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<https://doi.org/10.1080/0144929X.2019.1645209>

Online Dispute Resolution in Mediating EHR Disputes: A Case Study on the Impact of Emotional Intelligence

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An Electronic Health Record (EHR) is an individual's record of all health events that enables critical information to be documented and shared electronically amongst health care providers and patients. The introduction of an EHR, particularly a patient-accessible EHR, can be expected to lead to an escalation of enquiries, complaints and ultimately, disputes. Prevailing opinion is that Online Dispute Resolution (ODR) systems can help with the mediation of certain types of disputes electronically, particularly systems deploy artificial intelligence (AI) that reduce the need for a human mediator. However, disputes regarding health tend to invoke emotional responses from patients that may conceivably impact ODR efficacy. This raises an interesting question on the influence of emotional intelligence (EI) in the process of mediation. Using a phenomenological research methodology simulating doctor–patient disputes mediated with an AI smart ODR system in place of a human mediator, we found an association between EI and the propensity for a participant to change their previously asserted claims. Participants with lower EI tend to prolong resolution compared to those with higher EI. Future research include trialling larger scale ODR systems for specific cohorts of patients in the area of health related dispute resolution are advanced.

Keywords: Online dispute resolution; ODR; electronic health record; EHR; mediation; emotional intelligence; negotiation support.

Word count: 10456 words

1. Introduction

An electronic health record (EHR) is a virtual record of every health related event such as a hospital admission, general practitioner visit or allergic episode experienced by an individual from in-utero to after-death (WHO, 2006). The EHR is intended to be a person's life-long longitudinal medical record containing data from multiple episodes and providers, and extends beyond inpatient care to ambulatory care settings (Gesulгаа et al, 2017, Nguyen et al, 2014). In the USA, the Health Insurance Portability and Accountability Act of 1996 (HIPAA) has given every patient the right to review their medical record and some 90% of US hospitals have now given their patients access to EHR (AHA, 2018). In Europe, 65% of patients have access to EHRs in healthcare facilities, and 81% of patients have access to hospital EHR (Armstrong 2017).

Personal EHRs facilitate benefits for patients and health professionals that include better health outcomes, patient empowerment, shorter consultations and cost savings (Tang et al, 2006, Urowitz et al 2012, Archer et al 2011). Woods (2015) asked patients directly to comment on the benefits patients perceived and the level of stress or harm felt after reading their records. On the whole, patients felt more empowered about their medical condition following access to their records however, ten percent of patients felt aggrieved over language used by doctors to refer to patients and were concerned about omissions or inconsistencies between what was said in a consultation and what was written in the EHR. While a lack of communication or misunderstandings are a contributing factor to health care disputes (Amirthalingam 2017, Lee 2015, Bergman and Fiester 2009, Abdelrahman and Abdelmageed 2017), disputes over the content of the EHR such as in the quality, accuracy, privacy and security of personal health information are expected to become more prevalent (Halamka et al, 2008, Katsh et al, 2011, Yau et al, 2011, Bellucci et al, 2012, Palabindala, et al, 2016). Mechanisms to resolve such differences will be necessary. In this context, our research study highlighting support for EHR disputes resolution could serve as one of the key mechanisms required in successful EHR adoption.

In recent decades, many disputes that were traditionally resolved using litigation have resorted to Alternative Dispute Resolution approaches (ADR). ADR processes including mediation, negotiation and arbitration have gained favour for their potential to avoid costly and time consuming legal battles. Mediation typically involves disputants meeting face to face with a mediator facilitating the dialogue toward a satisfactory resolution. That mediators possess high emotional intelligence is well documented (Kelly and Kaminskiene 2016, Duffy 2010, Oberda 2018).

Online Dispute Resolution (ODR) are ADR processes that commonly utilise advances in information and communication technology (ICT) to reflect an online presence (Bellucci et al, 2012; Legg, 2016). ICT applied to ODR range from systems where the technologies are relatively passive such as email systems where participants dialogue is enacted through a mediator by email, to systems where artificially intelligent web agents provide stakeholders support drawn from sophisticated models of the dispute and/or reasoning, without involving a human mediator. The ReConsider ODR system (Muecke, 2011) used in this study embeds an AI model of patient-provider disputes to facilitate dispute resolution, without involving a human mediator.

ReConsider (Muecke, 2011) is a Smart ODR system that encourages disputants to reassess their positions by presenting issues and sub issues in a structured way until the parties reach agreement or the parties acknowledge they cannot agree. The software guides two parties to resolve their dispute asynchronously, and without the intervention of a human mediator. Instead, the computational model draws inferences using Bayesian inferencing described in subsequent sections, and guides the asynchronous dialogue. On commencement, the program asks disputants to choose a position from the most general set of positions. If disputants disagree on that position, then less general positions are presented and so on, until agreement is reached at a very fine-grained level, or no further levels exist in the computational model.

In general, ODR promises improved access to justice and cost-effective conflict resolution ((Zelevnikow & Bellucci, 2012) Poblet and Casanovas, 2007; Barendrecht et al, 2016) and been deployed for managing disputes between buyers and sellers in online markets (e.g., SquareTrade by eBay), insurance claims (e.g., SmartSettle and Cybersettle), divorce settlements (Abrahams et al, 2012) and to support the resolution of family law financial disputes (Bellucci 2008). Most ODR systems do not deploy artificial intelligence however notable exceptions include Bellucci (2008) and Muecke (2011).

As outlined above, most disputes are well known to be emotionally laden though how emotion is impacted with ODR, and the influence of emotional intelligence in ODR has not been widely studied. Fisher and Shapiro (2005) present an in-depth discussion of emotions experienced by parties in face to face dispute resolution and advocate methods by which emotion can be managed by mediators. The role emotion plays in ODR, particularly Smart ODR systems that reduce the involvement of a human mediator, has not been explored. Understanding the role emotion plays is especially important for disputes between patients and healthcare providers that are often exceptionally emotive (Menkel-Meadow, 2011).

This study focuses on the emotional intelligence of participants in a Smart ODR without a human mediator. Emotional intelligence (EI), defined as the ability to recognise and manage one's own emotions and deal effectively with other peoples' feelings (Goleman, 1995) is known to influence face to face dispute resolution processes and outcomes (Ogilvie and Carsky, 2002; Borland and Ross 2010, Foo et al, 2004). Borland and Ross (2010) specifically found the propensity to resolve a face to face dispute is directly related to the EI of disputants.

The aim of this research is to explore the suitability of Smart ODR in the healthcare context, with an emphasis on understanding whether parties' emotional intelligence is a factor in the propensity to settle a dispute between patient and healthcare provider in the absence of a human mediator, who might otherwise attempt to manage participant's emotions. For this purpose, a Smart ODR system, ReConsider, is loaded with a computational model of a healthcare dispute and a simulation is conducted with an EHR dispute case scenario. The objective of this paper is two-fold: i) to pilot

the use of ODR in mediating EHR disputes and ii) to study the interplay between negotiators' EI and the computational model that the Smart ODR uses. This is the first study to intersect technology, emotion and health through its focus on the impact of EI with the use of ODR in mediating EHR disputes. The paper is structured as follows. Section 2 presents a review of literature on dispute resolution and ODR, EI and emotions in negotiations, and their intersection in the context of EHR disputes. In Section 3, we describe the research methodology using a descriptive case study approach, and provide the design of the pilot study as well as the ODR tool developed for the simulation experiment. Section 4 presents an in-depth analysis of the ODR negotiations undertaken by the disputants using the simulated doctor-patient roles in an EHR dispute for the pilot study. In Section 5, we discuss the findings of the study with regard to the impact of EI on ODR using two data set examples for the EHR dispute. Finally, in Section 6, we draw conclusions and implications for future ODR implementations and research.

