

# Pioneering Singapore's First Mobile Phone Application For Antenatal Patients

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## ABSTRACT

*The KKH Woman&Child Healthpedia mobile phone app launched by KK Women's and Children's Hospital in May 2011 was awarded the Excellence Award at the Hospital Management Asia in September 2011. This first-of-its-kind free app provides on-the-go information on pregnancy health in an Asian context. By March 2012, there had been more than 16,000 downloads. Specifically tailored for Asian women, it also contains useful information on women's and children's health by specialist doctors. Its features include providing up-to-date educational information to address pregnancy concerns. The "Pregnancy FAQ" section provides up-to-date pregnancy-related FAQs, on topics ranging from the types of "care during pregnancy" to diet and information surrounding fetal screenings and tests. It also addresses users' questions relating to labour and delivery information, to facts and myths about care during pregnancy. Other well-received features include a pregnancy calculator and a pregnancy planner, which features a week-by-week guide to the pregnancy. This allows the user a week-by-week e-resource that details not only their pregnancy milestones, but also fetal development and offers useful tips. This includes relevant information on what both mother and baby are going through at every stage of pregnancy.*

## INTRODUCTION

With the advent of mobile technology and the recent development of the iPhone, blackberry and touch screen devices, smartphones have very quickly become the phone of choice and have dominated the mobile phone markets. A recent article from Times magazine in September 2011 showed that based on data collected by Nielsen surveys, in the United States<sup>2</sup> alone, 4 in 10 mobile phone users are now using smart phones. Out of those, 40% were android based, 28% were apple OS based, and in third place at 19% were those using RIM Blackberry phones<sup>1</sup>

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It has been speculated that by 2015, smart phone sales would exceed one billion annually, a significant jump from approximately 630.5 million expected sales this year alone<sup>2,3</sup>.

As smart phone use becomes more extensive, mobile applications (apps) have also become increasingly popular, especially among the younger generation. In 2010 alone, smart phone ownership in Singapore increased from 38% at the beginning of the year to 46%<sup>4</sup>. Games, music, and news are some examples of info-entertainment we can now enjoy with ease thanks to the growing number of customized applications designed to suit the users' every purpose. The medical world has also evolved together with this technology. We have produced a myriad of health related applications such as those containing medical calculators to determine the anion gap, ransons scoring for pancreatitis, as well as applications that allow us a quick reference to medical information and disease processes on the go.

The question we often ask ourselves is how we can better care for our patients. Patient education has always and will always be an area in need of continual improvement. A very recent article by Chou et al about health education needs and the effectiveness of electronic learning (e-learning) is one of the many

studies that highlight the importance of health promotion and education<sup>5</sup>. Their cross sectional survey of 281 Taiwanese patients before and after e-learning was implemented in the clinic waiting rooms showed that 84.4% of those surveyed perceived health education to be important and that 72.2% of those involved in their study gave positive feedback about e-learning for health education<sup>6</sup>. Electronic learning via mediums such as the internet or any computer assisted device such as a smartphone can readily fulfill high volume information acquisition. They redefine the boundaries of traditional methods of information gathering for patients such as through books, newspapers and make them appear obsolete by comparison.

With the advent of the internet, we encountered increasing numbers of patients who wanted to be better informed about their conditions. They used various search techniques on the web to obtain print outs of information which they often discussed with their primary physician in clinic. Often, multiple questions arose and so did the problem of misinformation. These days, many mobile phone applications written by the laymen for the laymen, are widely available. Examples relevant to our field include pregnancy planners, women's health and fitness applications and health tips. With such applications being free of charge and easily downloadable, it is not surprising that our patients are being exposed to a greater variety of information from unknown or unverified sources. It goes without saying that based on sheer extrapolation alone there is great potential for misconceptions to arise.

With the above issues and the needs of our community in mind, a small group of doctors and KKH hospital staff came up with the idea of developing an Obstetrics and Gynaecology (O&G) related application—one that would not only serve as a reliable source of patient information in this region but also as educational tool that could be easily accessible, fun to use and cost free. Pregnancy is always a special event for every mother, regardless of the number of times she has been through it. As obstetricians, we know that mothers are always looking for credible information to learn more about their pregnancy and baby. Thus, the idea of the KKH pregnancy planner was born in late 2010.

