; 2.4–3.3)	3.3 (0.66; 2.8–4.0)	61.3
Questions	9.4 (3.69; 6.2–11.7)	11.0 (3.48; 8.8–12.8)	38.7	Empathy	2.6 (0.62; 2.0–3.0)	3.3 (0.74; 2.7–4.0)	80.6
Simple Reflections	2.3 (1.61; 1.0–2.7)	2.4 (1.90; 1.3–2.8)	48.4				
Complex Reflections	2.0 (1.32; 1.0–2.7)	4.1 (2.56; 2.4–5.5)	83.9				
Affirmations	1.4 (1.09; 0.7–2.3)	2.3 (1.21; 1.6–3.0)	71.0				
Seeking Collaboration	2.7 (1.24; 1.7–3.3)	3.4 (1.50; 2.5–4.7)	61.3				
Emphasise Autonomy	0.2 (0.33; 0.0–0.3)	0.4 (0.42; 0.0–0.6)	48.4				
Confront	0.1 (0.28; 0.0–0.0)	0.1 (0.08; 0.0–0.0)	96.8				
PC, percentiles.							

training. Two (6 per cent) veterinarians fulfilled all four criteria suggested by Moyers et al[29] for 'fair competency' after training, although none reached overall 'good competency'.

Participants significantly improved their MI skills after training regarding all MITI variables evaluated except for *Seeking Collaboration, Simple Reflections* and *Confront* (S1-3 tables). Researchers found significant interactions with *Years in VHHM* for *Cultivationg Change Talk, Giving Information, Persuade* and *Seeking Collaboration.*

Relevance of MI training for dairy cattle veterinarians
Overall, participating dairy cattle veterinarians perceived their new skills and knowledge in MI to be relevant in their work (figure 2); the mean (25–75th percentiles) rating for relevance from all workshops was 4.9 (4.0–6.0). For all six study groups, there were workshops where all participants rated relevance as 4 or greater on a scale of 1 to 6. Ratings of 2 were given only in two questionnaires from two different workshops in one of the study groups, and single ratings of 3 were noted in workshops from four groups.

Participants mentioned a variety of educational aspects as useful in their work: (1) learning about the potential negative consequences of a directive communication style for client behaviour change; (2) being less of an 'expert' and instead putting the client in focus, listening more to the opinions, wishes and motives of clients; (3) not providing excessive information, but exploring the client's knowledge and checking how information was perceived; (4) having methods and tools for communication and a technique that enabled them to better steer the conversations; (5) reaching more difficult clients; (6) being more observant about resistance from the client.

Perceptions of the educational concept
Overall satisfaction of the participants with the training programme was high; mean (25th–75th percentiles) ratings were 5.1 (5.0–6.0). The ratings for the different workshop days are shown in figure 2. Participants highlighted a wide range of training elements they especially valued in the educational concept: (1) the small groups, and a calm, safe and open atmosphere for discussions; (2) the mix of theory and practice;

Table 4 Descriptive statistics (mean (SD; 25th–75th percentiles (PC))) of 6 summary measurements and 1 original measurement describing motivational interviewing (MI) skills and proportion of 31 Swedish veterinarians reaching suggested thresholds for near moderate, moderate and above moderate MI skills before and after a 6-month training programme

| Variables	Mean (SD; 25th–75th PC)		% Improved	According to suggested thresholds (Near moderate); moderate; above moderate	
	Before	After		Before	After
Relational	2.7 (0.55; 2.4–3.2)	3.3 (0.67; 2.7–3.8)	77.4	(13%); 13%; 0%	(55%); 55%; 19%
Technical	3.1 (0.35; 2.9–3.3)	3.2 (0.42; 2.9–3.3)	54.8	–	
Cultivating Change Talk	2.5 (0.49; 2.0–2.7)	2.8 (0.63; 2.3–3.3)	58.1	(23%); 23%; 0%	(61%); 42%; 6%
MI-non-adherent Behaviours	9.0 (2.85; 7.2–11.2)	3.8 (2.31; 2.0–5.7)	96.8	(3%); 0%; 0%	(48%); 35%; 16%
MI-adherent Behaviours	4.3 (2.17; 2.3–5.8)	6.1 (2.43; 4.4–7.5)	71.0		
Reflection to Question Ratio	0.6 (0.68; 0.3–0.8)	0.7 (0.54; 0.4–0.9)	51.6	–	
Percent Complex Reflections	0.4 (0.20; 0.3–0.6)	0.6 (0.17; 0.5–0.8)	80.6		
Total skills	–			(0%); 0%; 0%	(45%); 29%; 6%
Participants significantly improved their MI skills after training regarding all MITI variables evaluated except for *Seeking Collaboration, Simple Reflections* and *Confront* (see online appendix tables S1–3). Researchers found significant interactions with *Years in VHHM* for *Cultivating Change Talk, Giving Information, Persuade* and *Seeking Collaboration.*					
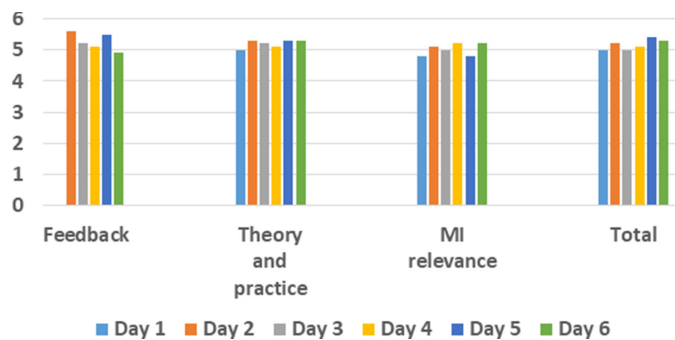
Figure 2   Ratings (Likert scale 1–6, 6 representing highest rating) of feedback of recordings, theoretical introductions and exercises, relevance of new skills in their work, and overall satisfaction by 32–38 Swedish dairy cattle veterinarians participating in training programme in motivational interviewing (MI).

