

# Sweet Talk: A text messaging support system

Victoria Franklin, Stephen Greene

## Article points

1. Text messaging has become part of teenage culture and provides a low-cost method for delivering a behavioural support strategy.
2. Sweet Talk's automated system sends daily text messages tailored to the young person's personal profile and diabetes self-management goals.
3. This novel support system was associated with improved diabetes self-efficacy and adherence to the individual's care strategy.
4. Sweet Talk could be readily adopted by other diabetes teams and used to deliver preventative strategies and behavioural support interventions for other chronic conditions.

## Key words

- Type 1 diabetes
- Text message
- Behavioural support

Victoria Franklin is a Specialist Registrar in Paediatrics and Stephen Greene a Reader in Child Health at Ninewells Hospital and Medical School, Dundee.

Diabetes self-management is complex and demanding for any age group, but adolescence presents additional difficulties. Young people strive to form their own identity, to conform with their peer group and resist authority – these can all conflict with optimal diabetes management. In addition, puberty is associated with insulin resistance that can undermine self-care efforts (Amiel et al, 1986). Unsurprisingly, adherence to insulin regimens decreases during adolescence and this is associated with poor glycaemic control and an increased risk of ketoacidosis (Morris et al, 1997). Furthermore, clinic attendance rates frequently decline around the time of transition to adult care services. The challenge is to develop innovative ways of engaging young people with type 1 diabetes and support them in optimising their diabetes self-care. Sweet Talk is an automated text messaging system designed to offer regular support to young people with diabetes to help them optimise their diabetes self-management and glycaemic control.

Frequent contact with and support for our service users improves adherence to drug regimens and should improve metabolic control (Kirsh et al, 1981) and it is therefore recommended that contact should be as frequent as resources allow (Lorenz et al, 1996). However, increasing traditional face-to-face contact between health professionals and service users is costly and time-consuming for both parties. The challenge is to use innovations that are feasible within finite health service resources.

Conventional methods of helping young people with diabetes include support groups and group behavioural interventions such as coping skills training and motivational

interviewing (Grey et al, 2000; Viner et al, 2003). However, participation in such groups is frequently low and those most in need are least likely to attend (Farquhar J, 1986; Glasgow et al, 1999; Hanestad and Albreksten, 1993).

Specialist support groups and chat lines are accessible via the internet and provide information on, for example, self-help strategies, patient-to-patient and professional-to-patient support (Eysenbach et al, 2004). They have the advantage of convenience and allow asynchronous communication and uninhibited sharing of emotions and issues. However, use of the internet does not have universal appeal and can create a 'digital divide', which may further disadvantage less

motivated people or those without ready internet access (Pagliari et al, 2005).

### Text messaging and young people

Recently published statistics reveal that 91% of 12-year-olds own a mobile phone (The Carphone Warehouse plc, 2006). The popularity of text messaging increased rapidly among teenagers in the late 1990s as it is a low-cost and socially acceptable method of communication.

### Health related text messaging interventions

The high levels of mobile phone ownership and use among young people mean that they have great potential as a communication tool between health professionals and their patients (Gimenez-Perez et al, 2002).

Text message reminders have been used in the general practice setting for clinic reminders: in one study non-attendance rates were reduced at a young adult diabetes clinic (Summerton and Summerton, 2004); yet in an orthodontic surgery it had no impact on the failed appointment rate (Bos et al, 2005).

Text message reminders have proved an effective means of improving adherence to vaccination schedules in travellers attending an immunisation clinic (Vilella et al, 2004) and it has been suggested that text messages could promote adherence with asthma medication (Neville et al, 2002).

Text messaging has also been used as a method of transmitting blood glucose data to a web-based server (Ferrer-Roca et al, 2004). This data was used to calculate an estimated monthly HbA<sub>1c</sub>, which was fed back to the participant by text message. Although this study was not described as a behavioural intervention, such feedback may serve to enhance adherence to self-monitoring of blood glucose and, therefore, improve overall diabetes control.