### AIMS

The team's aims were to develop a credible application for expecting women or those who were planning for pregnancy that was free of charge, originating from an established healthcare institution, be easily available and downloadable from an app store and be relevant to our Asian population.

### METHOD

Based on our surveillance of the local smartphone market at that time, the predominant operating system of choice in Singapore was the apple operating system. Online consumers who chose to use apps chose to do so via Apple (68%), Nokia (38%), Android (24%), Blackberry (18%), Microsoft (14%), and others (8%)<sup>8</sup>. Although the apple OS was the most commonly used operating system in Singapore, symbian was the preferred medium for our Indonesian and Filipino counterparts. For that reason, we set our sights on launching with the apple os (available to the iPhone) and with plans to gradually expand our reach to include the android and symbian platforms.

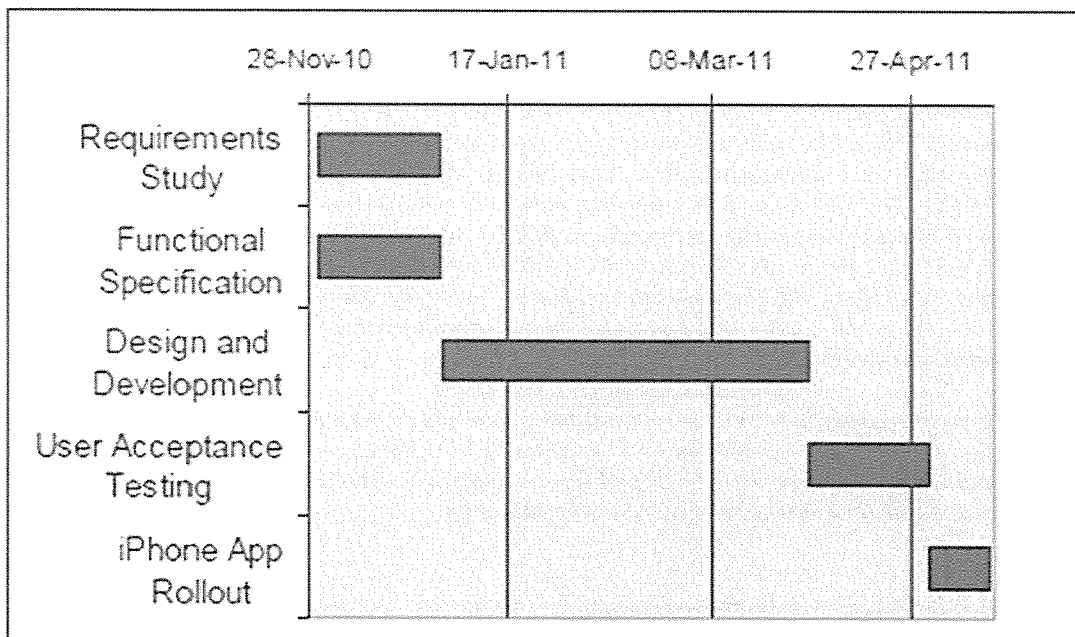
The creation process — A small group of interested parties comprising the chair of the department, a house officer, a researcher, 2 corporate managers and software engineers were involved in the creation of the KKH application. Multiple meetings were held (See Fig 1). The software component was outsourced to paid programmers. However, the actual design of the application was primarily decided by the team. The content was also created by the medical team. Each tap of the touch screen was important and would be crucial in linking the various components in the app together. This in turn had implications as to how user friendly the app would be. Therefore, many test drives and trial runs were essential before the app was weaked to satisfaction. Finally, the data and backgrounds were ported over into the iPhone application after the basic structure had been completed. Adjustments to font and design were then made. These days, there are many ways that one can go about designing an iPhone application. Other programs such as SwebApps<sup>9</sup> are available online for those who should choose to do so. Some allow the user to complete their application within an hour, while others take weeks to months.

