

# Delivering High-Quality Individualized Healthcare: An Illustration of U-Health Service Design in National Taiwan University Hospital

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## INTRODUCTION

Taiwan has a well developed healthcare system, with every citizen there covered by a nation-wide, government-managed health insurance system, the National Health Insurance (NHI). The current remote healthcare service systems in Taiwan can be roughly categorized by three types: life caring, medical caring, and long-term caring. All of them adopt the passive, request-and-respond model. That is, patients or their families have to specify their service requirements by themselves. Due to the inadequate integration of healthcare information systems, however, most patients do not have sufficient information to decide which services suit them the best. In addition, resources are concentrated on the urban hospital sectors, the healthcare manpower in the rural areas is significantly insufficient, and thus the care provided tends to be episodic and fragmented. Moreover, the healthcare systems of different medical institutions can not communicate with each other, and thus the patient care records are not shared between institutions and most are paper-based and not well organized.

In meeting these challenges, National Taiwan University Hospital (NTUH), one of the largest hospitals in Taiwan, is undergoing healthcare service reforms, combining home healthcare service network and sensors network, in a new service called **The U-Health service system**, to provide a continuous and personalized healthcare service for remote patients.

## MATERIALS AND METHODS

**The U-Health service system** consists of six service components which will be rolled out in an integrated manner: (1) tele-education, (2) tele-diagnosis, (3) tele-monitoring, (4) tele-consultation, (5) tele-therapy, and (6) lifetime health. Through the system, the patients upload their daily biometric

information to the database. If they have any question, they can call their care managers at call centers to receive care and guidance. Care managers call out the patients through video conferencing or phone interview twice or thrice a week (5 to 10 minutes for each time). In each conference or interview, care managers review the biometric records and provide advice and counseling. If care managers find any symptoms that require immediate attention, they will provide immediate guidance and alert the patient's physician. Patients' biometric information can be assessed by both care managers and intensive care unit (ICU). In any emergency case that the patients can not find their care managers, they can directly contact ICU for advice. The targeted customer segments of U-Health Service are (1) elderly, (2) patients of heart diseases, (3) patients of chronic diseases, and (4) patients of terminal illness.

Our research is focused on how to make the personalized healthcare services delivered by the U-Health service system effective. To ensure that the services provided can deliver high quality healthcare and offer value sufficiently satisfactory to each individual patient of their different needs, we have developed service value metrics to evaluate the fitness between *services* being provided and different types of customers and users (*i.e., patients and healthcare workers*). The service propositions we identified are examined across six P's (product, price, place, promotion, process, and people). A set of value metrics that categorizes the needs of patients, physicians, and nurses is proposed to highlight different purposes of U-health service. We show that the best service design has to achieve a strong fit and a good balance of value perceived by the patients and healthcare workers.

## RESULTS

The research will make important contributions in individualized healthcare service in several dimensions: (1) developing the U-Health service system as an effective platform for delivering individualized healthcare to patients at the convenience of their homes, (2) developing service value models for individualized healthcare based on service processes, service delivery, service metrics, and service outcomes, (3) developing service metrics and the fit between service models, perceived value, and service metrics, (4) identifying and validating the most effective economic and operational models for the U-Health service systems.

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