Text messaging has also been used to deliver a smoking cessation behavioural intervention to college students (Obermayer et al, 2004). In this non-controlled study, the rates of 24-hour quit attempts and smoking cessation

after the 6-week programme were comparable or higher than minimal contact or self-help strategies.

Finally, text messaging can also be used as a method of capturing symptom data and has been used by our group to collect information about hypoglycaemia (Tasker et al, in press).

Text messaging has several potential advantages over paper-based symptom diaries because mobile phones have become an integral part of people's lives and can be used to prompt people with diabetes to send their diabetes management data.

### Text messaging support for young people with diabetes

Teenagers can be difficult to engage in traditional health care and promotion (Wysocki et al, 1997), but as they are typically early adopters of new technology, there is an opportunity for developing interventions to engage young people using e-health strategies. Text messaging predominates in mobile phone use by young people and provides an inexpensive, convenient form of communication and its almost ubiquitous use (Gimenez-Perez et al, 2002)s make it a perfect medium for engaging this population in diabetes self-management issues.

### The Sweet Talk intervention

Sweet Talk is a complex intervention at the heart of which is an automated and scheduled text messaging system designed to offer regular support to young people with type 1 diabetes to help them optimise their diabetes self-management. During the diabetes consultation, the Sweet Talk intervention involves setting and writing contracts of agreed personal diabetes self-management goals during the diabetes consultation. Based on these goals and profiles for age, sex and diabetes regimen, the Sweet Talk system schedules the automated delivery of a series of appropriately tailored messages, including daily messages to reinforce the individual's personal diabetes self-management goals and a weekly reminder of their specific goals.

The system draws on a database of messages

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1. Use of mobile phones is popular among young people.
2. Text messaging has been used to increase adherence to asthma medication regimens, to convey blood glucose data and to aid smoking cessation.
3. The Sweet Talk intervention utilises the widespread use of mobile phones in young people by offering regular support to those with diabetes to optimise self-management and, therefore, glycaemic control.
4. On the Sweet Talk programme the young person receives text messages tailored to their personal goals.

Table 1. Examples of text messages from the Sweet Talk database.

| Diabetes goal                    | Example of text message   |
|----------------------------------|---|
| Self-monitoring of blood glucose | Always test ur sugar if u feel unwell or think u may be hi or low<br>Make BG testing less sore – only prick the sides of ur fingers where there are less pain sensors   |
| Insulin injections               | Lumpy sites? :( Change ur site<br>Change ur needle everytime u inject. It will hurt less and reduce risk of infection   |
| Healthy eating                   | You are what you eat. Eat Healthy. Be Healthy<br>Fruit, carrot or celery sticks, pretzels, plain popcorn make healthy snax  |
| Exercise                         | Boost your daily activity – play ur favourite music and dance!<br>Regular exercise can stabilise blood sugar and reduce your need for insulin'  |
| Carbohydrate counting            | The key 2 carb counting is that the amount of carbs u eat (sugar or starch) will determine how hi ur BG level will b after a meal or snack<br>Do you have any carb counting questions for the doctors or dietician? |
| Insulin pump                     | What do u love or hate about ur pump? Text us!<br>Summer holidays soon! Remember to take extra pump batteries, insulin and supplies with you – just in case you have any problems                                   |

that was created to encompass four main diabetes self-management tasks (insulin injections, blood glucose monitoring, healthy eating and exercise). Example text messages are shown in *Table 1*. In addition, the person with diabetes received occasional text 'newsletters' regarding topical diabetes issues or requests for tips and suggestions about living with diabetes and personal replies to any messages they sent to Sweet Talk. A detailed description of the development of the Sweet Talk system has been published previously (Franklin et al, 2003; Waller et al, 2006).

### Evaluating the Sweet Talk system

The Sweet Talk system has been evaluated in a randomised controlled trial (Franklin et al, 2006). Young people aged 8–18 years with type 1 diabetes diagnosed over one year previously were invited to participate. All participants were given a card outlining the functions of the system, emphasising that Sweet Talk is not intended for emergency use or to replace 'DiabNet' (the emergency out-of-hours hotline for the Forth Valley, Tayside and Fife health boards; *Figure 1*).