2. Literature Review

The continuing prevalence of the EHR is likely to lead to more enquiries, complaints and ultimately disputes between health care professionals, governing bodies and patients (Gagnon et al, 2016; Palabindala, et al, 2016). A patient with access to electronic records has considerable time to deliberate on recorded symptoms, diagnoses and test results. Content can be evaluated against a variety of medical websites, some of questionable quality. Given the textual form of the record is in a low form of information richness (Daft and Lengel, 1986), the interpretation of the text is open to different views and conclusions. Key actions and decisions taken by practitioners, often in seconds, are available for fine-grained scrutiny even decades after they have occurred. As a consequence, patients can be expected to have queries and raise concerns. Some concerns will be elevated to disputes and require effective and efficient dispute resolution processes, ideally underpinned by negotiation theories discussed in the next section. In general, disputes can take a long time to settle with high costs and legal procedures involved with no guarantee for justice (Barendrecht et al, 2016). ODR systems that are popular in other domains due to their speed and low costs should be envisaged for mediating health related conflicts. The absence of convenient systems to address these disputes has been identified as a key barrier for a successful EHR system implementation

(Gagnon et al., 2016; Shah et al., 2016, Gesulga et al., 2017). The next subsections reviews the state-of-the-art in ODR as well EI from the principles of negotiation theory for the mediation process of EHR disputes.

2.1 Dispute resolution processes

Negotiation theory underpinning the negotiation process (Walton and Mckersie, 1965) falls under two main categories, distributive (zero-sum) theory and integrative (collaborative) theory. Zero sum negotiation refers to outcomes in which one party wins what the other party loses, while collaborative approaches emphasises outcomes as the result of coordinated behaviour of both participants (Robertson et al, 1990), and often yield assertiveness and high cooperativeness (Thomas, 1976; Pruitt, 1983; Abrahams et al, 2012). Our work is informed by integrative approaches as these promote better outcomes for all parties and help to foster good relationships between the parties in the longer term – which are important aspects to managing patient health care.

2.2 EI and Emotions in ADR (involving EHR negotiation)

EI is the ability to recognise and manage one's own emotions and those of others has its root definition as the ability to understand and use emotions adaptively in everyday life (Mayer and Salovey, 1997). The concept of EI relates to theories on how humans express emotion and assumes that emotional responses to our environment differ from person to person. There are several measures to quantify one's emotional intelligence, usually referred to as the EQ (Emotional Quotient).

It is generally understood that emotionally intelligent (high EQ) individuals are better equipped to deal with emotional responses than those with a low EQ who are less likely to recognise emotions. Borland and Ross (2010) found that higher levels of EI can help disputants understand the emotions they feel (and those of counterparts) whilst negotiating, and to manage these emotions effectively. In contrast, Choi et al (2015) reported only a weak link between EI and emotion management. They suggest that during a negotiation, even though intrapersonal EI (but not interpersonal EI) increased counterpart positive emotion and decreased counterpart negative emotion, further investigation is required. Similarly, it is expected that a negotiator with a higher EI could affect higher levels of satisfaction of their counterpart, however, we see mixed results in the literature. Muller and Curham (2006) report that a disputants' ability to understand emotion positively predicts their counterpart's outcome satisfaction. Similarly, Kim et al (2014) found EI to be relevant to the extent that trust was engendered and in the desire of participants to work together again. Chun et al (2010), however, found no relationship between EI and establishing trust and rapport in negotiations.

Conclusions from Boland and Ross' (2010) study into leadership, face to face negotiation and EI, found the level of a negotiators EI relates to the propensity of disputants to settle during the mediation process. Their conclusions suggest that disputants with High EQ are more likely to seek mutually satisfying agreements; while those with a Low EQ would try to put a stop to conflict by not addressing underlying issues (for example by compensating or putting pressure on disputants to settle). Previous studies investigating ODR show that the expression of negative emotions leads to delay and prevention of settlement (Brett et al, 2007; Friedman et al, 2004), while related research

highlights the importance of emotional tone as well as timing (van Veenen, 2010; Olekalns and Druckman, 2014). In the current study, a human mediator is not present to moderate negative emotions or tone, however, disputants use the ReConsider Smart ODR asynchronously, to express their positions and beliefs in structured forms under the control of the system. Participants cannot deviate from the forms with emotional outbursts that may inflame emotional responses and delay resolutions.

There are several studies in the literature investigating the role of EI in negotiation from different perspectives. In organisational conflict management (Sheraji et al., 2013) illustrated that there is a significant relationship between EI and conflict management strategies such as collaboration, competition, avoidance and conciliation with collaboration strategy ranked highest. In addition, Coleman and Matthew, (2015) and Katz and Sosa, (2015) recognized that EI can contribute to the repertoire of effective negotiators.

Studies in EI in ADR: (new paragraph)

Need for mediators to be EI:

Kelly and Kaminskiene (2016) describe how important it is for mediator and negotiators to have high EI. Emotional intelligence facilitates the awareness of five emotionally laden core concerns negotiators have; appreciation, affiliation, acceptance, status and role. A negotiator may use the following skills to build empathy and trust to improve the emotional aspects of a negotiation: to work with emotions across all dimensions of a negotiation; to understand emotional nuance, as a result of power differential, cultural nuance, or past experience; to address process issues with the same vigor as substance issues; to actively listen and to encourage all the parties to listen to each other.”. Duffy (2010) suggests empathy and sympathy are necessary for mediators to do their job, but is it only EI mediators who can remain attached but detached and therefore preserve mediator impartiality. Oberda (2018) gives a list of emotions mediators should look out for and support for the contention that mediators should be emotionally intelligent. Bultena et al (2011), also affirms importance of EI improving the communication between disputants.

2.3 Emotion management in ODR

The way we experience or operationalise negotiation is broadly classified under two major contributing fields, namely behavioural sciences and computational modelling. Negotiation from a behavioural perspective is concerned with the psychology of participants in the traditional face to face setting. Computational modelling in ODR, on the other hand, refers to negotiations conducted using computers. Computers can help parties to objectify options and possible alternatives to solutions and clarify their priorities through text based communication and shared informational screens. Information technology also provides opportunities for face-to-face negotiation using video conferencing tools, although we do not use visual tools as yet in our research. Whilst different in their approach to negotiation, common to these is the importance given to affective components of negotiators such as trust, beliefs and emotions (Turan et al, 2013; Legg, 2016), suggesting learnings from studies conducted with face to face negotiations can be applied to electronic negotiations.

Recent reports indicate that ODR has real potential to bring access to justice in a financially sustainable way, without putting undue pressure on already overstretched legal systems (Barendrecht et al. 2016). In addition, ODR may alleviate some of the obstacles to conflict resolution including negotiators experiencing less time pressure from asynchronous systems and reduced face-to-face negative emotional issues, whilst also preventing mediator stress and burnout. If emotions play a role in negotiation, then emotional intelligence can be expected to impact dispute resolution processes and if well understood, is likely to improve negotiation performance for EHR disputes. These, together with a collaborative style of negotiators underpinned by integrative theory form our motivation to explore the influence of EI on ODR.

Need to look up Zondag and Lodder 2007 – they theorise that disputes can be deconstructed into small units that can then be described on an emotional level. In their view, these objectives could be accomplished through an automated questionnaire or with semantic analysis technology capable of deriving 'meaning'- and an example of questionnaires is..

Example of tools: The only one I found was Darin Thompson, where they showcase an example of an ODR with tools to identify emotional aspects of the dispute, for example feedback on how they feel about the dispute. Depending on their answer, the system can congratulate them or ask them to review a video which conveys empathy and sympathy (say if they are distressed). An emotional intelligence functionality accumulates data about responses to the emotional feedback mechanisms. This data can be analysed to compile general profiles of users' emotional states at various points in the pathways and to provide insights not potential enhancements of emotional intelligence functionality.

