Campus-Based Health Information Campaign Using Bluetooth 4.0 Low Energy Device (iBeacons)

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Background

The use of Information and Communications Technology in health, or "eHealth" is considered globally as an essential tool in delivering health care services for its innovative impact on health outcomes, both in highly industrialized, and developing countries (Macabasag, Magtubo, & Marcelo, 2016; Blaya, Fraser, & Holt, 2010). Incorporating technology makes health care and health education efficient and accessible (Siritongthaworn, Krairit, Dimmit, & Paul, 2006). Of particular note is the of the emerging technology called "iBeacons," which can disseminate information electronically through the use of Bluetooth technology (Newman, 2014; Koühne & Sieck, 2014, November). These transmitting devices are using specifically the technology of Bluetooth low energy (BLE). Although it is a product produced by Apple, iBeacons is also compatible with different platforms such as Android. Scholars are now starting to recognize the use of iBeacons. For instance, He, Cui, Zhou, & Yokoi (2015, July) studied the design interaction system between museum hall collections and visitors. Regarding localization, Lin et al. (2015, August) tested the use of iBeacons in locating the position of patients in an emergency room. The present literature analyzed iBeacons regarding localization and positioning function (e.g., Gast, 2014; Oscar, 2014, May; Varsamou & Antonakopoulos, 2014, September), however, to our knowledge, there is a dearth of studies related to iBeacons' ability to disseminate health information.

Aim

To test the effect of iBeacons in improving knowledge, attitudes, and practices (KAP).

Methods

We utilized a quasi-experimental, pretest-posttest approach to ascertain the effect of iBeacons on the respondents' KAP. The two experimental groups received the health information through iBeacons and pamphlets respectively, while the control group received no intervention. The respondents are nursing students in a higher educational institution (HEI) in Metro Manila. The respondents were purposively selected since the current version of the iBeacons we utilized is only compatible with Apple iOS. The health information focused on Zika Virus Infection. We created a 10-item multiple-choice quiz to test the respondents' pretest and posttest knowledge. The quiz was validated by a nursing professor who teaches communicable and infectious diseases nursing. We adopted the World Health Organization questionnaire to assess Attitudes and Practices regarding Zika Virus Infection. The questionnaire was modified to fit the objectives of the study. Content validity was established after evaluation from three senior nursing professor from the said HEI. Cronbach's alpha for 21 Attitudes and 17 Practices items were 0.944 and 0.952, respectively.

Results & Discussions

Over a four-week period, improvements had been observed in the knowledge, attitudes, and practices (KAP) scores. In table 1, the pamphlet and iBeacons group showed improved posttest knowledge scores while the control group (no intervention) shows no significant improvement in their posttest scores.

Table 1. Comparison of pretest and posttest knowledge scores

Type		Mean	SD	t_{19}	p
Pamplet	Pre test	7.35	0.67	-5.272	p<0.001
	Post test	8.75	0.85		
iBeacons	Pre test	7.15	0.75	-6.371	p<0.001
	Post test	9.05	0.89		
no intervention	Pre test	7.40	0.82	-0.271	0.789
	Post test	7.45	0.76		

*significant at 0.05

One-way ANOVA suggested that there is a significant difference in the attitude and practices scores between the two experimental groups and the control group.

Table 2. Comparison of attitude and practices scores according to type of treatment

Jeni	Type	Mean	SD	$F_{2,57}$	p
attitude	no intervention	2.81	0.28	5.472*	0.007
	iBeacons	3.18	0.39		
	pamphlet	3.10	0.43		
practices	no intervention	3.04	0.46	4.466*	0.016
	iBeacons	3.46	0.44		
	pamphlet	3.38	0.50		

*significant 0.05

Tukey's Post Hoc Analysis revealed that differences in attitudes and practices scores of iBeacons and pamphlet group were not statistically different.

Table 3. Tuckey Post Hoc Analysis

Dependent Variable	(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.
attitude	no intervention	iBeacons	-0.37*	0.12	0.007
		pamphlet	-0.29*	0.12	0.043
	iBeacons	pamphlet	0.08	0.12	0.783
practices	no intervention	iBeacons	-0.41*	0.15	0.018
		pamphlet	-0.34	0.15	0.065
	iBeacons	pamphlet	0.08	0.15	0.863

* The mean difference is significant at the 0.05 level.

Conclusions

The pretest and posttest scores of pamphlet and iBeacons group show significant difference. A significant difference was also evident in the intervention and control groups. However, between the two intervention group, no significant difference was seen. The use of iBeacons is put forward as a potential tool for improving the delivery of health information to the public. Additional research must be done to provide further evidence.

HEALTH EDUCATION