Explaining diabetes: Studying the effects of using analogies to talk about illness

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Article points

1. This study examined the efficacy of two commonly used analogies to explain type 1 diabetes.
2. Explanations with embedded analogies were rated more effective than the control message which did not use analogies.
3. Data suggest that using analogies to explain diabetes has an impact on ratings about both the communicator and the message they give.
4. Future research should investigate the effects of other explanatory analogies used by healthcare practitioners.

Key words

- Analogies
- Diabetes
- Health communication

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Using analogies to explain illness has had long-standing anecdotal support in the absence of any empirical evidence. This study investigates the effects of two analogies frequently used to explain the nature of diabetes. The study involved 300 undergraduates who were placed in one of three message groups. They were then either exposed to a control message about diabetes that did not use analogies or one of two messages where a commonly used analogy was used. Results indicated significant differences for ratings concerning the message, as well as for four ratings concerning the communicator. The participants' attitudes towards diabetes were also significantly different. The authors urge that healthcare professionals realise the impact of their use of analogies when explaining illnesses.

There is an implicit appeal to using some form of comparison, such as analogies, metaphors and similes, to explain illness and it is frequently advocated (Olweny, 1997; Hayes, 2000). Comparisons are linguistic devices that can aid the pragmatic communicative task of explaining the nature of an illness and related medical procedures. They can be used for both children or adults (Whitt et al, 1979; Potter and Roberts, 1984; Eiser et al, 1986ab; Harmon and Hamby, 1989; Busari, 2000), for different cultures (Elsberry and Sorensen, 1986; Nichter and Nichter, 1986; Furnham, 1994), for various illnesses and procedures (Whitt et al, 1979; Beales et al, 1983; Elsberry and Sorensen, 1986; Olweny, 1997; Wortmann, 1998) or for explaining the nature of randomised clinical trials (Jenkins et al, 1999).

It may be intuitive practice to use comparisons to explain complicated information about illness but there is little evidence for its effectiveness and much of the evidence that does exist is anecdotal. There are a few empirical investigations concerning the use of figurative language to explain illness (Potter and Roberts, 1984; Eiser et al, 1986ab; Spiro et al, 1989) but, as a frequently used way to explain illness to patients, it warrants increased empirical scrutiny. There has been some discussion about the dangers of using figurative language to explain health-related concepts (Bannard, 1987; Spiro et al, 1989; Whaley, 1994, 2000).

This article reviews the literature concerning the use of figurative language for explaining illness, particularly the research and analogies used to explain diabetes. The article also describes a study that investigated the effectiveness of analogies to explain diabetes.

Literature review

Healthcare professionals frequently employ analogies to explain elaborate or complex medical concepts or processes (Analogies Enhance Teaching Efforts, 1996; Jenkins et al, 1999). Diabetes is no exception and Harmon and Hamby (1989) comment that:

"Translating abstract concepts, such as the pathophysiology of diabetes into everyday speech, is a challenge to all diabetes educators. One approach to meeting this challenge is to use analogy – a point-by-point comparison of something familiar with something unfamiliar."

Numerous analogies have been suggested for explaining diabetes and the physiopathology of a variety of other diseases. Analogical comparison has been perceived to assist the process of explanation for illness, and examples include cars and their use of fuel to explain diabetes, the nature of the telephone to explain epilepsy, "outlaw" cells to illustrate cancer, garden hoses to exemplify the problems related to hydrocephalus and balloons as aneurysms (Whitt et al, 1979; Rose, 2003).

Other analogies for parts of the body or normal body functions include the pupil of the eye being a small window; the tympanic membrane likened to an illuminated ice rink; abdominal percussion compared to thumping on a wall to locate the stud for picture hanging; the movement of an earthworm can be used to represent peristalsis; and the variation in a balloon likened to gas in the bowel. Blood vessels have been compared to pipelines and nerves to electric wiring (Beales et al, 1983; Elsberry and Sorensen, 1986).

Among the few studies into the efficacy of using comparisons in the healthcare arena, Potter and Roberts (1984) investigated the use of metaphor when explaining illness to children. They examined the effects of type of disease (diabetes compared with epilepsy), participants' cognitive maturity (preoperational and concrete operational) and amount/type of information provided about an illness (description and explanation) on several dependent variables. Potter and Roberts (1984) suggest that the children exposed to analogous explanations had significantly better comprehension of the illness than their peers, who had been given description-only information about their condition.

Eiser et al (1986b) investigated children's comprehension of explanations of illness that had used metaphors. The descriptions varied in relation to type of illness (cancer or diabetes) and explanation (strictly medical or metaphorically-aided). Eiser et al (1986b) suggested that segments of the information were more readily comprehended when using metaphor.