We explore the role of EI based on the propensity of negotiators to settle, a finding suggested by Borland and Ross (2010) in their face to face study and apply it to ODR systems. We undertake such a study that intersects EI, ODR and negotiation within the context of EHR dispute resolution, which we believe to be among the first of its kind in literature.

3. Materials and methods

This study adopts a phenomenological approach using a descriptive, case study research methodology, which typically involves gathering data that would describe events (Glass and Hopkins, 1984). In this setting, we investigate the influence of EI on an ODR architecture designed for doctor-patient EHR disputes. We have adopted an observational type of descriptive research in a structured manner, as patterns are derived automatically by the ReConsider software that logs ODR interactions between the disputants. These disputant interaction patterns form the essence of their emotional phenomena. This approach would fall under phenomenological research, a rigorous descriptive empirical phenomenology developed by Giorgi and the Duquesne Circle in the 1970's (Wertz, 2005).

A phenomenological approach is apt for understanding behaviour from the participants' own frame of reference (Smith and Osborne, 2003). In the context of this study, the participants are the doctors and patients disputing on the patient's EHR, while the behaviour studied is the negotiation

process with the disputants' level of EI as the frame of reference. Through the ODR, further prompts are offered to explore the dimensions of the case study situation for the negotiation process to take place. Using this design, we investigate the successful use of ODR for EHR disputes and the impact of EI in the mediating process as a pilot study.

For this study, the phenomenological data were collected in the form of ODR patterns of interaction during the negotiation process. The ODR provided opportunities for the participants playing the role of doctors and patients to reflect on each other's claims, capturing the effect of disputants' emotions leading to empathy or understanding of the other disputant's point of view during the negotiation process. Analysis and interpretations of qualitative data collected included some quantifiable metrics such as the number of times each claim position was revisited before arriving at a resolution. The main observable metric, 'propensity to resolve a dispute' was operationalized as the number of times positions were altered during a negotiation. For the purposes of this study, we have defined negotiation success as the acceptance of a settlement reached by both parties.

The specific aims of this study are:

- 1) To configure an ODR architecture using an integrative or collaborative approach between patients and doctors for piloting an ODR for mediating EHR disputes; and
- 2) To assess the impact of a disputant's EI on the propensity to resolve an EHR dispute when using the configured ODR.

The ODR tool used in this study presents embedded contextual information relevant to a dispute as an argument tree first advanced by (Stranieri, Zeleznikow, Gawler, & Lewis, 1999) to model the reasoning judges perform when reaching property settlements following divorce. The Argument Tree approach enabled machine learning to be embedded in artificial intelligence systems in diverse fields including family law (Stranieri & Zeleznikow, 2006), construction safety (Cooke, Lingard, Blismas, & Stranieri, 2008), refugee law (Yearwood & Stranieri, 2006), copyright law (Stranieri & Zeleznikow, 2001) and sentencing (Hall, Calabro, Sourdin, & Stranieri, 2005). An argument tree is a hierarchy of claims (positions) that divide into more fine grained issues as the tree is traversed from root, high level claims to leaf nodes. The Argument tree was first used as shared mental model that represents a structuring of a dispute by (Muecke, Stranieri, & Miller, 2008). This represents a non-dialectical model of reasoning distinct from dialectical models (Stranieri, Zeleznikow, & Yearwood, 2001) that model the claims and counter-claim dialogue sequences between disputants exemplified by (Lodder, 1999; Lodder & Zeleznikow, 2010).

At any point in time during a dispute, a negotiator playing the role of doctor or patient, is required by the ReConsider system to focus on a single claim and its sub-claims drawn from the Argument Tree of the concepts that model the dispute. Disputants deliberate asynchronously and independently. Stating a new claim or making a concession in this framework is equivalent to changing a claim. The number and pattern of claim changes provides a measure of the behaviour of parties during the process of negotiation.

As detailed below, participants EQ was elicited prior to commencement of the simulated doctor-patient disputes. There are a number of validated instruments to elicit a respondent's EI; including Bar-On EQ-i (Bar-On, 2000), ECI (Boyatzis and Sala, 2004), Goleman's Emotional Intelligence

Appraisal (Goleman 1995) and the MSCEIT (Mayer and Salovey, 1997). MSCEIT is the most appropriate and commonly used measure in negotiation and social interaction (Fulmer and Barry, 2004; Mueller and Curhan, 2006) due to its relatively high level of internal validity (Ambavale and Dani, 2014). The MSCEIT inventory identifies the extent to which persons perceive, facilitate, understand and manage emotion in themselves and with each other (Mayer et al, 2004, Caruso and Salovey, 2004). Our study used the MSCEIT to elicit participant's EQ prior to observing their interactions in a simulated doctor-patient EHR dispute in order to identify the impact EI may have on the dispute resolution process. Next, we describe the design of our pilot case study and the ODR software tool (ReConsider) configured for this purpose.

3.1 Case study design

In order to conduct a pilot study with a qualitative phenomenological design approach, we considered a hypothetical scenario of an EHR dispute related to the appropriateness of communications from a doctor to a young pregnant woman.

The pilot study involved two phases; in the first, participants were asked to complete the MSCEIT online and then, in the second phase, they assumed the role of a disputant in the given hypothetical doctor–patient EHR dispute. They were required to work through a simulated mediation process using an ODR system called ReConsider configured with this case study setting. Patterns of interactions during the negotiation process and participants' respective EQ scores were analysed to identify a link between EI and the negotiator's behaviour.

For the simulated pilot study, we recruited twenty voluntary participants who were final year undergraduate students completing their major sequence in Information Systems and Health Informatics at two Australian universities. Participants were randomly allocated in pairs to take up the role of a doctor and a patient. A website was created to allow volunteers to provide their consent to participate in the research and to access the two phases anonymously. Wherever possible, males were allocated to the role of the male doctor, and females to the role of the female patient.

Similar to other studies reported in literature, undergraduate students were used in this pilot case study experiment as they can be expected to have had exposure and knowledge of the medical profession. Buelens and Van De Woestyne (2007) in their review of negotiation research report that 80.2% of studies published from 1995 to 2004 have used students in their experiments and case studies. Kim et al (2014) examined the EI of a student cohort to explore the effect of rapport on negotiation. Since the objective of this pilot study is to explore the intersection of ODR, EI and EHR, and mainly their impact on the mediation process, a doctor-patient role-based simulation with students was considered appropriate for the pilot study.

Participants first completed an online version of the MSCEIT test. The EI score was recorded but not presented to participants until the ReConsider part of the study had been completed. For the second activity, each participant was randomly assigned the role of either patient or doctor and presented with a hypothetical scenario that involved a young pregnant woman who was concerned that her obstetrician was rude and denied her access to ultrasound procedures (Appendix 1). Participants playing the role of both doctor and patient was provided with a version of their proxy's view the dispute and not their adversary's view. Participants playing the doctor and patient was

shown the same electronic health record. Although, each participant was in the same classroom as their adversary, their identity was not known to them.

Participants accessed the ReConsider software program that was configured with an Argument tree model pertaining to doctor-patient communication issues as illustrated in Figure 1. They selected options based on user prompts that represented possible positions for participants to take on factors that they perceived relevant to the dispute, and these are described in the next section. At any point during the process, parties in the doctor-patient pair could view progress through real time explicit tracking of issues in agreement and in dispute. Each party was asked to regularly reflect on their position over the disputed issues, and to modify them if appropriate. At every prompt generated by ReConsider, the participants were able to skip, ignore or repeat claims at any time. The system recorded each instance where a position was recorded (referred to as a claim) and subsequent changes to claims (that is, a claim change). This enabled claims to be tracked against time intervals and compared.