(3) to listen, analyse and reflect on their own and the co-participants' verbal behaviours; (4) practical examples and exercises. Participants' observations of their improvement in the skills contributed to the learning. Comments about the main course literature used in the training[24] were all very positive, suggesting that it was perceived to be highly relevant for the veterinary context.

Negative perceptions mostly related to the long and intensive workshop days, technical problems and finding that listening to all participants' recorded conversations in a large group (groups of six to eight) was too much. Some participants commented that the programme had not supplied enough training to master the new skills, but made them highly aware of the drawbacks of their previous methods. Several participants mentioned that they had great difficulty finding professional conversations to record.

Suggestions of improvements made by participants were to include more practical training, to further adapt the material and the training to the veterinary context, to use an audiobook and to integrate the MI training into continuing education courses in methodology in VHHM.

Discussion
MITI before and after training
All participants improved at least some of their MI skills after training and significant improvements were reached for nearly all variables. The proportion of participants who numerically improved their skills were highest for the MITI variables *Persuade*, *Giving Information* and *Persuade with Permission* and the summary measurement *MI-non-adherent Behaviours*. These are likely to be important improvements suggesting that the clients were given a role as equal partner and that veterinarians increased their abilities to supply information so that it was more likely to be received positively by clients. *MI-non-adherent Behaviours* have been related to negative outcomes in targeted change behaviours.[30 31]

The improvement in MI skills reached by our participants is similar to that reported in other studies on training of professionals in routine work situations.[23 32–34]

Only 29 per cent of participants reached 'moderate competency' and only 6 per cent reached overall 'fair competency' according to the classification suggested by Moyers *et al*.[29] In the only other published study of training veterinarians in MI, Bard[8] reported 3 out of 14 (21 per cent) UK cattle veterinarians reached overall 'fair competency' in MI with short training (4–5 hours).

These findings suggest it may be difficult to integrate novel MI skills into the consultation practice of already trained professionals, even when training programmes extended over several months. To introduce MI training at an early stage (ie, in veterinary education) may be a more efficient means of improving veterinary communication skills in VHHM. MI training can (and in some cases already does) complement existing communication training in veterinary education.

Important aspects of an educational concept to train communication skills
MI is not learnt simply by reading a book or attending lectures but by practice and specific feedback.[32 35] One reason for the low proportion of participants in the present study reaching overall 'moderate' or 'fair competency' may be due to insufficient practice of and feedback on skills; participants reported difficulties in finding professional conversations to record for their practical training, and most of the practical training was centred on recording conversations when skills were used and using recordings to provide feedback to participants. Although perceived as 'frightening' by some of the participants, the feedback on recordings and transcripts was rated as the most valuable training component.

Schwalbe *et al*[32] found that MI skills were sustained if the initial training was followed by feedback and coaching, whereas they otherwise eroded over a 6-month follow-up period. One reason why extended programmes have been found to be more successful may be related to the increased possibility of incorporating new skills in practice over time. Short duration of training or too few practice opportunities was suggested to be reasons why a 6.5-hour communication skills intervention for veterinarians did not improve skills as measured by roter interaction analysis system.[7]

Keeping training groups small is a recognised key element in communication training,[4] and the value of this aspect was a recurrent theme in our questionnaires. Compared with groups of >20 participants, small groups of four to nine increase the interactivity, gives each participant more space and provides greater opportunities for feedback. Such conditions give a high value of listening to each other's conversations and prevents fatigue from listening to too many participant conversations. Small groups also create a safe setting to develop practice as well as allow more learning from sharing thoughts and experiences.