Figure 1. Sweet Talk information card outlining functions of the system.



### Outcomes of the Sweet Talk intervention

Sweet Talk engaged adolescents, a typically difficult group to reach, achieving high representativeness with 73% of the eligible clinic population participating. The Sweet Talk intervention was associated with significant improvements in diabetes self-management and adherence to testing and drug regimens (Franklin et al, 2006). Furthermore, the participants perceived a significant increase in the quantity of support provided by the diabetes team. Sweet Talk was not associated with significant improvements in glycaemic control. However, maintaining contact and

communication with young people throughout adolescence and increasing diabetes self-efficacy is important, and these may translate into long-term beneficial effects on glycaemic control.

Eighty-two percent of participants reported that Sweet Talk improved their diabetes self-management, and 90% wanted to continue receiving messages after the end of the study period. Participants reported that Sweet Talk messages had a positive influence on various aspects of their diabetes self-management routine, including healthy eating, blood glucose testing and exercise. Example views of the Sweet Talk system are shown in *Table 2*. Messages

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1. The impact of the Sweet Talk messages were viewed by the majority of participants as having a positive influence on their self-management.

**Table 2. Participants' views of the Sweet Talk system.**

| Theme                              | Comments  |
|------------------------------------|---|
| Impact on diabetes self-management | Made me test my sugars more<br>I think it helped because it does remind you to try and eat a bit better<br>Stopped eating as much chocolate<br>Made me more active during the year  |
| Contact with the diabetes team     | I thought it was quite good. A lot of it [was] useful. If you had a question it was answered very quickly   |
| Clinic reminders                   | That was helpful – one time I forgot I even had a clinic, so it reminded us<br>Nice to know you knew I was coming<br>Remembered anyway  |
| Informational content              | Before I didn't know you weren't meant to inject through clothes and everything.<br>I used to do that<br>Full of facts I've never found out before<br>Boring, I knew about it half the time<br>Some of the stuff, I knew and didn't do anyway – no change<br>Annoying to get same messages over again |
| Companionship support              | Stuff about what other people say is interesting, you think its just what you feel, but then you think they've got it as well<br>You got to ask questions and hear results from everyone else as well   |
| Encouragement provided             | I think it is encouragement to keep going<br>Yes it sort of made you think about what you're doing the way it said it   |
| Suggestions for text messages      | More about what other people are feeling – I think it helps to know other people are feeling the same as yourself<br>Update on progress with research   |

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1. The Sweet Talk system could easily be adapted to aid in the management of other chronic diseases.

containing information relating to diabetes and those sharing peoples' experience of living with diabetes were most valued by the participants. Also valued were the practical aspects of the system, including clinic visit reminders, ease of contacting the diabetes team and as a method of obtaining supplies. Receiving repeats of the same message was reported as the most annoying aspect of the Sweet Talk system.

**Behavioural science in diabetes. Contributions and opportunities Sweet Talk – the future**

Sweet Talk is an innovative method of maintaining communication and contact with young people with diabetes between clinic visits. The Sweet Talk system could be readily adapted for use by other diabetes teams, by adapting the message content to reflect individual clinics' philosophy, protocols and approach to diabetes care. The text message database could also be easily adapted to support people with other chronic and acute conditions and for the delivery of preventative strategies. The challenge will be to integrate such interventions into health service informatics systems and incorporate detailed cost-effectiveness interventions. ■

Amiel SA, Sherwin RS, Simonson DC et al (1986) Impaired insulin action in puberty. A contributing factor to poor glycemic control in adolescents with diabetes. *New England Journal of Medicine* **315**: 215–9

Bos A, Hoogstraten J, Prah-Anderson B (2005) Failed appointments in an orthodontic clinic. *American Journal of Orthodontics and Dentofacial Orthopedics* **127**:355–7

Eysenbach G, Powell J, Englesakis M et al (2004) Health related virtual communities and electronic support groups: systematic review of the effects of online peer to peer interactions. *BMJ* **328**:1166–71.