A participant's propensity to resolve a dispute was gauged by analysing differences in the timing and number of claims made. For example, in disputes where parties did not depart from their initial positions and thereby made no claim changes, we hypothesize propensity to reach agreement is low. Likewise, where parties have made several claim changes, we expect parties have a positive desire to resolve the dispute; that is, propensity to resolve a dispute is high.

3.2 ODR Software Tool: ReConsider

The ODR architecture presented here uses Principled Negotiation (Fisher and Ury 1991) as its underpinning negotiation theory. The approach deploys an ODR engine, called "ReConsider" (Muecke 2008) that implements Principled Negotiation by embedding a model that supports the relevant issues and sub-issues into a hierarchy of possibly conflicting factors. ReConsider is a two party, multi-issue ODR tool which attempts to help parties reach an agreement by providing a structured hierarchy of concepts that characterise reasoning about the issue in question. The software invites disputants to negotiate over issues asynchronously and online. Participants work through the hierarchy and specify their positions over key issues to discover points of agreement and disagreement. The ReConsider system was used successfully in a previous study where it played a role in enticing disputants to reflect on their claims and appreciate the claims of their adversary in property disputes following divorce (Muecke, 2011).

ReConsider was selected for the study due to the ease with which positions can be analysed and context can be slotted into the software program, particularly as two of the researchers had in-depth knowledge on how the program works to modify and configure it appropriately.

Agreement is facilitated by reframing issues in terms of their smaller sub-ordinate issues. The basic premise to agreement is that if participants agree on sub-issues, then they are more likely to change their views and accept the issues described at parent nodes, and ultimately the overall issue. Figure 1 shows the argument tree based on the deductive reasoning approach through a consensus among the authors.

<Figure 1>

In Figure 1, the root node (1: Communication issues) indicates the extent to which communication between the doctor and patient are regarded as acceptable. Participants playing the role of patients, when prompted, indicated the communication was unacceptable whereas those playing the role of doctor indicated the opposite. ReConsider logs a disagreement at that top, most generic node, and moves focus to sub-issues at the next level. Nodes subordinate to the root node represent the most important factors contributing to the communication between doctor and patient that includes: the method of communication used by the Doctor/Patient (node 10 in Figure 1), the ability of the Doctor/Patient to accurately convey important information (node 17,16), and the Doctor/Patient expectations (11,12). Below the 2nd level nodes are additional nodes which inform the nodes above. Each level of the tree becomes progressively more refined, until base facts are represented at leaf nodes (nodes to the right in Figure 1).

Once a party has entered a claim value for a node the children node, then the ReConsider system invokes an inference mechanism taking the values entered at the children nodes to infer a value at the parent node. The AI generated inference is related to the disputant's claim and if different, the participant is prompted to re-assess their claims. For instance, if the patient's responses to the nodes at Level 2 of the tree indicate the content of the doctors information is adequate, the style of delivery is adequate and patient's expectations have been met, the AI mechanism infers that the communication (root node) is adequate. The AI inference is presented alongside the patients to prompt the patient to reconsider their claims if their claim differs from that of the AI.

The AI inferences are performed with a Bayesian Belief Network (BBN) at each level of the tree. A BBN, first introduced by (Pearl, 1985), is a directed graph where nodes are linked with directional arcs that represent the casual dependencies between nodes. Weights on each arc between nodes represent the extent to which one node causally determines another. Bayesian probability laws are applied to combine weights from sub-ordinate nodes to infer a likelihood of a parent node. Bayesian Belief Networks have been deployed extensively in artificial intelligence(Daly, Shen, & Aitken, 2011). Weights for the ReConsider BBN's were derived by consensus between the study's investigators.

A summary of the steps involved in interactions of participants with Re-Consider are:

Step 1. Claim Selection: ReConsider commences by asking disputants to rate the issue at the root node, 1: Communication Issues. Each disputant is required to select one of the following claim options to describe their view about the communication between the doctor and the patient: (1) "was completely inadequate", (2) "was inadequate", (3) "slightly inadequate", (4) "not the best, yet acceptable", (5) "was good" or (6) "was completely adequate".

Step 2. Identification of Dispute Factors: If the disputants do not select the same claim option (that is they disagree), ReConsider guides disputants through the next level of questioning, which may help to clarify a disputant's understanding of the issue, and hence help to resolve the issue at the higher level. In this case nodes 16, 17, 11, 12, 9, 10 help to clarify Node 1: Communication issues (Figure 1).

Step 3. Argument Tree Traversal: Disputants assert their claims for each sub-node, and if disputants do not agree, the system will display prompts relating to each respective the subordinate level. For example, given the doctor and patient did not agree at node 9, prompts relating to nodes 28, 29, and 30 are presented and canvassed. If the disputants agreed on the sensitivity of the Doctor's Communication (node 29), there would be no need to explore

this branch of the tree and hence the ReConsider system would not present prompts for the sub-nodes 31, 32, 33.

Step 4. Modification of Claims: Once the tree has been fully explored to points of agreement or leaf nodes, the disputants work their way back up the tree towards the root node. This assists the disputants to modify their previously asserted claims, now with a better understanding of the dispute.

Step 5. Application of Bayesian Inference: Once the disputants have worked their way back to the initial node on which they asserted a claim, Bayesian inference is used to determine the likely claim value for the root node.

Step 6. Inference Feedback: The system's inference is presented to disputants as the recommended solution to the dispute. If a claim at a node differs from the inference engine's suggestion, the participant is asked to reconsider his or her claim. The claim changes were logged by the system for further analysis

4. Results

Results suggest a link between propensity to resolve a dispute, measured by the number of claim changes during a simulated dispute resolution using the Smart ODR architecture and the EI of disputants. A negotiation is considered successful in ReConsider if both parties keep making claim changes until they agree with claims made at the root node. Of the 20 participants recruited, 11 completed the MSCEIT, with 2 pairs (4 participants) successfully completing the dispute resolution simulation (Table 1).

Table 1 shows the overall summary of the data collected relating the EI scores (MSCEIT scores) with the number of claim changes made during a negotiation. Tables 2 and 3, described below, show a summary of the interactions for Case A and B respectively that were captured from the ODR system at all nodes of the Argument Tree of ReConsider. We measure the propensity to resolve a dispute by tracking the number of claims made against nodes (Table 1) and variations of point differences in claim changes across time intervals (Tables 2 and 3).

<Table 1>

We performed an in-depth analysis of the patterns of interaction during the negotiation process for Case A and Case B by recording claim values and the sequence in which these claims were made, so as to gain insights. We describe how this data given in Table 2 (Case A) and Table 3 (Case B) contributes to the logical reasoning adopted for making inferences using Bayesian inference engine of the ODR. Each row (labelled T1, T2, T3...) represents claims entered by one party before control was passed to the other party (referred here as a Time Interval). The top row labels refer to Nodes (their number and descriptions are given in Figure 1). The bulk of the table comprises of numbers reflecting the claim values for nodes made by disputants in a certain time interval. If multiple claims are made within the one-time interval, then the claims are displayed as "n1, n2, '. Bolded claims represent the final claim values of nodes made by a disputant.

4.1 Analysis of Case A

In this section, we consider Case A, where the two participants with average EI scores resolved the dispute. Data from Table 1 shows that the number of claim changes between the disputants were similar (Doctor's 19 against the Patient's 25).

<Table 2>

Table 2 tracks the negotiation against time intervals (T1 to T9). In T1 – T3, both the patient (P) and the Doctor (D) assign claims against the child nodes of Node 1 (Nodes 9, 10, 11, 12, 16, 17) which revealed disagreement at all nodes except node 16.

