Deciphering conversational complexity around a diabetic patient in a web based forum

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Abstract
Web based conversational forums have gained momentum as an aid to clinical decision making. This paper, written in an empirical explanatory manner, attempts to understand the flow of information and the process of sense-making in one such forum (Tabula-rasa) through considering a prototype discussion among participants.

Keywords: Asynchronous learning; Clinical decision making; Construct; Communication; Conversational forum; Diabetes; Knowledge.

Introduction

A disease is classically defined in terms of dysadaptation or maladjustment which may be further visualized from a bio-chemical plane (cellular), a functional plane (organ system), and more perceptible exterior forms (symptoms and sickness role).[1,2] Since the maladjustment is the result of interaction between micro / macro environmental factors, individual factors, and agent characteristics in a distinctive manner, resultant exterior manifestations (and course of the illness) follows a unique trajectory for every individual.[3] The treating physician needs to make sense, in terms of diagnostic and prognostic management, from the apparent chaos generated through such individuality, and shared decision making has been found to facilitate the process.[4] Currently, web

based conversational learning forums are well understood, and are attempted as platforms for collective wisdom to deal with diagnostic and prognostic uncertainties.[5] This manuscript attempts to decipher the process of arriving at a definitive consensus diagnosis by participants of a prototype web-based platform. The explanatory commentary offers a basic scaffold for understanding the mechanism of validation and sense-making from non-linear information.

Material and Methods

We considered diabetes - an inherently complex disease which can affect virtually every organ and system of the human body - an ideal candidate for web based asynchronous learning. The exterior manifestations of this disease are unpredictable and depend on several coexisting factors;[6,7] simultaneously, diabetes can affect the outcome of other co-existing morbidities, thus introducing an element of complexity and ambiguity in clinical decision making.[8,9]

The e-health care portal that we used for this study is User Driven Health Care (UDHC: http://care.udhc.co.in). UDHC maintains patient health records and information that is shared (with due written consent from the patient and without any directly identifiable details) on web-based platforms like Facebook for learning and for promoting collaborative decision making. For this purpose, UDHC follows the HIPAA (Health Insurance Portability and Accountability Act) guidelines.[10]

The online discussion of the case referred to in this manuscript took place on Tabula Rasa – this is a closed, secret Facebook group with around 1500 registered users including doctors, medical students and patients. As a routine, complex cases uploaded on UDHC are shared in Tabula Rasa and discussed using available evidence from the literature. In the past, these discussions have helped in learning about the best available options for treatment, which is beneficial to learners and to the patient.[11-14]

In this case, as is usual, the moderator,

who is one of the authors (RB), posted details of the patient on Tabula Rasa and invited comments and suggestions from members of the group. As the discussion progressed and as new evidence became available, the moderator made those details available to the group.

Data Analysis

In order to maintain the conversational nature of the data, it is presented in the sequence in which it occurred online, with our explanations and the discussion interspersed at appropriate locations in the conversation. The moderator is indicated by the title 'Moderator', while all other contributors are indicated by their initials. The explanation offered by the authors for making sense of the discussion is grounded in the theory of Systems and Conversations (Pask and Laurillard; [15]). This theory states that dynamic teaching-learning interactions influence the construct of learning.[16]

Results and Discussion

What follows below is an unedited presentation of an online conversation (in italics), supplemented by a commentary around one real diabetic patient, as it happened over time (around 1 week; source: http://www.udhc.co.in/INPUT/displayIssueGraphically.jsp?topic_id=1631)

"A 70 year man with Diabetes since 2 years and large bowel diarrhoea since 4 months."

This initial statement serves as a triggering point for thinking; it enables the learners to connect in real time with the problem. The task goal is now clear to both the moderator and the learners/participants.

Moderator - His diabetes appeared relatively well controlled but his large bowel diarrhea has been relentless. Finally a ZN stain showed these acid fast organisms (shares link to image). Will appreciate microbiological confirmation. He has peripheral neuropathy which aggravated with his diarrhea and he has been completely bed ridden since last two days.

The moderator explicitly communicates his clinical concerns around the issue and then asks for a diagnostic clue. Other learners are silent at this juncture and probably are trying to 'fit' their previous experiences into this new scenario.

SD - ...looks like cryptosporidium cysts. I can't tell the size in the absence of information regarding magnification. These are usually 4-6um much smaller than cyclo or isospora cysts. Micrsporidia are much smaller and non acid fast.

CP - we had seen plenty of such slides in Nepal and India. Can you please let me know the magnification of the image-if oil immersion lens was used? If it is under oil immersion, in my opinion it is unlikely to be cryptosporidium..may be cylospora.

Initial aid is offered by a set of specialized learners (Microbiologists) who attempt to make sense from visual cues. The specialized learners have chipped in to describe their concept of the problem through pattern identification.