Ferrer-Roca O, Cardenas A, Diaz-Cardama A, Pulido P (2004) Mobile phone text messaging in the management of diabetes. *Journal of Telemedicine and Telecare* **10**: 282–5

Farquhar JW (1989) The use of a Teleport system in parent and adolescent support. *Diabetic Medicine* **6**: 635–7

Franklin V, Waller A, Pagliari C, Greene S (2003) Sweet Talk: text messaging support for intensive insulin therapy for young people with diabetes. *Diabetes Technology and Therapeutics* **5**: 991–6

Franklin V, Waller A, Pagliari C, Greene S (2006) A randomised controlled trial of Sweet Talk, a text-messaging system to support young people with diabetes. *Diabetic Medicine* **23**: 1332–8

Gimenez-Perez G, Gallach M, Acera E et al (2002) Evaluation of accessibility and use of new communication technologies in patients with type 1 diabetes mellitus. *Journal of Medical Internet Research* **4**: E16

Glasgow RE, Fisher EB, Anderson BJ et al (1999) Behavioral science in diabetes. Contributions and opportunities. *Diabetes Care* **22**: 832–43

Grey M, Boland EA, Davidson M et al (2000) Coping skills training for youth with diabetes mellitus has long-lasting effects on metabolic control and quality of life. *Journal of Pediatrics* **137**: 107–13

Hanestad BR, Albrektsen G (1993) The effects of participation in a support group on self-assessed quality of life in people with insulin-dependent diabetes mellitus. *Diabetes research and clinical practice* **19**: 163–73

Kirsht JP, Kirsht JL, Rosenstock IM (1981) A test of interventions to increase adherence to hypertensive medical regimens. *Health Education Quarterly* **8**: 261–72

Lorenz RA, Bubb J, Davis D et al (1996) Changing behaviour. Practical lessons from the diabetes Control and complications trial. *Diabetes Care* **19**: 648–52

The Carphone Warehouse plc (2006) *The Mobile Life Report 2006. How mobile phones change the way we live.* Available at: [www.mobilelife2006.co.uk](http://www.mobilelife2006.co.uk) (accessed 19.01.07)

Morris AD, Boyle DIR, McMahon AD et al (1997) Adherence to insulin treatment, glycaemic control, and ketoacidosis in insulin-dependent diabetes mellitus. The DARTS/MEMO Collaboration. Diabetes Audit and Research in Tayside Scotland. Medicines Monitoring Unit. *Lancet* **350**: 1505–10

Neville R, Greene A, McLeod J et al (2002) Mobile phone text messaging can help young people manage asthma. *BMJ* **325**: 600

Obermayer JL, Riley WT, Asif O, Jean-Mary J (2004) College smoking-cessation using cell phone text messaging. *Journal of American College Health* **53**: 71–8

Pagliari C, Gregor P, Sullivan F et al (2005) *Literature review and conceptual map of the area of E-Health.* Available at: <http://www.sdo.lshmt.ac.uk/sdo602003.html> (accessed 19.01.07)

Summerton L, Summerton J (2004) Text communication improves 'no show' in a young adult clinic. *Pediatric Diabetes* **5**(Supplement 1): 14

Tasker APB, Gibson L, Franklin V et al (in press) What is the frequency of symptomatic hypoglycaemia in the young: assessment by novel mobile phone technology and computer based interviewing. *Pediatric Diabetes*

Vilella A, Bayas JM, Diaz MT et al (2004) The role of mobile phones in improving vaccination rates in travelers. *Preventative Medicine* **38**: 503–9

Viner RM, Christie D, Taylor V, Hey S (2003) Motivational/solution-focused intervention improves HbA1c in adolescents with type 1 diabetes: a pilot study. *Diabetic Medicine* **20**:739–42

Waller A, Franklin V, Pagliari C, Greene S (2006) Participatory design of a text message scheduling system to support young people with diabetes. *Health Informatics Journal* **12**: 304–18

Wysocki T, Harris MA, Greco P et al (1997) Social validity of support group and behavior therapy interventions for families of adolescents with insulin-dependent diabetes mellitus. *Journal of Pediatric Psychology* **22**: 635–49