In T4 we start to see changes to claims. This time interval reveals D may be willing to negotiate by matching and making claim changes closer to P's claims; for example for nodes 30, 29 and 21, D matched claims made previously by P by lifting their claim by at least 2 levels.

In T5, it appears P is willing to revisit claims to achieve agreement, evidenced by P using the claim changes made at the nodes 31, 32, 33 to inform her revised claim at Node 29. Agreement at Node 29 has been facilitated by agreement at the node's leaf nodes.

From T6 onwards, both P and D appear to be willing to achieve agreement by edging closer to each other's claims, and hence are showing similar tendencies to compromise. In T7, P either matched D's recent claims or submitted claims closer to D's claims, whilst in T8, D matches P's claim value at Node 10 and Node 9. D appears to compromise by moving down two claim levels for Node 9; effectively making agreement very easy. P also makes a claim on the top node for a claim value of 2. In the last time interval (T9), we find P agrees with D's claim for the top node signalling the resolution of the dispute.

In this dispute both parties compromised and displayed a willingness to mediate and resolve the dispute. The parties took into consideration their counterpart's values to modify their ratings to either resolve them or to at least move closer to achieving agreement. This goodwill was often mirrored by the disputants. Both disputants have average EQ scores that were similar in value. This indicates that participants have displayed similar emotional perception, use, understanding and emotion management related to the decision making task in the mediation process. Participants from this case data set displayed good propensity to resolve the dispute through their compromising nature.

4.2 Findings for Case B

In Case B, the two parties recorded low EQ scores and D made many more claims (83) than P's 44.

<Table 3>

D and P made their initial claim assignments from T1- T3. Most nodes were in dispute, with the exception of Node 20. In T4 we start to see changes to initially set claims, commencing with P who assigned 0 (down from 2) to Nodes 29 and 18. These claim changes are a departure away from agreement seeing as D's claim for the same was 1. This trend of a seemingly unwillingness to edge closer to agreement is evident in claim changes made to Nodes 10, 16, 17, 21, 30 and 28. For example, for Node 21, P's initial claim was 3, against D's claim of 4. Being so close, it was unfortunate P decided to move from a claim level of 3 to 1, resulting in D resolving the node in the last time interval. P did not make claim changes to the remaining nodes, with the exception of Node 9, where P's claim changes contributed to resolving the node. Overall, it became clear P did not take into account D's previous claims in making their claims.

On the other hand, D made many claim changes, though mainly at the last time interval, perhaps in an attempt to resolve the nodes quickly. The majority of nodes were resolved through direct final action, for example, leaf nodes for Nodes 29 and 10 were resolved after D's last minute claim changes to each in T31. Whilst node 31 was resolved earlier at T27, this result was due to D's constant revision of claims whereby D matched P's claim of 0 after eight rounds of claim changes.

Finally the dispute was resolved at T32 with P accepting D's repeated claim of 2 (all at T31) for the top node (Node 1).

There were also major differences in the number of claims made. The number of claim changes made by P is very small compared to D, and most of the claim changes do not edge closer to resolving the dispute. Throughout the negotiation, it appears P does not show a willingness to resolve the dispute.

The MSCEIT scores of the disputants in Case B were similar, at a lower than average EI level. The disputants in this case negotiated as if they were acting on their own; as there was little evidence to indicate disputants considered their counterpart's claims when making their own claims. This is also reflected by the relatively small number of claims made within the considerable time taken by the disputants to resolve this dispute. Particularly absent was the communal goal of well-meaning negotiators to achieve a satisfactory agreement in the quickest time, indicating a low propensity to resolve the dispute. These observations can be understood given the participants' low EI score.

4.3 Summary of key findings

In this study, by adopting a phenomenological approach using a descriptive, case study research methodology, we were able to capture details from the interaction of disputants whilst using the Smart ODR. By applying interpretative phenomenological analysis as described in section 3, the key findings suggest that:

- (1) The number of claim changes relates to how well a negotiation is resolved;
- (2) Participants with a higher EI tend to mediate with their counterpart to resolve a dispute faster through the ODR;

- (3) participants with a lower EI tend to resist working with their counterpart to resolve a dispute and choose to work on their own as exhibited through their claim patterns in the ODR; and
- (4) Participants with an average EI tend to negotiate inclusively of a counterpart's position seen through the ODR.

5. Discussion and implications

We have found that our ODR model via the ReConsider online tool had enabled disputants to revise their positions by unpacking the issues and presenting them for re-consideration during the mediation process. Across most issues, the number of claims made tended to be associated with the number of nodes resolved. It was not surprising to find that the most highly contested nodes were the leaf nodes of D's content and P's content as these nodes are most directly related to the content of the communication made in the EHR. We therefore claim ODR systems can be successfully applied to disputes concerning communication issues in EHR. This result also confirms the suitability of the case study to the participants who underwent the doctor-patient roles in the pilot study.

Our results report on the interactions between disputants and postulate a relationship between negotiation styles and EI. Case A participants had a higher EQ score than Case B participants, though the scores are a global average EQ score in absolute terms. This case demonstrated that disputants with an average EQ tend to appreciate and copy positive behaviour. On the other hand, the disputants in Case B recorded lower EQ scores and tended to resist agreement shown by their reluctance to modify claims. The findings can be explained by surmising that those with low EI are reluctant to modify their positions due to a lower awareness of the impact of emotions associated with positions held. Those with average to high EI could be sufficiently empathic of their own emotions and those of counterparts that they consider a modification of positions without risking a subjugation of their own feelings. These preliminary findings suggest that EI may be a useful indicator of propensity to resolve an EHR dispute using ODR.

Our findings support Borland and Ross' (2010) study, where in both studies high EQ participants seek mutually satisfying agreements and similarly those with a low EQ score try to put a stop to conflict. Given our findings support those from Borland and Ross's (2010) study, our study is an example of how outcomes from face to face negotiation are similarly experienced by disputants using ODR systems.

The suggestion made in this paper is that an average to high EI is associated with a higher propensity to reach agreement whereas low EI is associated with a lower propensity to reach agreement. This pilot study has shown interesting results to motivate further exploration to study with a large sample size and diversity of participants with a wider range of disputes.

6.1 Limitations

This pilot study, through a simulated experiment of a real-life EHR dispute mediation process through ODR, has contributed to some noteworthy results. However, to arrive at a

generalisation of findings to a wider population, the limitations of a small sample size and use of a single case study should be addressed. Participants who completed the study demonstrated good participant engagement and interest in the dispute, and the data retrieved served well for our in-depth analysis. To further this study, a variety of EHR disputes should be negotiated using ODR systems.

6. Conclusions and Future Research

Most research into dispute resolution concentrate on simple adaptations of alternate dispute resolution mechanisms. Moreover, investigations from the effect of emotions and EI on interactions between disputants whilst they are involved in the online mediation process, have not been addressed so far, in particular in the context of EHR disputes that is gaining attention in this digital world. Researchers have arrived at a consensus that, as patient accessible EHR gains momentum and popularity that disputes would arise around the contents of a patient's her, quick and cost-effective mechanisms to resolve disputes will be required. However, there is lack of research in investigating support systems such as ODR along with necessary EI levels of disputants that can impact on EHR dispute mediation.

In this study, we investigated the capability of an ODR system and the possible link between EHR disputes and the EI of disputants where an ODR system was used to simulate the mediation process. We used a participants' EQ score to ascertain whether EI influenced the propensity to resolve an EHR dispute online. Hence, the scope of this research was to hypothesise whether emotional factors can affect the negotiation process in ODR for mediating EHR disputes.

