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Using behavioral economics concepts to increase organizational learning in an NHS hospital

Adverse safety incidents in hospitals are often missed opportunities for organizational learning (Anderson et al., 2013; Mahajan, 2010). Organizational learning is a process by which errors are detected and corrected (Argyris and Schön, 1996). Beneficially, hospitals that encourage organizational learning are better able to adapt to scientific, political, and economic changes than hospitals that do not (Ratnapalan and Uleryk, 2014; Walson, and Chou, 2011). To become learning organizations, hospitals should embed dissemination systems that allow information to be openly transferred between individuals and across working units. The current paper provides practical insights into how hospitals can use behavioral economics concepts to enhance their dissemination systems (Dolan et al, 2012; Visser, 2007).

The current service evaluation took place within eight wards at one acute care NHS hospital. To encourage organizational learning, the hospital's managers already issued a report each month, called the "Lesson of the Month." The Lessons are based on safety incidents that occur in the organization. They are written by clinicians for clinicians, and fit within one printable A4 page. The hospital's managers informed ward managers about the Lessons to be disseminated but did not tell them how to do so. The ward managers could use a variety of available dissemination systems. In the following section we describe three dissemination systems, their problems, and how each was enhanced in the current study.

Dissemination Systems

Written reports. Written reports are a formal dissemination system that ward managers can use to tell their nurses about adverse safety incidents. Written reports need only be produced once and can be copied many times thereafter. Additionally, as nurses pass along

information, the veracity of their claims can be checked by referring back to the written reports. However, a problem with written reports is that nurses who do not read the written reports may not learn the information (Donthu et al., 1993).

In an effort to mitigate this problem, the ward managers in the current service evaluation could print out and post written reports, i.e., the Lessons. However, there are many written reports managers post, and if they did post the Lessons they were difficult to locate. To enhance the Lessons, we increased their salience. Salience is a behavioral economic concept that describes how our behavior, such as reading the Lesson, is influenced by what draws our attention (Dolan et al, 2012). Physical salience can attract attention via an automatic process (e.g., one cannot help but notice a single purple dot on a white background), or a reflective process (e.g., if one wants to find a single purple dot on a colourful background, one can; Wolfe, et al., 2003). To draw nurses' attention to the Lessons, a vibrant purple poster was created, called a safety board (See Figure 1).

Figure 1. A picture of the safety board used in the current study. © Heart of England NHS Foundation Trust

Verbal Reports. Verbal reports are another formal dissemination system that ward managers can use to tell their nurses about adverse safety incidents, typically at regularly scheduled meetings. By taking the time to talk about safety incidents ward managers imply

that the information is valuable. Additionally, ward managers who allow their nurses to ask questions may promptly clarify any confusion. However, a problem with verbal reports is that nurses who are not present when the report is spoken may not learn the information.

The ward managers in the current service evaluation could use verbal reports to disseminate the lessons, but were not before our intervention instructed to do so. We instructed ward managers to use verbal reports consistently. Strengthening the verbal reports, a messenger effect is to be expected, as hospital managers are authority figures (Dolan et al, 2012). The messenger effect is a behavioral economics concept that describes how the implication of the speaker that the information they convey is valuable adds social currency to it. The more social currency information has the more likely it will be shared with others and remembered (Berger 2013). The messenger effect was encouraged by the study in at least two connected ways. First hospital managers acted as messengers by explicitly instructing ward managers how to tell their nurses about the Lessons. Second, ward managers likely became better messengers due to these instructions.

Word-of-mouth. Word-of-mouth refers to an informal dissemination system that occurs as nurses discuss information with each other. As much as 70% of organizational communication may occur through word-of-mouth and much of this goes on without managerial involvement (Crampton, 1998). Typically, formal dissemination systems do not reach every nurse, and so more complete organizational learning may require word-of-mouth. One benefit of word-of-mouth is that sharing information requires nurses to process the information on a deeper-level and so may help them to better remember it. A potential problem of word-of-mouth is that as nurses share information they may alter its meaning and/or accuracy. However, hospitals that discourage word-of-mouth are unlikely to stop it. In contrast, hospitals that encourage open discussions are better able to manage the information being discussed (DiFonzo and Prashant, 2002; Hymowitz, 1988).