Moderator - So could this be cyclospora instead of cryptosporidium? If this is crypto we may go for Nitazoxanide (provides link to a CDC.gov site that details treatment options for cryptosporidium) but ... if this is Cyclo we should use co-trimoxazole (provides link to a CDC.gov site that details treatment options for cyclosporiasis).

CP - size wise it does not look like cyclospora - can you ask them to also do a gram stain of the stool sample and see if there are small, budding yeasts?

SD - I agree ...this is unlikely to be cyclospora. An easy way to rule it out is auto fluorescence. Cyclospora will autofluoresce... But size wise they are so different that I don't think that would be needed.

CP - This is the link which gives finer details of differentiation between the two (provides link to online book).

One of the key characteristic of conversational learning is that every attempt is made to arrive at the 'best-fit' structure – this is done either by appending fresh information into the existing structure (assimilation) or through making changes in the existing structure (accommodation).[17] Thus, the nature of processed knowledge depends on the direction assigned by learners who are engaged in goal centric behavior (may be read as clinical problem solving ability) and who process information in an experimental environment (a patient-centric problem) according to their own preferences.

Moderator - This patient's weakness and reduced appetite since the last two days has been progressive, although his diarrhea has subsided - today's alkaline phosphatase, twice repeated, was in the 3000s! Any inputs on this current dilemma?

This post may be perceived in the background of reflective practice where one tries to observe his course of actions and implications.[18] Conversational learning may be thought of as a platform where 'cumulative' reflections are offered on an 'individual' activity as a conscious attempt to remove uncertainties. These reflections, based on real-time inputs from the patient, are progressive and dynamic in nature and may assist in the clinical decision making process. The dynamicity of the conversational platform allows collective decision making while respecting individual autonomy in contrast to deterministic behavior and pre-fixed ideas which are considered against the best interests of patients.[19]

BS - Shouldn't we consider ruling out metastasis and carcinoma colon if the disease is progressing rapidly? ...considering this thread and the history, we should start thinking beyond diabetes-induced gastropathies or opportunistic infections as his diabetes is not of long duration and is well controlled

The experiential environment offered by the moderator is now transforming into a theoretical representation where reflections and adaptations are emerging: participants have started thinking about other considerations by using their ability to process new information. This processing may be labeled as abstract

conceptualization where previous theoretical knowledge about a topic is utilized to make assumptions.[20]

KB- Are the other Liver enzymes within normal range and the only anomaly is AlkPhos?...

Moderator - Yes all the other enzymes are normal.

PJ - Is this a new elevation of AlkPhos (what is his baseline?). If other LFTs and hepatobiliary imaging is OK, then also look at drug-induced cholestasis.
Moderator - Drug induced cholestasis looks like an important pointer.

KB - Can a drug increase the ALP levels so much?

One can perceive that the discussion is taking shape according to the nature of the stimulus received from the patient. The initial focus was on microbiology, but it has shifted to alkaline phosphatase now. This flexibility is the key characteristic of conversational learning which facilitates accommodation in the light of newly offered conversational evidence.

BD - .....regarding drug induced cholestasis, could you please mention the drugs that the patient has received in the last 8 days?
Moderator - He was put on loperamide in view of his large bowel symptoms but it was stopped today as he didn't pass any stools yesterday.

BD - I am sharing the link from e-HealthMe.com - could Imodium cause alkaline phosphatase to increase?
Moderator - I am intrigued by the last link from eHealthMe.com. Is it a data mining online engine?

AP - They are mining - it is quite good the way it is set up. All this is autogenerated from public data

Moderator - This is very interesting. How do we know that their 'clever' outputs to the public through the data mined from their inputs are 'valid' in terms of 'internal' and 'external' validity?

A conversational learning process sometimes grants an opportunity for 'offshoot learning' which may not seem to be relevant to the current discussion. Should such lateral topics be welcomed as an opportunity for opportunistic learning or should they be discouraged as they may have the propensity to distract? Since the environmental structure of conversational learning is liberal and non-hierarchical by default, the former option is preferred - persons with diverse interests (outside classical individualized clinical care) may, thus, find a space to contribute and learners may suitably use the new information in some future discourse.

Moderator - we badly need to figure out which fraction of alkaline phosphatase is increasing in this patient. Our patient can't afford the test. Can we crowd source the funding?

BD - can we speak to [name of person] about getting it done at a cheaper rate from [name of lab]?

Moderator - It will be fantastic if [name of person] can help.

AB - Please let me know what is needed. I will try to get you some discount centrally.