Differences in skill acquisition between veterinarians

MI skill acquisition is tied to pre-counselling skills and advisors are variable in their response to MI training.[36] [37] In their modelling, researchers found significant interactions with previous MI skills—expressed as *Empathy* pre-training—for *Relational, MI-adherent Behaviours, Affirmations* and *Complex Reflections*. However, whereas others have found high *Empathy* skills pre-training to be associated with increased MI skill acquisition,[38] this study found the highest skills development in participants with low *Empathy* pre-training, potentially as these participants had the biggest gains to make.

Veterinarians with very little (<1 year) or very substantial (>15 years) experience in VHHM did not improve in practising *Cultivating Change Talk*. This is a core MI skill because client Change Talk has been found to correlate with increased likelihood of behaviour change.[39] [40] The result is in line with the finding that veterinarians with longer experience in VHHM improved less than those with less experience in regards to *Giving Information*. Our results are in contrast to other studies showing that clinicians develop skills with MI training, independently of age, professional experience or background.[37]

Relevance of MI training for dairy cattle veterinarians

Participating veterinarians considered MI skills highly relevant to VHHM work and several veterinarians commented that they viewed MI as relevant also to other aspects of their work as well as for inter-collegial relationships. Similar experiences have also been described by environmental, food, animal and health safety inspectors after being trained in MI.[25] There is currently no consensus about the optimal communication style in VHHM. Further research is needed to determine if the MI methodology is successful in encouraging farmers to implement preventive actions and how well the methodology aligns with clients' perceptions.

Improving delivery of MI trainings in the veterinary context

This is the first report of an MI course of this type and length being provided specifically to veterinarians working in VHHM. Questionnaires indicated a need for further adaptations to the veterinary context. A trainer more familiar with the veterinary context and vocabulary may have improved the results.

Time was the main reason for participants in the present study not to complete the course and was mentioned in the questionnaire as a constraint. A prolonged course is therefore unlikely to be attractive to veterinarians in VHHM. A web-based course would decrease travel time, and an audio version of the course literature may improve the concept. Offering simulated conversations with professional actors and using pre-recorded audio/video of advisory conversations and various types of exercises may also allow participants further opportunities for theoretical learning and practice.

The authors of the present study suggest future courses directed at veterinarians should focus more on the MI core skills of *Cultivating Change Talk* and *Reflections*, where skills were low. Because educating clients is an important task for veterinarians, further training in providing information in a non-persuasive, non-judging style to support client behaviour change might also be beneficial.

Methodological considerations

The participants in the present study were not randomly selected dairy cattle veterinarians working in VHHM but were chosen from among those who had shown interest in a communication course. This approach is likely to have reduced the number of dropouts but also might have led to more sustained training and therefore potentially might have improved the MI skills compared with a randomly selected sample of veterinarians.

Role-play with actors were used to estimate MI skills before and after training. Actors role-playing farm situations may not necessarily mirror actual veterinary–client conversations. However, the role-plays were designed to provide controlled conditions for participants to demonstrate as many MI skills as possible, whereas conditions in on-farm conversations are more unpredictable and may not allow participants to demonstrate as many skills. Furthermore, on-farm conversations may not always contain ambivalence and have clear-cut targeted change behaviours for clients and so may vary in their relevance for use of the MI methodology. As this study used only role-play situations, further studies are needed to investigate whether veterinarians who receive MI training are able to implement their skills in on-farm advisory work.

Coding is difficult and the coders had not previously had any experience of coding veterinary advisory consultations, which are likely more complex than, for instance, conversations about smoking cessation. Coders may not have fully understood the context, may have misinterpreted situations and may have miscoded the data. Also, they may have missed some behaviours, underestimating their frequencies. However, this study used the same three coders for pre-training and post-training conversations and inter-rater reliability between coders were fair to excellent.[41] It cannot be excluded that coders had more experience about the veterinary context when coding post-training compared with pre-training, and therefore may have drifted in their long-term evaluations.

Conclusions

This study showed that MI training using a stretched-out design and including coaching and specific feedback

can successfully improve veterinarians' communication skills in VHHM, and result in moderate to fair MI skills in at least a proportion of participating veterinarians. Literature suggests these improvements are important in order to increase engagement with veterinary advice and support management changes to improve animal health and welfare. Furthermore, results demonstrate that veterinarians perceive MI methodology as highly relevant to their profession and training using this concept as very useful. Researchers therefore suggest MI training should be incorporated into communication training in veterinary and continuing education.

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