The previously described changes to formal information dissemination systems were also designed to increase word-of-mouth. The objective was to make talking about the Lessons a social norm. A social norm is a behavioral economics concept that describes how people are more likely to do what they see other people doing (Dolan et al., 2012). The safety boards, in addition to attracting visual attention, were placed in a social area where they could trigger conversations about the Lessons (Berger and Schwartz, 2011). Further, when ward managers told nurses about the Lessons they were also instructed to encourage their nurses to discuss the Lessons.

The current service evaluations evaluation.

The current service evaluation was conducted as a between-subjects trial with two groups. The dependent variables were measured pre- and post- intervention. In the control group nothing was altered. In the intervention group ward managers were provided with a safety board upon which to display printed Lessons (written reports) and were explicitly reminded each month to tell their nurses about the Lessons (verbal reports) and to encourage their nurses to talk about the Lessons (word-of-mouth).

We have three hypotheses: 1. we predict that nurses in the intervention group will discuss the Lessons with more staff in their ward than those in the control group; 2. we predict that nurses in the intervention group will recall more Lessons than nurses in the control group; 3. we predict that nurses in the intervention group will recognize more Lessons than nurses in the control group.

Methods

Participants.

Eight wards with varying specialities participated in the study (e.g., surgical, elderly care, etc.). Within each ward 10 nurses were randomly selected to be surveyed pre-

intervention, voluntarily and anonymously. All selected nurses received and signed an

information sheet. In total 51 nurses completed the pre-intervention survey. Then post-

intervention, 10 new nurses from each ward were selected to be surveyed in the same

manner. In total 61 nurses completed the post-intervention survey. The following reasons

were given for nurses who did not participate: illness, holiday leave, or time pressure due to

work.

Materials.

Survey. The survey was delivered in-person during the nurses' scheduled shifts. The

survey was designed using Qualtrics 2015 and took less than 15 minutes to complete on an

internet enabled device.

Procedure.

Pre-intervention survey. Pre-intervention surveys were completed during the first

three weeks of August, 2015.

The survey first assessed, using recall and recognition tests, how many of the three

Lessons that were released the previous three months the nurses remembered. Of the two

tests, we favour recall for the following reasons: First, the ability to recall information

typically requires deeper-processing than the ability to recognize information, which can be

quite superficial. Second, recall tests generate fewer false positives than recognition test.

Recall was assessed by asking nurses to write what each of the Lessons had been

about within three designated textboxes. These textboxes appeared large enough to contain

highlight information (e.g., pressure sores) but not deep content (e.g., a pressure sore

developed by an 80-year-old patient who was left unattended during the evening). Before

starting the recall test, the nurses were informed that they would have only three minutes to

finish; if they did not click the button to advance before this time elapsed, then the survey

automatically advanced. All nurses clicked the button to advance before this time-limit elapsed.

Next the survey assessed nurses' recognition memory by asking them to select which three of six Lesson titles, half actual and half pseudo, were actual titles. The software required that they select three. If they selected a different number, the survey instructed them to go back and select exactly three. Before starting the recognition test, nurses were informed they would have only two minutes to indicate which Lessons they recognized; if they did not click the button to advance before this time elapsed, then the survey automatically advanced. All nurses clicked the button to advance before this time-limit elapsed.

To gauge how the nurses learned about the Lessons, the next screen in the survey instructed them to check the box next to all the dissemination systems they experienced (if any) during the previous three months. The following five options were simultaneously presented: i) a Lesson posted on a safety board, ii) a Lesson not posted on a safety board, iii) their ward manager telling them about a Lesson, v) other, and vi) I did not hear about any Lessons. Lastly the nurses were asked to report how many staff they discussed the Lessons with in their ward.

