Empathy Training for Resident Physicians: A Randomized Controlled Trial of a Neuroscience-Informed Curriculum

Helen Riess, MD[1,2,4,5], John M. Kelley, PhD[1,2,3,4], Robert W. Bailey, BS[1,4], Emily J. Dunn, BA[1,4], and Margot Phillips, MD[1,4]

[1]Massachusetts General Hospital, Boston, MA, USA; [2]Harvard Medical School, Boston, MA, USA; [3]Endicott College, Beverly, MA, USA; [4]Empathy and Relational Science Program, Department of Psychiatry, Massachusetts General Hospital, Boston, USA; [5]Associate Clinical Professor of Psychiatry, Harvard Medical School, Massachusetts General Hospital, Boston, MA, USA.

BACKGROUND: Physician empathy is an essential attribute of the patient–physician relationship and is associated with better outcomes, greater patient safety and fewer malpractice claims.

OBJECTIVE: We tested whether an innovative empathy training protocol grounded in neuroscience could improve physician empathy as rated by patients.

DESIGN: Randomized controlled trial.

INTERVENTION: We randomly assigned residents and fellows from surgery, medicine, anesthesiology, psychiatry, ophthalmology, and orthopedics (N=99, 52% female, mean age 30.6±3.6) to receive standard postgraduate medical education or education augmented with three 60-minute empathy training modules.

MAIN MEASURE: Patient ratings of physician empathy were assessed within one-month pre-training and between 1–2 months post-training with the use of the Consultation and Relational Empathy (CARE) measure. Each physician was rated by multiple patients (pre-mean=4.6±3.1; post-mean 4.9±2.5), who were blinded to physician randomization. The primary outcome was change score on the patient-rated CARE.

KEY RESULTS: The empathy training group showed greater changes in patient-rated CARE scores than the control (difference 2.2; P=0.04). Trained physicians also showed greater changes in knowledge of the neurobiology of empathy (difference 1.8; P<0.001) and in ability to decode facial expressions of emotion (difference 1.9; P<0.001).

CONCLUSIONS: A brief intervention grounded in the neurobiology of empathy significantly improved physician empathy as rated by patients, suggesting that the quality of care in medicine could be improved by integrating the neuroscience of empathy into medical education.

KEY WORDS: empathy; randomized controlled trial; communication skills; graduate medical education; patient–physician relationship.
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INTRODUCTION

Delivering compassionate patient-centered care remains a core value of the medical profession and is central to the educational mission of residency and fellowship training programs. However, communication skills training and relational aspects of care have traditionally received less attention, and have few metrics for evaluation. Most recent studies show a decline in empathy during medical education that persists beyond training,[1–4] although there is a recent dissenting view.[5] Empathy has long been mandated as a learning objective for medical school education by the Association of American Medical Colleges,[6] and the Federation of State Medical Boards will soon require evidence of competency in physician–patient communication for license renewal.[7] Empathic communication skills are associated with increased patient satisfaction,[8] improved adherence to therapy,[9] decreased medical errors,[10] fewer malpractice claims,[8] better outcomes,[11–14] decreased burnout[15] and increased physician well being.[15]

Empathy has been defined as process with both cognitive and affective components which enables individuals to understand and respond to others' emotional states and contributes to compassionate behavior and moral agency.[16–18] Neuroscience is elucidating the neural mechanisms of empathy and providing new theoretical frameworks.[16,19–21] A decline in empathy may buffer medical residents from the psychological distress from learning to perform painful procedures on patients. However, studies suggest physicians may not rebound from their decline in empathy once they have completed their training.[15] Many physicians begin medical training with humanistic ideals, but empathy training is not specifically taught in most undergraduate or graduate medical programs.[22,23] This may reflect a devaluation of relational aspects of medicine or a common belief that empathy is an inborn, immutable trait. Neuroscience has challenged these assumptions by showing specific brain circuits associated with empathic behaviors, and changes correlated with the decline in empathy during medical training.[16]

Responding to the need for training interventions that are specific, concise, evidence-based and reproducible, the first author developed an empathy and relational skills training

protocol grounded in the neurobiology of emotions. The training was designed to improve physician skills in detecting subtle non-verbal signs of emotions, in themselves and in their patients, and to respond in ways that provided support and resolution of communication challenges. Building on the Four Habits Model of physician communication,[24] the neuroscience of empathy provides the first empirical evidence for how to effectively detect and respond to non-verbal communication in demanding interpersonal encounters.[25] The training goals were to (1) improve physician awareness of patients' emotional verbal and non-verbal communications; (2) respond to these communications with empathic understanding; (3) increase physician emotional and physiological self-awareness and self-regulation; and (4) use these skills in challenging patient interactions. We hypothesized that changes in physician behavior would be detected by patients and result in better patient ratings on standardized measures of empathy and relational skills.