An in-depth analysis of the simulation case study based experiment resulted in several noteworthy findings and ideas for future work towards generalisations for a wider population.

Overall, our findings relating to propensity to resolve the dispute suggest that:

(1) When the EQ scores of the participants are below 80 (lower EI), the claims were made inefficiently leading to prolonged resolution and the participants tend to resist mediating with their counterpart to resolve the dispute; and

(2) Mid-high range EQ resulted in effective negotiation styles, particularly in a disputant's ability to negotiate inclusively of a counterpart's position.

In addition, due to the success of the pilot, the ODR and argument tree used to resolve the dispute was considered appropriate to the case study. We demonstrated face to face findings relating to propensity can be replicated using an ODR.

The ODR used in our study was not designed to capture emotional signals during disputants' interactions during the mediation process. In the case of participants with an average EI, we found that a lack of visual cues did not inhibit the negotiation. This finding also suggests that designing the ODR software programs to make the emotional impact of a dispute more obvious to disputants may be helpful in encouraging participants with lower EI to resolve the dispute.

Our preliminary study has implications for designing ODR systems in disputes arising from a lack of communication and data issues in the EHR discipline. Trials with specific cohorts of patients (assessed on the basis of their EI) may be considered in preparation for future EHR disputes.

This study highlights the potential for ODR in resolving EHR disputes in the entire future lifespan of an individual and beyond, opening a Pandora's Box of research opportunities for providing cost-effective mediation methods that need to bridge technology and the health-related emotions of the patient and the associated doctors effectively. Future research include trialling ODR on a large sample size and in a variety of EHR disputes would help in arriving at greater insights into this multi-faceted research topic.

Acknowledgments

We thank the universities' Collaborative Network Fund that provided us the grant towards conducting this pilot study. We acknowledge the contribution of Dr. Nial Muecke in the development of the ODR software, ReConsider and the assistance of Ms Heather May in extracting and performing preliminary data analysis on ODR interactions from the ReConsider online system. We are also grateful to Prof. Jemal Abawajy for his valuable suggestions while conducting the study.

Declaration of Interest

No potential conflict of interest was reported by the authors

7. References

- Abrahams B, Bellucci E, Zeleznikow J (2012) Incorporating Fairness into Development of an Integrated Multi-agent Online Dispute Resolution Environment. *Gr Decis Negot*, 21(1): 3-28
- AHA 2018. Expanding Electronic Patient Engagement. American Hospital Association. Annual survey IT supplement Brief #1, March 2018. <https://www.aha.org/system/files/2018-03/expanding-electronic-engagement.pdf>. Accessed 29th June 2018
- Ambavale R. and Dani S. (2014) A Study On Emotional Intelligence Measures: Analysis And Comparison. *Int J Advanced Research Manag Soc Sciences*, 3(5): 35-65.
- Archer N, Fevrier-Thomas U, Lokker C, McKibbin KA, Straus SE (2011) Personal health records: a scoping review. *J Am Med Inform Assoc* 18(4)
- Armstrong S, (2017), Patient access to health records: striving for the Swedish ideal. *BMJ* p357 : j2069
- Bar-On, R (2000) Emotional and social intelligence: Insights from the Emotional Quotient Inventory (EQ-i). In R. Bar-On and J.D.A. Parker (eds.), *Handbook of emotional intelligence: Theory, development, assessment and application at home, school and in the workplace*. San Francisco: Jossey-Bass, pp. 363-88
- Barendrecht M et al, (2016) Trend Report 4 - ODR and the courts: The promise of 100% access to justice? The Hague Institute for Innovation of Law, 56.

- Cooke, T., Lingard, H., Blismas, N., & Stranieri, A. (2008). ToolSheD: The development and evaluation of a decision support tool for health and safety in construction design. *Engineering, Construction and Architectural Management*, 15(4), 336-351.
- Daly, R., Shen, Q., & Aitken, S. J. T. k. e. r. (2011). Learning Bayesian networks: approaches and issues. *The Knowledge Engineering Review*, 26(2), 99-157.
- Hall, M. J. J., Calabro, D., Sourdin, T., & Stranieri, A. (2005). Supporting discretionary decision-making with information technology: a case study in the criminal sentencing jurisdiction. *U. Ottawa L. & Tech. J.*, 2, 1.
- Lodder, A. R. (1999). DiaLaw. In *DiaLaw* (pp. 33-61): Springer.
- Lodder, A. R., & Zeleznikow, J. (2010). *Enhanced dispute resolution through the use of information technology*: Cambridge University Press.
- Muecke, N., Stranieri, A., & Miller, C. J. I. (2008). Re-consider: The integration of online dispute resolution and decision support systems. 62.
- Pearl, J. (1985). *Bayesian networks: A model of self-activated memory for evidential reasoning*. Paper presented at the Proceedings of the 7th Conference of the Cognitive Science Society, 1985.
- Stranieri, A., & Zeleznikow, J. (2001). Copyright regulation with argumentation agents. *Information Communications Technology Law*, 10(1), 109-123.
- Stranieri, A., & Zeleznikow, J. (2006). KNOWLEDGE DISCOVERY FROM LEGAL DATABASES—USING NEURAL NETWORKS AND DATA MINING TO BUILD LEGAL DECISION SUPPORT SYSTEMS. In *Information Technology and Lawyers* (pp. 81-117): Springer.
- Stranieri, A., Zeleznikow, J., Gawler, M., & Lewis, B. (1999). A hybrid rule–neural approach for the automation of legal reasoning in the discretionary domain of family law in Australia. *Artificial Intelligence and Law*, 7(2-3), 153-183.
- Stranieri, A., Zeleznikow, J., & Yearwood, J. J. T. K. E. R. (2001). Argumentation structures that integrate dialectical and non-dialectical reasoning. 16(4), 331-348.
- Yearwood, J. L., & Stranieri, A. (2006). The generic/actual argument model of practical reasoning. *Decision support systems*, 41(2), 358-379.
- Zeleznikow, J., & Bellucci, E. (2012). Legal Fairness in ADR Processes-Implications for Research and Teaching. *Australasian Dispute Resolution Journal*, 23(4), 265-273.
- Yearwood, J. & Stranieri, A. (2009), 'Group structured reasoning for coalescing group decisions', *Gr Decis Negot*, 19(1) 77-105
- Abrahams B, Bellucci E, Zeleznikow J (2012) Incorporating Fairness into Development of an Integrated Multi-agent Online Dispute Resolution Environment. *Gr Decis Negot*, 21(1): 3-28
- AHA 2018. Expanding Electronic Patient Engagement. American Hospital Association. Annual survey IT supplement Brief #1, March 2018. <https://www.aha.org/system/files/2018-03/expanding-electronic-engagement.pdf>. Accessed 29th June 2018
- Ambavale R. and Dani S. (2014) A Study On Emotional Intelligence Measures: Analysis And Comparison. *Int J Advanced Research Manag Soc Sciences*, 3(5): 35-65.