The same authors have also studied what metaphors children and adults create for body parts (Eiser et al, 1986a). When participants provided their answer to "My heart is like…" Eiser and colleagues discovered that children's metaphors were on a continuum ranging from perceptual (comparisons based on shape, colour and texture) to functional (brain as computer; body as machine) and affective (germs are bad), with younger children producing and preferring the more perceptual comparisons and older children and adults preferring the more functional metaphors.

Finally, examining the effects of comparisons on medical students' learning of physiology, Spiro et al (1989) found that they had difficulty understanding analogies used to explain physiological phenomena, particularly comprehending the parallels between the physiological objects or system and the object/system to which it is likened.

The anecdotal suggestions and evidence, coupled with the limited empirical research, provide a preliminary, yet limited, theoretical foundation concerning the effect of using comparisons to explain illness. Further efforts toward understanding the role of analogies, particularly when used to explain illness, are required and this should be done through empirically examining the anecdotal evidence provided by health practitioners and common analogies in use.

Method

Aims

In the current study, the following hypothesis was tested: analogy-aided explanations for diabetes will be rated significantly higher on dependent measures for communicator, message and attitude than the control explanation for diabetes.

Participants

Undergraduate students at the University of San Francisco (*n*=300; female=211; male=89; age range: 18–23 years) participated in this investigation.

Protocols were randomly distributed to a convenience sample of students in classes in undergraduate courses. Each participant was

"Children exposed to analogous explanations had significantly better comprehension of the illness than their peers who had been given description-only information about their condition."

Box 1. Article given to participants in the control group giving a description of type 1 diabetes without using analogies.

Type I diabetes

Diabetes, type I, is a disease that results from the body not producing insulin, a hormone that the body uses to convert glucose (sugar, starches, and other foods) into energy. It is this hormone, insulin, which takes the sugar from the blood into the cells so it can be used. *[analogy for experimental conditions inserted here]*

The pancreas, an organ in the stomach, contains beta cells, which produces insulin. The immune system is another system of cells that protects the body from infections and disease. In most people with type I diabetes, the immune system gets confused, and the cells that normally protect you from germs attack the beta cells instead. The beta cells die, no insulin is made, sugar builds in the blood, and the individual develops diabetes. It's at this point that people with type I diabetes inject insulin to let glucose into the cell.

Without insulin, sugar builds up in the blood leading to several health problems. Initially, cells are starved for energy, and over time, high blood sugar levels may hurt the eyes, kidneys, nerves and heart. Long-term complications from diabetes, when left untreated, include such severe damage as blindness, increased risk of heart attack or stroke, destruction of the filtration system in the kidneys, death of nerve cells, slow healing of wounds and out of hand infections, congenital defects in children birthed by diabetic women, impotence in men, and loss of sensation in extremities.

Box 2. A description of type 1 diabetes using a lock and key analogy given to the second study group.

Type I diabetes

Diabetes, type I, is a disease that results from the body not producing insulin, a hormone that the body uses to convert glucose (sugar, starches, and other foods) into energy. It is this hormone, insulin, which takes the sugar from the blood into the cells so it can be used. As such, insulin works like a key to unlock the cell to let in sugar.

Box 3. A description of type 1 diabetes using a driveway analogy given to the third study group.

Type I diabetes

Diabetes, type I, is a disease that results from the body not producing insulin, a hormone that the body uses to convert glucose (sugar, starches, and other foods) into energy. It is this hormone, insulin, which takes the sugar from the blood into the cells so it can be used. Put differently, think of the blood vessels as streets, the cells as garages, and the glucose as cars that travel on the street. Insulin acts as the driveways, which allow the cars (glucose) to leave the street (blood vessels) and go into the garage (cell). With type I, the cars (glucose) stay on the street because there are no driveways (or insulin) to carry the glucose into the cell (garage).

assigned to one of three groups (n=100 per group): a control group exposed to a message explaining diabetes (*Box 1*), or one of two groups where an analogy (key/lock analogy or driveway analogy) was inserted into the control group message at the same place (*Box 2* and *Box 3*).

The two analogies were chosen because they are commonly used among diabetes educators and are thought to be easily processed and understood by people with diabetes of varying backgrounds. At the top of each message it was explained that it was an excerpt from an article by "Dr Terry Abel" that had recently appeared in the US magazine *Health*. All participants were told that what they were going to read contained a message concerning diabetes. They were then asked questions about the article they had read and were asked to avoid referring back to the article when responding. The responses were anonymous and the students were asked to refrain from mentioning the study to their peers until data collection was completed. During the debrief, it was explained that the author was fictitious and that the article had not appeared in *Health*.