METHODS

Study Design. From February to December 2010, we enrolled residents and fellows from six specialties at Massachusetts General Hospital (MGH) and Massachusetts Eye and Ear Infirmary (MEEI) who were given written information about the study and requirements for participation. Residents and fellows were eligible if they (1) were currently in training, (2) were available to attend all three training modules, and (3) had clinical interactions with adult outpatients or inpatients able to complete physician rating surveys. Trainees on or rotating to clinical rotations outside MEEI or MGH during the training period were excluded. Trainees on night float, pediatrics, ICU, or research rotations were excluded unless they had a clinic with adult patients. The training was provided separately for each specialty group. Compensation was $100 per hour. Patients were asked to rate their *single* interaction with the resident: "Please rate the following ten statements about *today's meeting* with your doctor." Different patients completed pre and post CARE measures, as using the same patients pre- and post-intervention period would have un-blinded them to the pre-post nature of the study.

Randomization and Masking. Participating physicians were randomly assigned in a 1:1 allocation ratio to either the training intervention or to standard residency or fellowship training. Group assignment was determined by a computer-generated random number sequence. Patients were blind to physician randomization, and physicians were blinded to which patients completed the surveys. To assist patients in properly identifying which resident they should be rating, a photograph of the resident was attached to the face sheet of each rating.

Intervention. We used an empathy and relational skills training protocol developed by the first author and previously tested in a pilot study.[26] The training was comprised of three 60-minute modules spaced over 4 weeks, delivered to groups of 6–15 residents in the same specialty in both inpatient and outpatient settings. The training protocol had the following objectives: (1) to provide the scientific foundation for the neurobiology and physiology of empathy training; (2) to increase awareness of the physiology of emotions[11] during typical and difficult patient–physician interactions; (3) to improve skill in decoding subtle facial expressions of emotion[27,28]; and (4) to teach empathic verbal and behavioral responses with self-regulation skills utilizing diaphragmatic breathing exercises[29] and mindfulness practices.[30] Videos of clinical interactions with real-time physiological responses utilizing skin conductance tracings allowed physicians to see the physiological concordance or discordance between themselves and their patients and the degree to which patient and physician are physiologically activated by challenging attitudes (e.g., arrogance, entitlement, dismissive behaviors). Tables 1, 2, 3 and 4 show participant characteristics and baseline measures, score changes by treatment group. program evaluation and educational content by module, respectively; details have previously been published.[26]

Primary Outcome Measure. The primary outcome measure was change in empathic and relational skills as assessed by

Table 1. Participant Characteristics and Baseline Measures

Measure	Training (N=54)	Control (N=45)	P-value
Demographics			
Age	30.7 (3.4)	30.4 (3.8)	0.71
Female – N (%)	21 (38.9)	24 (53.3)	0.16
Specialty – N (%)			
Medicine	15 (27.7)	17 (37.7)	0.39
Surgery	15 (27.7)	11 (24.4)	0.82
Anesthesia	10 (18.5)	3 (6.7)	0.13
Psychiatry	6 (11.1)	6 (13.3)	0.77
Orthopedics	5 (9.3)	6 (13.3)	0.75
Ophthalmology	3 (5.6)	2 (4.4)	1.00
Prior Skills Training – N (%)			
Communication Skills	8 (14.8)	11 (24.4)	0.31
Art and Medicine	5 (9.3)	4 (8.9)	1.00
Mind-Body Medicine	2 (3.7)	3 (6.7)	0.66
Other	1 (1.9)	1 (2.2)	1.00
Baseline Measures			
Patient-Reported CARE	39.9 (5.8)	41.8 (4.6)	0.09
Jefferson Scale	112.6 (11.8)	115.6 (8.7)	0.15
Ekman Faces Test	6.83 (1.70)	6.44 (1.92)	0.28
Neurobiology Test	3.75 (1.48)	3.48 (1.55)	0.38
BEES Test	44.1 (26.1)	42.1 (24.5)	0.70