The application that was created was named KKH Woman&Child HealthPedia. It was designed to target expecting mothers and those planning for pregnancy. It includes a gestation calculator extracted from our very own KKH formulary enabling the expecting mother to calculate their weeks in gestation according to several variables such as their last menstrual period (LMP) or estimated date of delivery (EDD). The highlight of the application is the pregnancy planner. It provides a week by week account of the commonly encountered pregnancy milestones that both mother and child will likely experience; as well as useful tips across the 40 week period that defines pregnancy. As the mother progresses through her pregnancy, the application also progresses with her. It has been personalized in such a way that the application "remembers" how many weeks pregnant mum is and will lead her to the

information pertaining to that particular week, much like a bookmark. Expecting mothers as well as those planning for pregnancy could thus use the information to mentally prepare themselves for what is to come by reading the provided information one week at a time. For each week, there are 2 sections – “mum” and “baby”. This enables mums to keep track of the estimated size of her growing child at certain check points as well as the changes her body is going through.

The final important feature of this application would be the availability of a wide range of frequently asked questions on topics ranging from diet to fetal screening

and tests. Hot topics such as screening tests during each trimester of pregnancy are often a cause of anxiety and therefore were well explored in this application. Other main categories covered under the FAQ section include Care during pregnancy (Eating right, facts and fallacies, smoking and pregnancy, discomforts and what you can do about it), labour and delivery (quick facts, pain relief in labour, vaginal birth after caesarean, miscarriage, ectopic pregnancies), and Post pregnancy care (going home, adapting to your baby, postnatal depression). The supplementary features of the application include a map of the actual hospital site, a list of womens' and children's services offered at KKH, as well as important contact numbers e.g. the appointment line and KK ask-a-nurse service.



*KKH iPhone App (Woman&Child HealthPedia) – Project Timeline*

**Fig 1. KKH Woman&Child HealthPedia – Project Timeline**

## RESULTS

The KKH Woman&Child HealthPedia was launched in May 2011 (See Fig 2). The team's initial target was to achieve at least 200 downloads within the first week, however, the actual number of downloads far exceeded the target (see Fig 3). By March 2012, there had been more than 16,000 downloads<sup>10</sup>. In addition, the app was also featured under apple's "New and noteworthy" section in the iTunes store and recognized as the No. 1 free app under the 'Medical Category' shortly after its launch and had been consistently on the Top 10 list of free apps in the health category for many months. Subsequently, the application's success was further

recognized as it proceeded to achieve an award of excellence at the Asian Hospital Management Awards (AHMA) in August 2011.

A verbal account by those who have used this application have found that "it is very useful" and "it would have been great if I had this app in my earlier trimesters. I look forward to seeing more features on children's health as it is the next phase I am going into" – says then expectant mother Ms Suhaila, May 2011. Others have also said that "this is good and I can look forward to quick information on a week-by-week basis, and it progresses concurrently with my Estimated Date of Delivery"<sup>11</sup>.