Medicine is not only about offering diagnostic or curative services to an individual: accessibility, approachability and affordability for the user are important variables which determine success in diagnosis or treatment.[21] Activities related to resource management and optimum allocation are an integral component of Medicine.[22]

Moderator - I have emailed his current CT abdomen images to all of you.

AS - There is not much that is decipherable from these images (window needs to be readjusted). However, ascending and descending colon is hugely dilated and there is no evidence of intramural air.

Moderator - So is the obstruction in the rectum? Could it be just a result of ileus? His O2 saturation is dropping and we are going to put him on the ventilator.

Both moderator and participants (roles are interchangeable at this juncture as there is perceptible non-hierarchical flow of information) are readjusting themselves in the light of re-description of the learning goal..

BD - our focus changes from ' diagnosis and cure' to ' save'..

Moderator – Yes, we got a per-rectum examination and there appears to be an annular growth on digital palpation.

KB - That could be the reason for increase in the bone fraction of alkaline phosphatase then.

Moderator - Yes but it is still difficult to explain why it was normal a week back and suddenly rose after the patient began developing the first signs of intestinal obstruction.

A previously divergent discussion is now becoming more and more convergent in terms of sensemaking. The moderator (who is overwhelmed by a finding) is trying to make deductions from new information that was induced by peers at a previous stage - Medicine seems to be an opportunistic mix of induction and deduction.

Moderator - Inputs on better ways to support this man will be appreciated.

AP – Offer shared decision making, emotional support, and provide a clear picture of prognosis and consequences for extending life in terms of quality of life. Keep him pain free and lucid for as long as possible

RS – First, regarding the patient's treatment, keeping socio-economic-legality in mind - you have previously pointed out that there is no current legal provision in India for palliation or do-not resuscitate.

In this way, a conversational forum (which takes up real issues rooted in real individuals) may provide a more realistic and trustworthy stimulus to think and act compared to structured modular courses targetting ethics, professionalism and the affective domain.

The whole gamut of non-linear events is summarized in Figure-1 which attempts to simplify the flow of proceedings.

Figure-2 tries to make sense from the apparently chaotic conversational learning by a free listing of key words.

Limitations

The patient, though in real time, is not seen by the participants. The discussion is initiated and guided by patient information provided by the moderator: thus, a conversational forum is heavily dependant on the evidence supplied by the treating physician. The success seen in this case may not be replicable in every case that is shared on such a forum, especially for someone attempting it for the first time. Another limitation is the asynchrony inherent in an online forum with multiple users. While the basic aim of having multiple contributers is to increase the probability of sifting 'the truth' out from the ambiguity,[23] it can lead to multiple versions of the truth and it becomes troublesome to arrange the
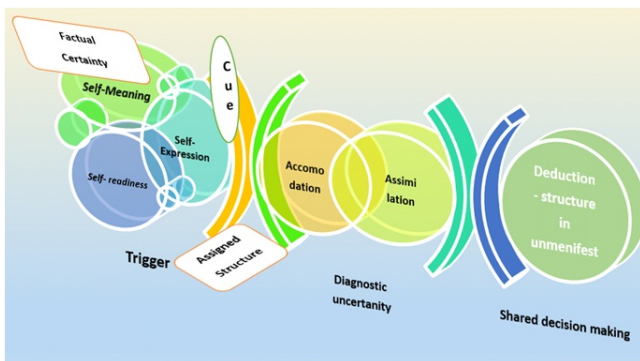

Figure 1: Emergence of shared decision making from uncertainty and subjectivism

Figure 2: Pattern in Chaos - free listings of key-concepts generated during conversational learning

'truths' into a viable order of cause and effect or to construct meaning.[24,25] The non-linear process demands optimization of knowledge and structuralism at the end of clinical problem solving.[26] With experience it may become easier to make sense of and to bring some degree of order to the proceedings.

Conclusions

The web-based conversational learning/decision making process described here represents a conscious effort to create collective wisdom around ongoing events during patient care which take shape as per revelation of new information. This manuscript provides an asynchronous multidisciplinary patient-centered approach to healthcare (offline data capturing through multiple computer users followed by shared conversations in an online forum) for optimizing patient outcomes. This strategy, thus, may serve as an alternative to deal with the current adverse doctor–patient ratio in the Indian context. In addition, being asynchronous, it offers an opportunity for learners to explore and learn without compromising their routine work.

References

1. Pandey PJ, Joshi A, Kale S, Meena JS, Kale N. Illness narrative: creative drama within. International Journal of User-Driven Healthcare. 2013:3(3):59-67.

2. Cassel EJ. The nature of suffering and the goals of medicine. N Engl J Med. 1982:306(11):639-45.

3. Joshi A, Nahar N, Phadnnis S, Biswas R. Patient-Provider reciprocity as complex adaptive system. Review of Global Medicine and Healthcare Research. 2013:4(1):208-21.