Values are means (SD) except where noted. CARE = Consultation and Relational Empathy measure. Neuro = Neurobiology and Physiology of Empathy Test. Ekman = Ekman Facial Decoding Test. Jefferson = Jefferson Scale of Physician Empathy. BEES = Balanced Emotional Empathy Scale. To compare the training and control groups, we used Fisher's exact test for categorical measures and Wilcoxon–Mann–Whitney tests for all other measures. All tests were two-tailed at a 5% level of significance

Table 2. Pre-Post Change Scores by Treatment Group

Measure	Training Group	Control Group	Difference	Effect Size (d)	P-Value
Primary Outcome Measure					
Patient-rated CARE	0.7±7.9	–1.5±6.0	2.2	0.31	0.04
Secondary Outcome Measures					
Neuro	2.3±2.4	0.4±2.3	1.8	0.79	< 0.001
Ekman	2.1±2.5	0.2±2.2	1.9	0.79	< 0.001
Jefferson	1.2±9.3	–1.1±6.7	2.3	0.28	0.12
BEES	.9±14.5	2.7±14.1	–1.7	0.12	0.49

Plus–minus values are means ± standard deviations. CARE = Consultation and Relational Empathy measure. Neuro = Neurobiology and Physiology of Empathy Test. Ekman = Ekman Facial Decoding Test. Jefferson = Jefferson Scale of Physician Empathy. BEES = Balanced Emotional Empathy Scale. Group differences were tested with two-tailed Wilcoxon–Mann–Whitney tests. The principal outcome measure was the patient-rated CARE

patients blinded to physician randomization. Patients rated physicians on the ***Consultation and Relational Empathy Measure (CARE)***[31] within 1 month pre-training and between 1–2 months post-training. The CARE is a 10-item instrument assessing physician empathy and relational skill (sample item: "At today's appointment, how was the doctor at showing care and compassion?"). Each item is rated on a 5-point ordinal scale, and the items are summed to yield a total score. The instrument has high reliability (Cronbach's α=0.92) and excellent validity (mean r=0.85 with other physician empathy measures.[31] Since different patients would be rating the physicians before and after the training period, each physician was rated by multiple patients (pre mean 4.6±3.1; post mean 4.9±2.5) to minimize the impact of idiosyncratic ratings and increase reliability. Patients were blinded to physician randomization and were instructed to rate the *single interaction* they just had with the residents, not the overall relationship. Mean ratings for each physician were used in all subsequent analyses.

Table 3. Program Evaluation and Self-Assessment of Improvement (N=54)

Program Evaluation	No. (%)
Did you find the find the training interesting?	51 (94)
Did you find the training helpful?	53 (98)
Will you apply the concepts you learned to your clinical practice?	53 (98)
After the training, did you improve in . . .	No. (%)
Listening carefully to patients without interrupting?	49 (91)
Interpreting non-verbal cues (tone of voice, posture, affect)?	49 (91)
Being aware of your physiological reactions to challenging patients?	52 (96)
Being able to manage your physiological reactions to challenging patients?	49 (91)
Being aware of your emotional reactions to challenging patients?	51 (94)
Being able to manage your emotional reactions to challenging patients?	49 (91)
Understanding the latest research on the neurobiology of empathy?	49 (91)

The numbers and percentages show how many participants responded "yes" to each question

Table 4. Description of Modules

Session	Style	Content
Module 1	Didactic	**Introduction and context for empathy training**
	Didactic	Neurobiology and physiology of emotion
	Didactic and skill-based	Non-verbal communication of emotion
	Didactic, skill-based and Experiential	Decoding facial expressions of emotion
	Video trigger, skill-based and Experiential	Empathic management of entitled behavior
	Experiential and skill-based	Physician self regulation exercise and discussion
Module 2	Didactic	**Introduction to empathy for the 'difficult' patient**
	Didactic and Experiential	Understanding manipulative patient tactics and behaviors
	Video trigger, skill-based and Experiential	Maintaining empathy while managing manipulative patient tactics
	Didactic and skill-based	Recognition of subtle emotional threats
	Didactic, skill-based and Experiential	Decoding facial expressions of emotion
	Experiential and skill-based	Self regulation exercise and discussion
Module 3	Didactic	**Introduction to empathy and delivering bad news**
	Didactic	Empathy and delivering bad news
	Didactic	Patient-centered delivery of bad news
	Video trigger, skill-based and experiential	Empathy and delivering bad news
	Didactic, skill-based and Experiential	Decoding facial expressions of emotion
	Skill-based, and experiential	Self regulation exercises and discussion
	Skill-based	Exercises balancing optimism and reality
	Didactic and experiential	Final summary and group discussion

