



Innovation of Medicine Giving Pacifier Development and Its Effect

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ABSTRACT

For the sake of safety and convenience, the current practice of feeding infants on medicines generally is through liquid medicine placed in several kinds of feeders. However, as infants usually do not cooperate, the results are not always satisfactory and the actual dosage of intake is hard to precisely be measured, thus discounting the effect of medical treatment. To overcome the above shortcomings, this invention is to create a medicine-giving device built in a nipple pacifier for infants to use. We hope to improve the effect of feeding infants on medicine by calming the infants down during the feeding process, so the full dosage of medicine could be taken completely and successfully.

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1. Introduction

Most medicine giving devices for infants and children that are used now do not really work wonders. It is not because infants and children reject the medicine, which is mostly made as syrup dosage, but because they reject the forceful feeding way imposed on them. Besides having difficulties in giving medicine, feeders also have problems in precisely calculating the actual intake dosage. This is what we have observed when we interviewed healthcare providers in medical institutions and babysitters in households. As it is necessary for both elders and children to take accurate doses of medicine, there are many medicine giving devices carried by pharmacies and specialty stores, mostly sold to babysitters and mothers. These devices usually include graduated pipettes, small feeding bottles, and measuring jugs. As the graduation could always be somewhat inaccurate and sometimes hard to read, feeders might possibly give erroneous dosage. Meanwhile, liquid medicine could remain in the container if not being properly cleaned after replacement. All of these factors trigger us to make some improvement on the medicine giving device.

According to the estimation of Taiwan Healthcare Reform Foundation, there are 8,374 people dying in adverse drug reactions, equivalent to 22 lives lost each day. According to the research of Bates et al. at Harvard Medical School in 2007, the cases of preventable adverse drug reactions are mostly caused by negligence, with 49% of it in giving prescription, 26% in giving medicine, and 14% in making prescription. According to Elizabeth B. et al., though the probability of medication error is relatively small, the harm caused to infants would be three times as much as to adults. The types of medication errors include four, from most frequent to least frequent, improper dose, wrong dosage, negligence on allergic history, and omission of giving medicine. However, according to relevant researches, after correct use of assistive devices, the probability of improper dose could be reduced by 83%.

2. Experimental Section

2.1. Design request

The questionnaire survey of product design collects the opinions of design users, which cover six major aspects of the design principle (fairness, simplicity, user-friendliness, allowable error, beauty and economy, easy-to-understand) as guidelines of the product improvement. We collected 40 questionnaires, which included ten questions of satisfaction towards medicine giving devices on the rating system of Likert 5-point scale. The score ranges from 2 to 10, representing from “strongly disagree” to “strongly agree” respectively, thus generating a total score from 20 to 100. The items that receive higher scores among the six major design aspects include: (1) fairness: 33 respondents (83%); (2) beauty and economy: 27 respondents (68%); (3) user-friendliness: 35 respondents (88%); (4) simplicity: 39 respondents (98%)

2.2. Brief Introduction of Technique

The invention is a medicine giving device built in a nipple pacifier especially designed for the infant patients, with simple, easy-to-use and convenient features. There is an elastic band around the front cap of the nipple pacifier, which could hold liquid medicine capsule tightly and prevent it from falling out of the nipple body, thus becoming a liquid-medicine-contained nipple pacifier for infants to suck. When the infant put the medicine-contained pacifier in mouth, liquid medicine would be slowly released from the capsule, so the infant could take the medicine completely and successfully, a feature the device is originally designed for.

3. Results and Discussion

The invention is a medicine giving device built in a nipple pacifier, which contains an elastic binding shell between nipple body and front cap, thus facilitating medicine feeding process. It could prevent the infant from resisting and precisely measure the dosage of intake. It is an easy-to-use, convenient medicine giving device.

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3.1. Medicine giving pacifier

The overall structure includes: (1) Nipple Body: a regular nipple with a front cap; inside the nipple is an extended space; between nipple body and front cap is an elastic binding shell. (2) Liquid medicine polo, circle or elliptic, with water-soluble shell. (figure 1)

The infant could take the oral medicine completely and successfully, a feature that the device is originally designed for. Before using the device, place the liquid medicine polo from the front cap into the inside space. Then the elastic binding shell will hold the liquid medicine polo tightly and prevent it from falling out of nipple body and inside space. Thus, the device features the same shape of nipple pacifier to infant to suck. Meanwhile, as the liquid medicine polo would be solved in the infant's mount, thus releasing the medicine out of the polo and helping the infant to take entire dosage. Thus, the dosage of intake could be precisely measured. (figure 2)

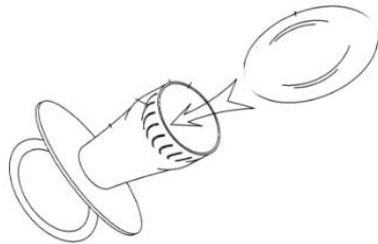


Figure 1. Design Structure.

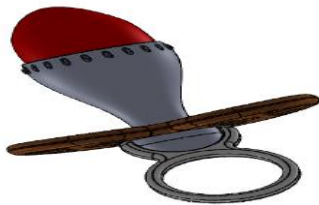


Figure 2. Finished Medicine Giving Device.

3.2. Satisfaction analysis of devices

We invited mothers and the patients suffering from slight dysphagia through random sampling to sample our product for two weeks and then handed out questionnaire in the third week. There were 73 participants and 70 effective questionnaires were collected. The satisfaction percentage of traditional and improved medicine giving devices is 38.1% and 68.3% respectively (as shown in Table 1). Respondents showing greater satisfaction towards on the improved device especially highlighted the fact that it could be used single-handedly.

Table 1. Comparison of Satisfaction between traditional and improved medicine giving devices (N=70).

Survey Items	Satisfaction				
	Traditional		New		
	Mean	SD	Mean	SD	sig
User Friendliness	38.20	6.33	63.9	6.54	0.001 *
Beauty	38.30	6.71	62.5	7.98	0.001 *
Overall Satisfaction	38.10	6.46	68.3	8.75	0.001 *

*p<0.05 level with significant difference

4. Conclusions

In Taiwan, infants and children are pretty much cared by the elders or immigrant mothers. However, the accidents of giving improper dosage due to feeders' negligence happen all the time. Therefore, the innovation is designed to provide fixed dose with easy-to-use features, so as to minimize the incidents of negligence. As our nursing staff is becoming insufficient and always loaded with excessive nursing work, we hope the improved device could improve their work satisfaction by simplifying their work and facilitate giving medicine. They could use the device to effectively and precisely give medicine to infants even though they are crying and screaming. Infants are more likely to accept the device and children are even more likely to take medicine by themselves as the device resembles a nipple pacifier. It could also be used by the elder and the patients suffering from dysphagia, so as to save intrusive treatment (such as nasogastric tube feeding).

Conflicts of Interest

This work was not supported by any public agencies or private companies that might be perceived as constituting a conflict of interest.

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