4. Elwyn G, Frosch D, Thomson R, William NJ, Lloyd A, Kinnersley P, et al. Shared decision making: a model for clinical practice. J Gen Intern Med. 2012:27(10): 1361-7.

5. Tennant B, Stellefson M, Dodd V, Chaney B, Chaney D, Paige S, et al. eHealth literacy and Web 2.0 health information seeking behaviors among baby boomers and older adults. J Med Internet Res. 2015:17(3):e70.

6. Bernstein RK. Dr Bernstein's Diabetes Solution: The Complete Guide to Achieving Normal Blood Sugars. 3rd ed. Little, Brown and Company: NY. 2007.

7. Vracko R, Benditt EP. Manifestations of diabetes mellitus - their possible relationships to an underlying cell defect: A review. Am J Pathol. 1974:75(1): 204–24.

8. American Association of Diabetic Educators. Patient Resources: AADE7 Self-Care Behaviors™ [Internet]. 2016 [cited 2017 Jan 17]. Available from: http://www.diabeteseducator.org/Patient_Resources/ aade7-self-care-behaviors/healthycoping.html

9. Hörnquist JO, Wikby A, Stenström U, Andersson PO, Akerlind I. Type II diabetes and quality of life: a review of the literature. Pharmacoeconomics. 1995:8Suppl 1:12-6.

10. U.S. Department of Health & Human Services [Internet]. Washington: HIPPA for Professionals [cited 2017 Jan 17]. Available from: http://www.hhs.gov/hipaa/for-professionals/index.html

11. Bera K, Seth B, Biswas R. Conversational learning among medical students: harnessing the power of web 2.0 through user driven healthcare. Annals of Neurosciences. 2013:20(2):37–8.

12. Purkayastha S, Price A, Biswas R, JaiGanesh AU, Otero P. From dyadic ties to information infrastructures: care-coordination between patients, providers, students and researchers. Contribution of the Health Informatics Education Working Group. Yearb Med Inform. 2015:10(1):68-74.

13. Biswas T, Bera K, Biswas R. Creating secondary learning resources from the BMJ Case Reports through social-media based discussion groups. 2011 Oct 28 [cited 2017 Jan 17]. In: BMJ Blogs. BMJ Case Reports Blog [Internet]. BMJ Publishing Group Ltd, c2016. [About 1 screen]. Available from: http://blogs.bmj.com/case-reports/2011/10/28/creating-secondary-learning-resources/

14. Biswas T, Sen P, Dasgupta S, Niyogi SG,Ghosh GC, Bera

K, et al. Creating secondary learning resources from BMJ case reports through medical student conversational learning in a web based forum: a young man with fever and lymph node enlargement. International Journal of User-Driven Healthcare. 2011;1(3):7–19.

15. Atherton JS. Learning and Teaching: Conversational learning theory: Pask and Laurillard [Internet]. UK:2013 [cited 2017 Jan 17]. Available from: http://doceo.co.uk/l&t/learning/pask.htm

16. Scott B. Conversation theory: a dialogic, constructivist approach to educational technology. Cybernetics and Human Knowing. 2001;8(4):25-46.

17. Atherton J S. Learning and teaching: Assimilation and accommodation [Internet]. UK:2013.[cited 2017 Jan 17].

Available from: http://www.learningandteaching.info/learning/assimacc.htm.

18. Leitch R, Day C. Action research and reflective practice: towards a holistic view. Educational Action Research. 2000;8(1):179-93.

19. Jenicek M. A Primer on Clinical Experiences in Medicine: Reasoning, Decision Making and Communication in Health Sciences. Boca Raton: CRC Press, Taylor and Francis group: 2013.

20. Larochellle M, Bednarz N, Garrison J (Eds). Constructivism and education. NY: Cambridge University Press. 1998.

21. Jacobs B, Ir P, Bigdeli M, Annear PL, Damme WV. Addressing access barriers to health services: an analytical framework for selecting appropriate interventions in low-income Asian countries.

Health Policy Plan. 2012;27(4):288-300.

22. Mackenbach JP. Politics is nothing but medicine at a larger scale: reflections on public health's biggest idea. J Epidemiol Community Health. 2009;63(3):181-4.

23. Pawlik K, Rosenzweig MR (Eds). The International Handbook of Psychology. 1st ed. Sage: New Delhi. 2000.

24. Hodgkin P. Medicine, postmodernism, and the end of certainty. BMJ. 1996;313:1568-69.

25. Radden G, Köpcke KM, Berg T, Siemund P (Eds). Aspects of meaning construction. John Benjamins Publishing Company: Philadelphia. 2007.

26. Sweeney K, Griffiths F. Complexity and Health care - An introduction. Radcliffe Medical Press: UK. 2002.