Patient Recruitment. All English-speaking adult patients were invited sequentially to complete the surveys by front office staff in outpatient clinics or by nurses and research assistants on inpatient services, who then collected the surveys.

Secondary Outcome Measures. The following measures were collected from trainees within 1 month pre-training and between 1-2 months post-training using REDCAP (Research Electronic Data Capture) Survey,[32] a secure, HIPAA compliant, web-based survey application hosted at Partners HealthCare:

Neurobiology and Physiology of Empathy Test. The research team constructed an 11-item, multiple-choice test of physician knowledge of the neurobiology and physiology of empathy, including recent research on neural

mechanisms involved in the experience of empathy. The items are summed to yield a score that ranges from 0–11.

The Ekman Facial Decoding Test.[33] assesses physician skill at decoding subtle facial expressions of emotion. The test is composed of 14 still photographs displaying seven different emotional expressions (happy, sad, fear, anger, disgust, surprise, and contempt). The items are summed to yield a score that ranges from 0–14.

The Jefferson Scale of Physician Empathy.[34] assesses physician attitudes about the relative value of empathy in clinical practice. Twenty items are rated on 7-point Likert scales, and the items are summed to yield a score that ranges from 20–140.

The Balanced Emotional Empathy Scale (BEES).[35] measures general empathic responsiveness in personal life. Thirty items are rated on 9-point Likert scales, and the items are summed to yield a score that ranges from –120 to+120.

Attitudes and Skills, and Program Evaluation. Participants were also asked a series of self-report questions before and after the training to assess baseline attitudes and skills, as well as subjective assessments of improvement in specific skills.

Statistical Analysis. Group differences on demographics and baseline measures were tested using Wilcoxon–Mann–Whitney tests for continuous measures and Fisher's Exact Test for categorical measures. Pre-post change scores were computed for all outcome measures, and Wilcoxon–Mann–Whitney tests were used to compare the training and control groups. We used more conservative non-parametric tests because they are robust to violations of the assumptions of parametric tests. Effect sizes (Cohen's d)[36] were computed for each outcome measure. All tests were two-tailed, with a 5% level of significance.

Statistical Power. Using a two-tailed Wilcoxon–Mann–Whitney test with a 5% level of significance, our target enrollment of 100 afforded 70% power to detect a medium effect (d=0.5) and 98% power to detect a large effect (d=0.8).

IRB Approval. All procedures were approved by the Institutional Review Boards of MGH and MEEI.

RESULTS

Participants. A total of 99 residents and fellows (52% female, mean age 30.6±3.6) from MGH and MEEI were included in the data analysis. Participants were drawn from medicine (N=32), general surgery (N=26), anesthesia (N=13), psychiatry (N=12), orthopedics (N=11), and ophthalmology (N=5). Figure 1 shows the recruitment flow. The treatment and control groups did not differ significantly in demographics, prior skills training, or baseline measures (Table 1).