Randomization. The intervention was only introduced to half of the wards for management to determine if it should be rolled out further. To decide which wards to deliver the interventions in, the researchers used the pre-intervention survey to calculate the average number of Lessons recalled by nurses in each ward. The wards were then ordered by the average number recalled in each, from most to least. From each descending two wards, one ward was randomly placed into the intervention group, via a coin toss, and the remaining ward was placed into the control group.

Intervention. The intervention lasted for three months during which three Lessons were released. Wards in the intervention group received the following enhancements:

Written reports on a Safety Boards- Safety boards were given to the ward managers, see Figure 1. Ward managers were told to place the safety board in a social area, like a breakroom, where the Lessons were most likely to trigger discussions. *Written reports _not_ on a safety board* were also released across the hospital, and due to ethical concerns our study did not stop them (e.g., reports appearing on the hospital's intranet). To learn about the prevalence of other written reports, we asked participants to report their experience with them as well. As we did not manipulate the prevalence of written reports not on a safety board, we did not expect to find differences in their use across groups or time.

Verbal report- Ward managers in the intervention group were explicitly reminded each month (phone calls and/or in person) to tell their nurses about that month's Lesson and to encourage their nurses to discuss them with each other (i.e., *increase word-of-month)*.

Post-intervention survey. Post-intervention surveys were completed the first three weeks of November, 2015. The post-intervention survey was similar to the pre-intervention survey with the necessary alterations for the recognition test. During the recall test 10 nurses did not click the button to advance before the time-limit elapsed but all did so for the recognition test.

RESULTS

We examine how nurses learned about the Lessons and how many they remembered. A binary logistic regression is used to assess the effects of group, time, and the interaction on the likelihood that nurses learned about the Lessons: written reports on safety boards, written reports _not_ on safety boards, and verbal reports. An ordinal regression is used to assess the

effects of group, time, the interaction on word-of-mouth, and the number of Lessons nurses recalled and recognized.

Where the interventions effectively implemented?

Written reports on a safety board. The number of nurses who learned about the Lessons via those posted on a safety board changed as expected. In the pre-intervention survey, 23% ($N = 6$) of nurses in the control group and 12% ($N = 3$) of those in the intervention group reported learning about the Lessons this way. As no safety boards were present in these wards pre-intervention, these nurses were mistaken likely because they did not know what a safety board was. In the post-intervention survey, 13% ($N = 4$) of the nurses in the control group and 72% ($N = 21$) of those in the intervention group learned about the Lessons this way. The binary logistic regression revealed that group ($p < 0.01$), time ($p < 0.01$), and the interaction ($p < 0.01$) were significant predictors of nurses learning about the Lessons via those posted on a safety board.

Written reports <u>not</u> on a safety board. Next the number of nurses whom learned about the Lessons via those <u>not</u> on a safety board was examined. As this was not manipulated it was not expected to change; it did not change. In the pre-intervention survey, 27% ($N = 7$) of nurses in the control group and 28% ($N = 7$) of those in the intervention group reported learning about the Lessons this way. In the post-intervention survey, 41% ($N = 13$) of the nurses in the control group and 17% ($N = 5$) of those in the intervention group learned about the Lessons this way. The binary logistic regression revealed that neither group ($p = 0.35$), time ($p = 0.16$) nor the interaction ($p = 0.16$) were significant predictors of nurses learning about the Lessons via those <u>not</u> posted on a safety board.

Verbal reports. The number of nurses who learned about the Lessons via their ward manager was examined; there was no change. In the pre-intervention survey, 23% ($N = 6$) of nurses in the control group and 20% ($N = 5$) of those in the intervention group reported

learning about the Lessons this way. In the post-intervention survey, 34% ($N = 11$) of the nurses in the control group and 41% ($N = 12$) of those in the intervention group learned about the Lessons this way. The binary logistic regression revealed that neither group ($p = 0.65$), time ($p = 0.96$), nor the interaction ($p = 0.58$) were significant predictors of nurses learning about the Lessons via their ward manager.

Did the interventions increase word-of-month between nurses?