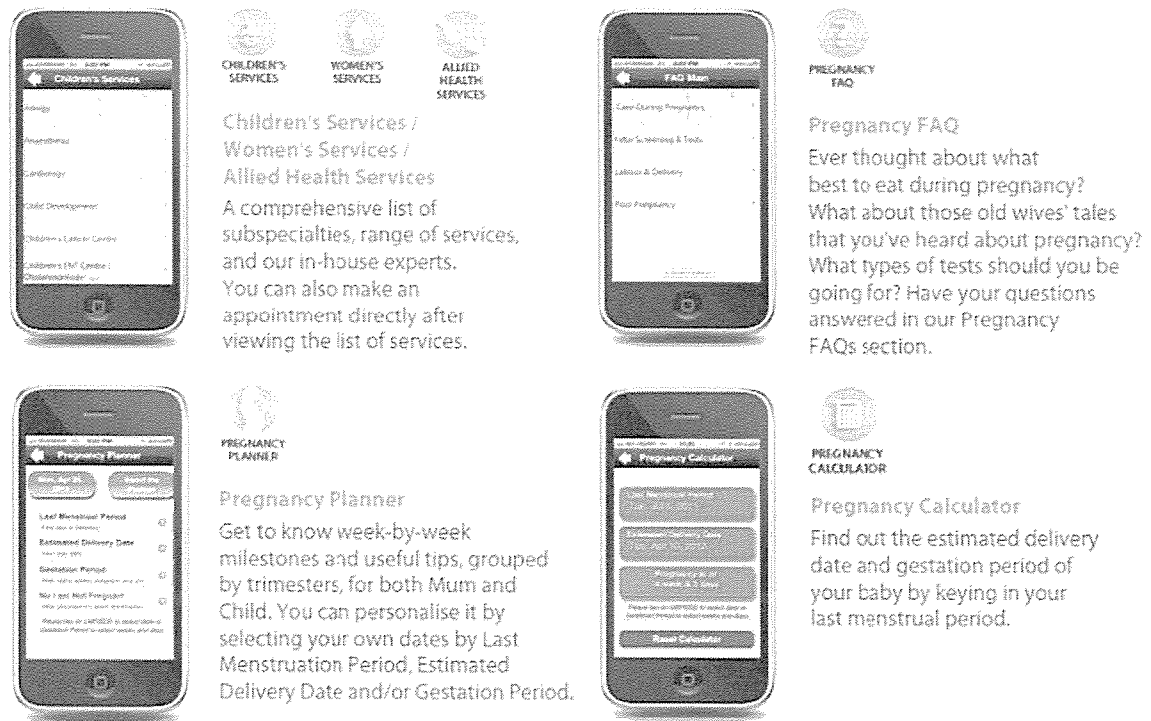
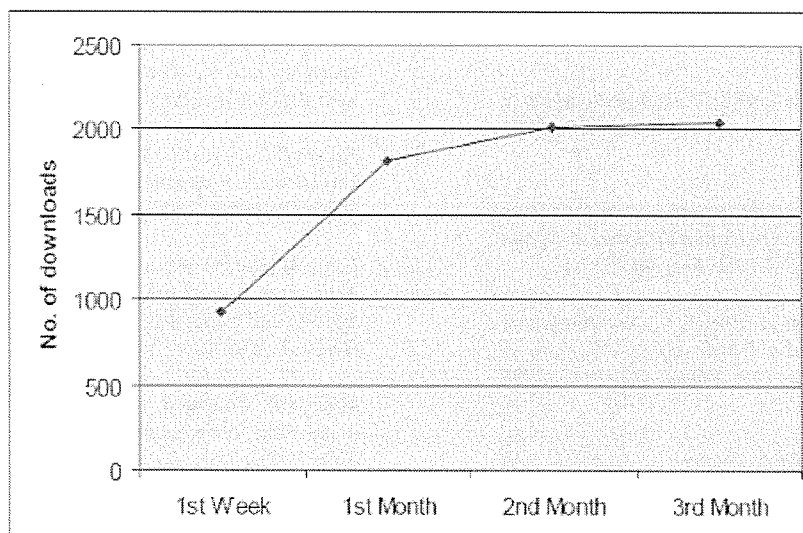


Fig 2. KKH Woman&Child HealthPedia – Some Mobile App Features



KKH iPhone App (Woman&Child HealthPedia) – No. of downloads

Fig 3. KKH Woman&Child HealthPedia – No. of downloads since launched in May 2011

## DISCUSSION

While it is satisfying to see many expecting mum's utilising this application, a word of caution seems to be in order. Information found in medical applications such as this one should be in no way a substitute for real life clinician care. Ultimately, it is an adjunct and supplement to patient information, never a replacement for the real deal<sup>12</sup>.

The world of apps is growing. Apple is but one example of an organization that is likely continue to grow rapidly. A decade ago, a share in the company would have cost \$12.50. On the 13th of Feb this year that same share was worth \$502.60. There is tremendous capacity for growth and expansion in the field of mobile technology.

Future developments include increasing the accessibility and reach of this application by launching it across other platforms such as the Android and

Symbian platforms. We endeavor to keep the application medically relevant by continuing to provide up to date information on a regular basis. Other potential areas for improvement include making the application more user friendly by including diagrams, pictures, a personalized electronic journal whereby expecting mothers can input data about their pregnancy into the application and connect to other expectant mothers via a mobile forum. The content of the application can also be expanded gradually to include other aspects of Women's Health, popular gynecological related subjects and even Children's Health in time to come.

It is an exciting area full of promise and potential. The KKH Woman&Child HealthPedia is the first iPhone pregnancy application produced by an institution (KKH) in the region. We hope that this new start would encourage and inspire medical practitioners and health care workers in other fields of medicine to do the same and take a step forward towards mobile patient education.

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