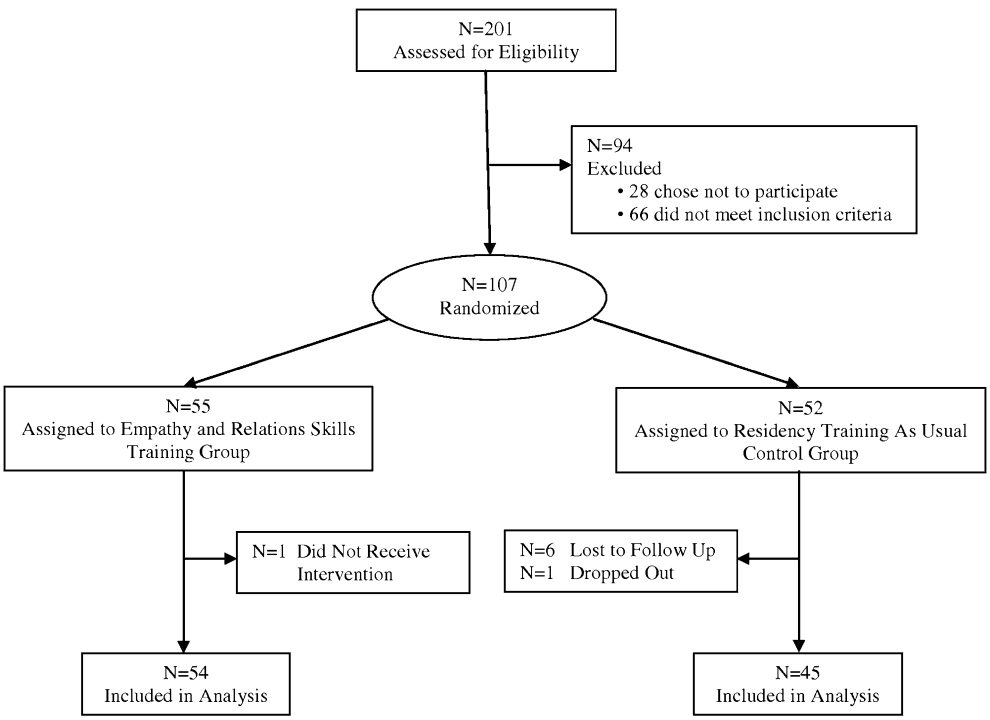

Figure 1. Study recruitment flowchart.

Principal Outcome Measure. Physicians randomly assigned to the training group showed greater improvement on patient ratings of physician empathy (CARE measure) than did the control group (P=0.04; see Table 2). We also examined the percentage of patient ratings that were "perfect" (i.e., highest rating on all 10 items of the CARE). Although not statistically significant, the observed values were consistent with the results shown in Table 2: the percentage of perfect CARE ratings rose from 31% to 33% for the training group, and fell from 35% to 28% for the control group. We examined physician gender and found that the training effect was very strong for women (mean difference on CARE= 5.17, d=0.73, P=0.002) and not significant for men (mean difference=–.1.10, d=–0.15 P=0.73).

Secondary Outcome Measures. As shown in Table 2, the training group showed significantly greater improvements in their knowledge of the neurobiology and physiology of empathy (Neurobiology Test; P<0.001), and in their ability to decode subtle facial expressions of emotion (Ekman Test; P<0.001). Differences in self-reported attitudes about the relative importance of empathy in clinical practice (Jefferson Scale; P=0.12) did not differ between the groups. The groups also did not differ in improvement in general empathic responsiveness in personal life (BEES; P=0.49). There was a strong positive correlation between change in ability to read subtle facial expressions of emotion as measured by the Ekman Faces Test and change in patient ratings of physician empathy as measured by the CARE measure. This correlation held for the training group (r=0.49, P<0.001), but not for the control group (r=0.12, P=0.45).

Baseline and Post-Intervention Self Assessment and Program Evaluation. At baseline, 53% of physicians reported that their empathy for patients had declined over the past several years; whereas only 33% reported an increase in empathy (13% reported no change). At baseline, 56% said they lacked the time to be empathic, and 29% reported burnout as the primary reason for their difficulty in being empathic. As shown in Table 3, participants were highly receptive to the training protocol and found it interesting and helpful. In addition they reported improvement in a number of areas specifically targeted by the training, such as listening carefully to patients without interruption, making meaningful eye contact, interpreting non-verbal cues, and greater self-awareness and ability to manage physiological and emotional reactions to challenging patients.

DISCUSSION

Our study is the first to demonstrate that a brief training intervention grounded in the neurobiology of emotions can increase patient-rated empathy among medical and surgical trainees**.** A recent systematic review argues that patient assessment, in contrast to self-report, is the most salient dimension for measuring physician empathy.[37] Using the patient-rated CARE measure, we found an improvement in physician empathy in the training group and a decline in the control group during the 4 month period between initial and final data collection (P=0.04, Table 2). Thus, the training may have reversed the well-documented decline in empathy during residency.[1–4] The training aimed to increase physician awareness of their patients' and their own emotional states and provided behavioral tools to convey empathic understanding and concern.