We examined how many staff members nurses reported discussing the Lessons with in their own ward. In the pre-intervention survey, the median number of staff nurses in both groups reported discussing the Lessons with was one. In the post-intervention survey, the median number of staff nurses in the control group reported discussing the Lessons with was two, and the median number for the intervention group was three. The ordinal regression revealed group ($p < 0.05$) and time ($p < 0.05$) were significant predictors for how many people nurses discussed the Lessons with, but that the interaction was not significant ($p = 0.14$).

Did interventions increase staff members' memory of the Lessons?

Recall. Two independent judges, blind to the participants' group, rated each of the responses as either correctly or incorrectly recalling a Lesson. The initial, inter-rater reliabilities were high (Cohen's kappa = 0.88). All disagreements were settled after brief discussion.

In the pre-intervention survey, nurses in the control group accurately recalled 0.3 Lessons on average, while those in the intervention group accurately recalled 0.4. In the post-intervention survey, nurses in the control group accurately recalled 0.3 Lessons on average, while those in the intervention group accurately recalled 1.0. These results are displayed in Figure 2. The ordinal regression revealed group was a significant predictor ($p < 0.05$) of how

many Lessons nurses recalled, but neither time ($p = 0.11$) nor the interaction were significant

($p = 0.65$).

Figure 2. The numbers of Lessons nurses accurately recalled in the control and intervention groups at pre- and post- intervention. The data in this chart reflect the data reported in the results section of this paper.

Lessons Recalled
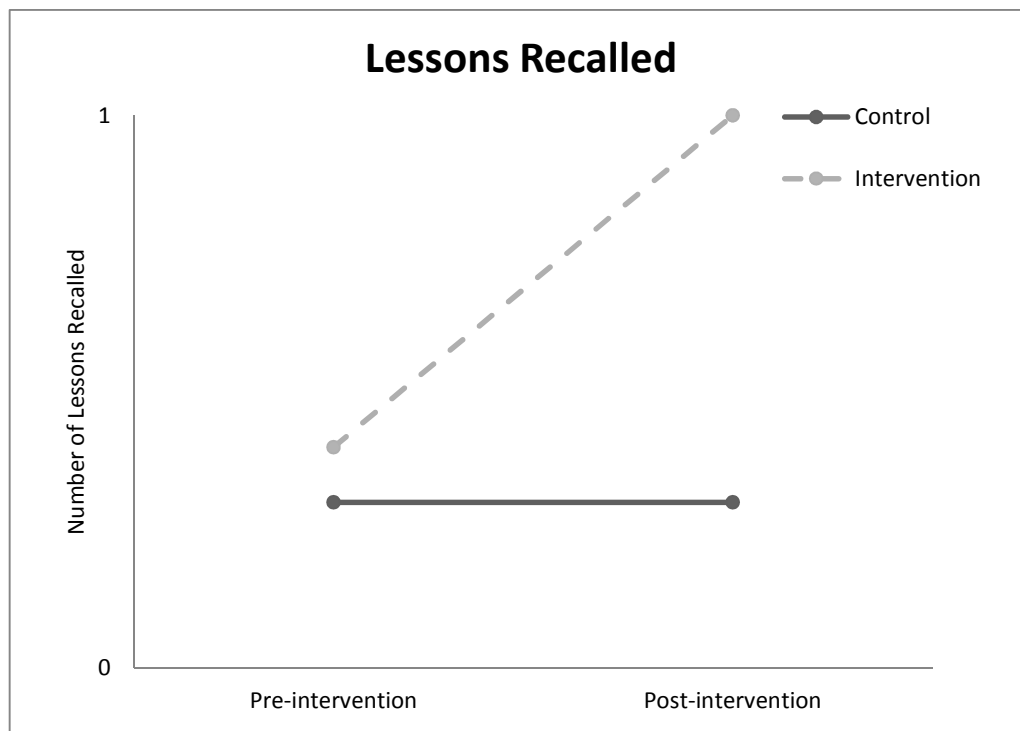
Recognition. In the pre-intervention survey, nurses in the control group accurately

recognized 1.3 Lessons on average, while those in the intervention group accurately

recognized 1.6. In the post-intervention survey, nurses in the control group accurately

recognized 2.4 Lessons on average, while those in the intervention group accurately

recognized 2.3. The ordinal regression revealed group was not a significant predictor of how

many lessons nurses recognized ($p = 0.70$), but that time was ($p < 0.01$). The interaction was

not significant ($p = 0.28$).