Dependent measures

After reading the illness explanation, participants responded to:

- Attitudinal measures concerning diabetes (semantic differentials). These were measured on 13-point scales including: favourable/unfavourable; pleasant/unpleasant; good/bad; wise/harmful.
- Message ratings were measured using 9-point scales and included the following categories: clear, effective, organised, vivid, informing, complete and accurate.
- Ratings for the author of the information were measured on a 9-point scale and included questions about whether the author was trustworthy, competent, credible, a good explainer, likeable, friendly, unbiased, an expert, knowledgeable and polite.

Results

Analysis of variance procedures (one-way ANOVA) indicated that the significant effects that analogy had on participants' responses were:

- Effectiveness of the message: ($F[2,297]=4.405$, *P*=0.013)

- Trustworthy (author): (F[2,297]=6.377, *P*=0.002)
- Credible (author): (F[2,296]=3.539, *P*=0.03)
- Friendly (author): (F[2,297]=7.272, *P*=0.001)
- Likeable (author): (F[2,297]=6.587, *P*=0.002)
- Respondents' attitude to diabetes: (F[2,296]=3.28, *P*=0.039).

Further analyses via *t*-tests revealed that both analogy conditions were viewed as more effective than the control group and were seen as more trustworthy (*Table 1*). The lock/key analogy was seen as more "credible" than the control group and the author of the driveway analogy was viewed as more "friendly" and "likeable" than both the lock/key analogy and the control. The participants in the driveway group expressed a more positive attitude towards the illness after reading the information than participants in the lock/key and control group (*Table 1*).

Table 1. Significant differences between study groups.

	Control		Lock/key analogy		Driveway analogy	
Variable (*P*=.05 or less)	Mean	SD	Mean	SD	Mean	SD
Effective	7.16ab	1.61	7.72a	1.19	7.56b	1.27
Trustworthy	6.81ab	1.77	7.52a	1.08	7.27b	1.32
Credible	6.91a	1.73	7.47a	1.33	7.26	1.41
Friendly	5.94a	1.64	6.10b	1.57	6.74ab	1.48
Likeable	6.13a	1.64	6.30b	1.56	6.91ab	1.57
Attitude	1.48a	0.68	1.49b	0.57	1.71ab	0.87

Means with corresponding letters, per row, indicate a statistical difference.

Discussion

The investigation examined the effects of two analogies that are frequently used to explain diabetes. In all cases where significant differences occurred, the analogy condition ratings were higher than the control group. There were significant differences in the scores of one message rating (effective), four explainer ratings (trustworthy, credible, friendly, likeable), and on the measure of attitude toward diabetes.

Interestingly, the use of analogies to explain diabetes had a greater effect on communicator ratings, rather than characteristics of the explanation. This may be due to a long-standing sociolinguistic premise that "good explainers" use analogies. A third interesting finding is that participants in the driveway group indicated a more positive attitude toward diabetes than those exposed to the lock/key analogy and those in the control group.

A credible explanation for the differences in the two analogy message groups is the "language-as-fixed-effect" fallacy (Clark, 1973). That is, examples of the same language or message group (in this case, an analogy) will frequently have differing effects. Specifically, Clark (1973) argued that when investigating language or message variables, one example or instantiation cannot be used to generalise all cases of the language or message type. Clark and other researchers (Jackson and Jacobs, 1983; Jackson et al, 1988; Jackson, 1992) suggested using multiple instantiations or examples when querying the effects of message types or language variables. This investigation is clearly an example of this point. In the present study, the means for the analogy messages were higher than the control group on the noted variables, yet statistically differed from each other on three of the six variables (50%). As such, extreme caution is advised on making generalisations about the effects of analogies to explain diabetes until the data support such claims.

Study limitations

There are several variables missing from this investigation that would have enhanced its contribution to the literature. For instance, demographic information, particularly participants' ethnicity, family history of diabetes, or any previous knowledge of diabetes and any effects of these variables could have enriched the findings. Also, a few more commonly used analogies that are used to explain diabetes could have been used within the study. A follow-up questionnaire could also have been carried out to assess any lasting impact of the analogies used. These are limitations that could be addressed in future studies. Observing the pattern of effects of a multitude of instantiations in the same investigation would have greatly bolstered our understanding of the use of analogies to explain diabetes.

"Healthcare professionals are strongly encouraged to recognise that the effects of analogies for explanatory purposes vary and to consider their choices of analogy carefully when explaining illness to people with diabetes and families"

Conclusion

A considerable amount of research is needed regarding the strategies used by healthcare professionals to explain illnesses, with attention given to linguistic tools, such as analogies, that have been commonly employed for many years. Empirically documenting the effects of using analogies is long overdue. Healthcare professionals are strongly encouraged to recognise that the effects of analogies for explanatory purposes vary and to consider their choices of analogy carefully when explaining diabetes to individuals and their families. ■

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