The training group showed significant improvement in their ability to decode subtle facial expressions of emotion. There was a strong positive correlation between ability to learn subtle facial expressions of emotion and change in patient-rated empathy. This supported our hypothesis that improved decoding of patients' emotional facial displays and eye contact are important in conveying physician empathy. There were also significantly greater improvements in the training group's knowledge of the neurobiology and physiology of empathy, which provided the scientific framework for the empathy and relational skills training.

Improvement in self-reported empathy on the Jefferson Empathy Scale was not statistically significantly greater for the training group as compared to control. Recent reports question whether patient- and self-assessments measure the same phenomenon.[4,5] Our finding that the training effect was stronger for women than men is similar to other studies.[22]

To date, five other randomized, controlled studies have attempted to improve physician empathy and communication skills at the level of patient perception.[22,23,38–40] All five studies had very small sample sizes (N<33); three did not randomize physicians to training interventions; and improving empathy in subjects did not reach statistical significance in two studies. The programs required substantially more training time, (8 hours-several days). A non-randomized study of mindful communication training with primary care physicians (27–34 hours) was associated with improved physician self-report of patient-centered attitudes, self-reported empathy, decreased burnout, and improved physician well-being.[15]

The empathy training protocol was designed to access physicians' prior knowledge of neuroanatomy and physiology of emotions in order to increase their understanding of human behavior. This brief training was well-received, and participants expressed interest in follow-up empathy training as a standard part of residency. Their interest affirms that medical trainees strongly value empathic care and are eager to improve their skills. However, long-lasting improvements in empathic clinical care cannot be sustained without organizational changes at all levels of healthcare. Such cultural changes require a commitment from clinical

and administrative leaders to place empathic care at the forefront of institutional missions

This study has a number of limitations. First, the sample size was relatively small, and the training was delivered by a single physician (HR) who may have been a particularly effective teacher. A larger trial with different instructors would provide further validation. Second, providing a monetary incentive may have biased residents to report more favorable self-report outcomes and assessment of the training. However, the training and control groups received the same hourly compensation. Moreover, the main outcome measure was unaffected by such bias because it was rated by patients. In addition, it is unlikely that this bias could explain the objective increases in knowledge and skills shown by residents. Third, there was no long-term follow-up. Future research could examine training retention, as well as optimal timing for booster training sessions. Fourth, the study would have been strengthened if obtaining more CARE measures had been possible. Fifth, Residents volunteered to participate, and therefore the sample may have been biased toward participants who were more receptive to the training. Sixth, some residents were excluded because their schedules precluded collection of patient-rated CARE measures. Future research in which the sample includes all residents in a service would address this limitation. Seventh, different patients were used pre- and post-intervention, and the patient cohorts could have differed in their ratings of empathy which may have introduced bias.

In our study the change in patient ratings of physician empathy was statistically significantly greater in the training group as compared to the control. This empathy training emphasized clinical behaviors that convey empathy, not merely attitudes or affects. Although the standardized effect size in this study (d=0.31) was modest, the change in empathy scores may indicate that virtue can indeed be taught.[41] By teaching specific skills, such as decoding facial expressions of emotion, residents learned how to convey empathy even when fatigued because it is integral to being a compassionate, professional physician.

If this empathy training program were to be instituted as a standard part of residency curricula, we would recommend more hours of training, more time for discussion and including empathy training in each year of residency. The training could be reinforced by supervisors, who might themselves require training. Future randomized controlled trials could address whether this empathy training results not only in improvements in patient ratings, but also in better medical outcomes, greater therapy adherence, reduced healthcare utilization, improved career satisfaction, reduced burnout, and fewer malpractice claims.

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***Conflict of Interest:** Helen Riess reports her role as Chief Technology Officer for Empathetics, LLC. This study was completed prior to formation of Empathetics, LLC. The other authors declare that they do not have a conflict of interest.*

***Corresponding Author:** Helen Riess, MD; Associate Clinical Professor of Psychiatry, Harvard Medical School, Director, Empathy and Relational Science Program, Massachusetts General Hospital, Wang ACC Suite 812, Boston, MA 02114, USA (e-mail: HRiess@Partners.Org).*

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