DISUCUSSION

The current service evaluation assessed whether enhancing the dissemination systems a hospital uses to spread information about particular adverse safety incidents would increase organizational learning. Encouragingly, Hypotheses 1 and 2 were supported. In accordance with Hypothesis 1, nurses in the intervention group discussed the lessons with more staff than those in the control group. In accordance with Hypothesis 2, nurses in the intervention group accurately recalled more Lessons than those in the control group. Hypothesis 3 was not supported, because both groups experienced a similar increase in the number of Lessons that nurses were able to recognize. Notably, the effects of the safety boards were stronger than the effects of verbal reports. However, because the experiment was not a complete factorial design we cannot speculate as to how much each manipulation would affect organizational learning alone. Below we discuss limitations of the current service evaluation and then how behavioral economics concepts could be further used to enhance organizational learning.

One limitation of the current service evaluation is its reliance on self-report. Due to the time constraints experienced in surveying nurses during their scheduled shifts, short self-reports were required. More rigorous evaluations (e.g., video recordings) would have been too expensive and invasive. In addition, management did not believe more rigorous evaluations were necessary for them to determine whether to roll out the intervention across the hospitals.

Another limitation was our inability to control the actions of the ward managers in both groups. Regarding the control group's ward managers, their having witnessed the intervention group's ward managers behaviors (posting Lessons and talking to their nurses about them) may have encouraged them to do so as well. Regarding the intervention group's ward managers, it is difficult to ascertain how faithfully they delivered the verbal reports to their nurses. Our inability to control whether verbal reports were delivered in the control and intervention wards may have contributed to the non-significance of verbal reports. More

oversight of the ward managers could have prevented these limitations but was deemed

unethical. Despite these limitations, encouraging benefits of the intervention were still found,

particularly with regard to the safety board.

The results of the current study add to a growing literature that demonstrates the

power of behavioral economics concepts to change behavior in applied settings at low

financial cost and with little cognitive effort on part of the people involved. The

enhancements used in the current service evaluation were inspired by three of the concepts

included in the MINDSPACE framework. MINDSPACE is an acronym that provides a

checklist of concepts interventionists can use to influence behavior (Messenger, Incentives,

Norms, Defaults, Salience, Priming, Affect, Commitment, Ego). The current service

evaluation used the messenger, norms and salience concepts. The messenger concept was

used to nudge ward managers to discuss the Lessons with their staff, the norms concept to

nudge staff to talk about the lessons more with each other and salience concept to nudge the

nurses' visual attention towards the Lessons.

Examples of how the commitment and affect concepts could be implemented are

described now. The commitment concept describes how people seek to be consistent with

their promises (Cialdini, 2007). Requiring nurses to sign a public contract that indicates their

promise to read the Lessons every month will likely increase the number of nurses who do so.

However, caution is required. To remain a nudge such a commitment must be a free choice

(e.g., not pay contingent), and management should ensure the nurses have sufficient time to

fulfil it. The affect concept describes how emotional associations shape behavior. The

Lessons could be modified to increase their emotional contents and so increase organizational

learning. However, caution should be taken here as well. The emotions one elicits need to be

arousing rather than depressing. This is because arousing information is more likely to be

read, shared, and spread through word-of-mouth (Berger, 2011). These cautions are not given

to dissuade applied use of these concepts, but rather to encourage their careful implementation. How the other MINDSPACE concepts might be used to increase organizational learning is an intriguing question for future work.

In conclusion the current service evaluation supports the use of enhanced written and verbal reports. Follow up tests should be conducted to assess whether these dissemination systems remain successful over time. How often such assessments should take place and how rigorous they need be is a matter of judgement that should be determined by weighing the costs and benefits of the particular learning materials in question.

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