- Archer N, Fevrier-Thomas U, Lokker C, McKibbin KA, Straus SE (2011) Personal health records: a scoping review. *J Am Med Inform Assoc* 18(4)
- Armstrong S, (2017), Patient access to health records: striving for the Swedish ideal. *BMJ* p357 : j2069
- Bar-On, R (2000) Emotional and social intelligence: Insights from the Emotional Quotient Inventory (EQ-i). In R. Bar-On and J.D.A. Parker (eds.), *Handbook of emotional intelligence: Theory, development, assessment and application at home, school and in the workplace*. San Francisco: Jossey-Bass, pp. 363-88
- Barendrecht M et al, (2016) Trend Report 4 - ODR and the courts: The promise of 100% access to justice? The Hague Institute for Innovation of Law, 56.
- Bellucci E (2008) Development of a Mediation Tool in Family Law: AssetDivider. In Enrico F, Giovanni S, Tiscornia D (Eds) *Legal Knowledge and Information Systems*, IOS Press, Netherlands. pp 88-97
- Bellucci E, Venkatraman S, Muecke N, Stranieri A, Abawajy J (2012) The role of emotional intelligence on the resolution of disputes involving the electronic health record. *Proceedings of the Fifth Australasian Workshop on Health Informatics and Knowledge Management*, pp. 3-12, Australian Computer Society, Melbourne
- Boland MJ, Ross WH (2010) Emotional intelligence and dispute mediation in escalating and de-escalating situations. *J Appl Soc Psychol*, 40(12):3059–3105
- Boyatzis RE, Sala F (2004) The Emotional Competence Inventory (ECI). In Geher, G (Ed) *Measuring emotional intelligence: Common ground and controversy*, Hauppauge, NY, US: Nova Science Publishers, xiv, pp. 147-180
- Brett, J., Olekalns, M., Friedman, R., Goates, N., Anderson, C., & Lisco, C. (2007). Sticks and stones: Language and on-line dispute resolution. *Academy of Management Journal*, 50, 85–99.
- Buelens M, Van de Woestyne M (2008) Methodological issues in negotiation research: a state-of-the-Art Review. *Gr Decis Negot* 17:321-345
- Caruso D, Salovey P (2004) *The Emotionally Intelligent Manager*. San Francisco: Jossey-Bass
- Choi HN, Chung GH, Sung SY, Butt AN, Soliman M, Chang JW (2015) Does Emotional Intelligence Matter in Interpersonal Processes? The Mediating Role of Emotion Management *Seoul Journal of Business*, 21 (2), 45 - 70
- Chun JU, Litzky, BE Sosik JJ, Bechtold DC and Godshalk, VM (2010) Emotional intelligence and trust in formal mentoring programs. *Group and Organization Management* 35(4): 421–455.
- Coleman H. and Matthew W (2015) Argue Mediating with Emotional Intelligence: When “IQ” Just Isn’t Enough, *Dispute Resolution Journal*, 70(3):15-24.
- Daft RL, Lengel RH, (1986) Organizational Information Requirements, Media Richness and Structural Design. *Management Science* 32(5), 554-571.
- Foo MD, Elfenbein HA, Tan HH, Aik VC (2004) Emotional Intelligence and negotiation: the tension between creating and claiming value. *Int J of Confl Manag* 15(4): 411 - 429
- Fisher R, Ury W (1991) *Getting to Yes: Negotiating Agreement without Giving In*. Boston: Houghton Mifflin
- Friedman, R., Brett, J., Anderson, C., Olekalns, M., Goates, N., & Lisco, C. (2004). Emotions and rationality in mediation: Evidence from electronically-mediated disputes. *Journal of Applied Psychology*, 89, 369–376.
- Fulmer IS, Barry B (2004) The Smart Negotiator: Cognitive Ability and Emotional Intelligence in Negotiation. *Int J Confl Manag*, 15:245-272
- Gagnon MP, Simonyan D, Ghandour EK, Godin G, Labrecque M, Ouimet M, Rousseau M (2016) Factors Influencing Electronic Health Record Adoption by Physicians: A Multilevel Analysis. *Int J Information Management*;36:258-70.

- Gesulga JM, Berjameb A, Moquialac KS, Galido A (2017) Barriers to Electronic Health Record System Implementation and Information Systems Resources: A Structured Review *Procedia Computer Science ScienceDirect Elsevier*, 124 (2017): 544–55.
- Glass G.V, Hopkins KD (1984). *Statistical methods in education and psychology*. Englewood Cliffs, NJ: Prentice Hall.
- Goleman D (1995) *Emotional intelligence*. New York: Bantam Books
- Halamka JD, Mandl KD, Tang PC (2008) Early experiences with personal health records, *J Am Med Inform Assoc* 15(1): pp. 1-7
- Jones, S. Groom F.M (eds) (2012) *Information and Communication Technologies in Healthcare*. CRC Press: FL
- Katsh E, Sondheimer N, Dullabh P and Stromberg S (2011) Is there an app for that? Electronic Health Records (EHRs) and a new environment of Conflict prevention and resolution. *Law Contemp Probl* 74(3): 31-56
- Katz, N. H. and Sosa, A. (2015), *The Emotional Advantage: The Added Value of the Emotionally Intelligent Negotiator*. *Conflict Resolution Quarterly*, 33: 57–74.
- Kersten, G & Lai, H 2007, 'Negotiation Support and E-negotiation Systems: An Overview', *Group Decision & Negotiation*, vol. 16, no. 6, pp. 553–586
- Kim K, Cundiff NLA and Choi SB (2014) The Influence of Emotional Intelligence on Negotiation Outcomes and the Mediating Effect of Rapport: A Structural Equation Modeling Approach, *Negot J*, 30(1): 49–68.
- Legg MJ, (2016) The Future of Dispute Resolution: Online ADR and Online Courts', *Australasian Dispute Resolution Journal*, 27: 277 - 235.
- Mayer, J. D. & Salovey, P. (1997). What is emotional intelligence? In P. Salovey & D. Sluyter (Eds). *Emotional development and emotional intelligence: Implications for educators* (pp. 3-31). New York: Basic Books.
- Mayer JD, Salovey P, Caruso DR (2004) Emotional Intelligence: theory, Findings, and Implications, *Psychol Inq* 15(3): 197-215
- Menkel-Meadow C. (2011) Scaling up Deliberative Democracy as Dispute Resolution in healthcare reform: a work in progress. *Law and Contemporary Problems* 7(1).
- Mueller JS, Curhan JR (2006) Emotional intelligence and counterpart mood induction in a negotiation. *Int J Confl Manag*, 17:110 - 128
- Muecke N, Straineri A, Miller C (2008) Re-consider: The integration of online dispute resolution and decision support systems. *Proceedings of the 5th International Workshop on Online Dispute Resolution, 21 st International Conference on Legal Knowledge and Information Systems (JURIX 2008)*. Florence, Italy, December 2008
- Muecke, N. 2011. *ReConsider : an investigation into the effect of structured reasoning and decision support on participants behaviour in online dispute resolution*. PhD Thesis. University of Ballarat/Federation University Australia. Mt Helen. Australia
- Nguyen L., Bellucci, E., Nguyen LT (2014). Electronic health records implementation: An evaluation of information system impact and contingency factors. *Int J Med Inform.* 83 (11), 779-796.
- Ogilvie J, Carsky M (2002) Building emotional intelligence in negotiations. *The Int J confl manag* 13(4): 381-400
- Olekalns, M. and Druckman, D. (2014) With feeling: how emotions shape negotiation, *Negotiation Journal*, 30 4: 455-478.
- Palabindala V, Pamarthy A and Jonnalagadda NR (2016) Adoption of electronic health records and barriers *Journal of Community Hospital Internal Medicine Perspectives* 6(5): 1-3.
- Poblet M, Pompeu C (2007) Emotions in ODR. *Int Rev Law, Comput Technol* 21(2): 145-155
- Pruitt DG (1983) Strategic choice in negotiation. *Am Behav Sci*, 27: 167-194,
- Robertson S, Zachary W, Black J (1990) *Cognition, Computing and Cooperation*, Ablex Publishing Cooperation, New Jersey/

- Seraji R, Otouee Z, Deldar A, Khah ME, and Erfani M (2013) Survey Relationship between Emotional Intelligence and Conflict Solving Strategies, *J Appl Sci Res*, 3(2):245-251
- Shah GH, Leider, JP, Castrucci BC, Williams KS Luo, H. (2016) Characteristics of Local Health Departments Associated with Implementation of Electronic Health Records and Other Informatics Systems. *Public Health Report* 131:272-82.
- Smith JA, Osborn M (2003) Interpretative phenomenological analysis. In Smith JA (ed) *Qualitative psychology: a practical guide to research methods*. London: Sage Publications
- Tang, P. C., Ash, J. S., Bates, D. W., Overhage, J. M., & Sands, D. Z. (2006). Personal health records: Definitions, benefits, and strategies for overcoming barriers to adoption. *Journal of the American Medical Informatics Association*, 13(2), 121-6.
- Turan, N., Dai, T., Sycara, K. & Weingart, L. R. (2013), Toward a unified negotiation framework: Leveraging strengths in behavioral and computational communities. In K.Sycara, M. Gelfand, & A.Abbe (Eds.) *Advances in Group Decision and Negotiation: Models for Intercultural Collaboration and Negotiation*, Vol.6,pp.53-65.
- Thomas KW. (1976). Conflict and conflict management. In Dunnette MD (ed) *Handbook in industrial and organizational psychology*, Chicago: Rand McNally pp. 889-935
- Urowitz S, Smith K, Alkazaz N, Apatu E, Quartey NK, Wiljer D (2012) Patient accessible electronic health records for the chronically ill: a review of the literature. *J Hosp Adm*, 1(2)
- van Veenen, J., (2010). Dealing with Miscommunication, Distrust, and Emotions in Online Dispute Resolution TISCO Working Paper Series on Access to Justice, Dispute Resolution & Conflict System Design , 4, 1-41.
- Venkatraman S, Stranieri A (2012) Unification of Electronic Health Records and CAM. *Proceedings of 3rd International Conference on Holistic Medicine, ICHM*, 17-18 Nov. 2012, Colombo
- Walton R, Mckersie R (1965) *A Behavioral Theory of Labor Negotiations*. McGraw - Hill, New York.
- Wertz FJ (2005) Phenomenological research methods for counseling psychology. *J Couns Psychol*, 52(2):167-177
- WHO (2006), *Electronic health records: manual for developing countries*; 2006. World Health Organization.
- Woods, S.S., Schwartz, E., Tuepker, A., Press, N.A., Nazi, K.M., Turvey, C.L., Nichol, W.P, 2013. Patient experiences with full electronic access to health records and clinical notes through the My Healthvet personal health record pilot: Qualitative study, *Journal of Medical Internet Research*, Vol. 15, Issue 3
- Yau GL, Williams AS, Brown JB (2011) Family physicians' perspectives on personal health records: Qualitative study. *Can Fam Physician* 57(5):178-84
- Yearwood, J. & Stranieri, A. (2009), 'Group structured reasoning for coalescing group decisions', *Gr Decis Negot*, 19(1) 77-105

Thompson, D. 2015. Creating New Pathways to Justice Using Simple Artificial Intelligence and Online Dispute Resolution, *International Journal of Online Dispute Resolution* 2:1.

Poblet, M., Casanovas, P., López-Cobo, J.M., Cabrerizo, Á., & Prieto, J.A. (2015). The Ontomedia Project : ODR , Relational Justice , Multimedia.

Bultena, C.D., Ramser C.D. and. Tilker, K.R , 2011.Fighting Futility II: Tools for Mediation Success, Southern Journal of Business and Ethics, Vol. 3, pp. 42-55.

Sourdin, T. 2016. Alternative dispute resolution. Rozelle, N.S.W. Thomson Reuters (Professional) Australia Ltd, 5th edition.

Bergman, E.J. and Fiester, A. (2009). Mediation and health care. In V. Ravitsky, The Penn Center Guide to Bioethics. [Online]. New York: Springer Publishing Company.

Fisher, R. and Ury, W., (1991). Getting to Yes: Negotiating Agreement without Giving In. Boston: Houghton Mifflin

Bellucci E, Zeleznikow J (2006) Developing negotiation decision support systems that support mediators: a case study of the Family_Winner system. Journal of Artificial Intelligence and Law 13(2):233–271

Ponte L, Cavenagh T (2004) Online negotiation. In: Cyberjustice online—dispute resolution (ODR) for

E-Commerce. Prentice Hall, NJ, pp 38–60

Picard, RW 1997, *Affective Computing*, MIT Press, Cambridge, Mass

Alexander, N. 2006. Mobile mediation: how technology is driving the globalization of ADR, Hamline Journal of Public Law and Policy, Vol 27, pp243 – 262.

Picard, R. 2000. Toward computers that recognise and respond to user emotion, IBM Systems Journal, 39:3, pp705 – 707.

Luneski, A.; Konstantinidis, E.; Bamidis, P. D.. 2010. Affective Medicine A Review of Affective Computing Efforts in Medical Informatics. Methods of information in medicine, 49:3 Pages: 207-218.

Wu, C-H, Huang, Y-M & Hwang, J-P 2016, 'Review of affective computing in education/learning: Trends and challenges', *British Journal of Educational Technology*, no. 6, p. 1304

Lara-Cabrera, R & Camacho, D 2019, 'A taxonomy and state of the art revision on affective games', *Future Generation Computer Systems*

Schwark, JD 2015, 'Toward a Taxonomy of Affective Computing', *International Journal of Human-Computer Interaction*, vol. 31, no. 11, pp. 761–768

Nass, CI & Yen, C 2010, *The man who lied to his laptop : what machines teach us about human relationships*. Penguin, New York.

Nahin, AFMNH, Alam, JM, Mahmud, H & Hasan, K n.d., 'Identifying emotion by keystroke dynamics and text pattern analysis', *Behaviour and Information Technology*, vol. 33, no. 9, pp. 987–996

Thiessen, EM & Soberg, A 2003, 'SmartSettle Described with the Montreal Taxonomy', *Group Decision and Negotiation*, no. 2, p. 165

U. B. Kjærulff, A. L. Madsen (2006) *Probabilistic Networks for Practitioners — A Guide to Construction and Analysis of Bayesian Networks and Influence Diagrams*, Department of Computer Science, Aalborg University, HUGIN Expert A/S.

Smith J.Q. (2010) *Bayesian Decision Analysis: Principles and Practice*. Cambridge University Press.

Suermondt, H. J. (1992) *Explanation in Bayesian belief networks*, PhD thesis, Stanford University, Stanford, CA.

Krieg, M. L (2001) *A Tutorial on Bayesian Belief Networks*, DSTO Electronics and Surveillance Research Laboratory, South Australia, Australia.

Jensen, F. V. (1996) *An Introduction to Bayesian Networks*, UCL Press, London UK.

Heckerman, D. (1996) *A Tutorial on Learning With Bayesian Networks*, Technical Report MSR-TR-95-06, Microsoft Corporation, Redmond, WA.

G. T. Jones and D. H. Yarn, (2003) *Evaluation Dispute Resolution under Uncertainty: An Empirical Look at Bayes' Theorem and the Expected Value of Perfect Information*, *Journal of Dispute Resolution*, Vol 2003, Issue 2, Article 8, pp. 427-461.

S. Mirarab, A. Hassouna and L. Tahvildari (2007) *Using Bayesian Belief Networks to Predict Change Propagation in Software Systems*, *15th IEEE International Conference on Program Comprehension (ICPC '07)*, BC, Canada.

Muecke, N. and Stranieri, A. (2007). *An Argument Structure Abstraction for Bayesian Belief Networks: Just Outcomes in On-line Dispute Resolution*. In *Proc. Fourth Asia-Pacific Conference on Conceptual Modelling (APCCM2007)*, Ballarat, Australia. CRPIT, 67. Roddick, J.F. and Hinze, A., Eds., ACS. 35-40.