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A Study of Women Reminded by Short Message Service for Elective Gynaecological Surgery: A Randomized Controlled Trial

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In partial fulfilment of the requirements for the

Master of Medicine in Speciality

Obstetrics and Gynaecology

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Declaration

I, Dr Johannes Frederik Andries Potgieter, hereby declare that this dissertation is my own work. It is being submitted to the University of Witwatersrand in partial fulfilment of requirement for Masters of Medicine in Obstetrics and Gynaecology.



Dr JFA Potgieter

Signed on 3rd November 2013

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ABSTRACT

Background:

Wireless communicating networks are becoming more and more utilized. By using Short Message Service (SMS) via mobile phones, patients can be contacted regarding blood results, follow-up appointments and reminders for chronic medication.In this study the use of SMS was put to the test in South Africa, a middle income country.

Objectives:

1. To evaluate whether there is better compliance in patients who received a SMS, reminding them of the date of elective surgery, as opposed to patients who did not receive a reminder SMS.
2. To describe demographic and clinical information of women who are booked forelective gynaecological surgery at Chris Hani Baragwanath Academic Hospital

Methods:

This study was undertaken at Chris Hani Baragwanath Academic Hospital, which offers a gynaecological elective surgery list on every working day.As with any busy hospital, it is not uncommon for women to wait lengthy periods of time for their surgery Participants were recruited and followed-up between 30th May 2011 and 14th of December 2011. Eligible criteria included all women scheduled to undergo surgery with a waiting list of at least one month. Women who did not have mobile phones and women who objected to receiving SMS

communications from the researcher on their mobile phones were excluded. Participants less than 18yrs, inability to read English SMS and refusal to participate in the trail were excluded. This was a double-blinded randomized controlled trial, which assessed the impact of a reminder SMS, in addition to the traditional methods of ensuring return for gynaecological surgery on patients remembering to avail themselves for surgery on their specific date. These numbers were randomized by block randomization into intervention group and control group. The Research Randomiser Form v4.0 program was used. Twenty nine patients were randomized to the intervention group who received a reminder SMS and 29 patients to the control group who did not receive the reminder SMS. Only patients with personal cell phones were included in the study. The participants as well as the researcher were blinded and only the supervisor knew who of the participants were randomised in either group.

Results:

A total of 58 patients were enrolled in this study. Participants included in the study were allocated numbers. The study showed that even though the shortest waiting period was < 2 months and the longest >5 months there was no significant difference in the number of patients that returned for surgery (53% versus 47%). Most of the patients in this study were African, unemployed and agesranged from 17 – 78 years. The primary reasons for their return in order of frequency were the presence of a mass (60%), pain (59%) and bleeding (36%). One of the major findings of this study was that older patients tended not to return for surgery. Surprisingly, patients who waited longer from the time of booking of surgery to the date of surgery, tended to return more frequently. The main reasons for not returning were that patients did not have money for transport and four patients were unreachable and hence lost to follow-up.

Conclusion:

This study failed to show that reminders by SMS for elective gynaecological surgery are effective. It also demonstrated that older women were more likely not to return for surgery. Perhaps their ability to read or respond to SMS is more limited than younger women. The other significant finding of this study contrary to expectation is that longer waiting periods seemed to encourage a better return rate.

Recommendations:

A larger sample size of a more heterogeneous population may produce more statistically significant results. A larger randomized controlled trial can be conducted using more hospitals.

Trial registration number:

International Randomised Controlled Trials Register. Date assigned: 29/07/2011. Number identification: ISRCTN66279562

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The funding for ISRCTN was provided by The Department of Obstetrics and Gynaecology Syndicate at Chris Hani Baragwanath Academic Hospital. The other costs involved were covered by the researcher.

1. INTRODUCTION

With the introduction of wireless communication networks via cellular phones, means of communication has exceeded many boundaries. The use of cellular phones has become part of day-to-day living. By using the Short Message Service (SMS) via a cellular phone network, patients can be given their blood results, follow-up appointments and reminders of their chronic medication.

Little research has been done in South Africa with regards to reminding patients about appointments usingSMS. In this study, SMS was used to remind patients about their appointment for gynaecological surgery. With the SMS system in place, it is now possible to communicate with patients without their having to use extra money for transport to the hospital or take time off from work, which can result in unpaid leave. This type of long distance communication implies fewer burdens on family's finances.

It is not uncommon for patients in the public service not to arrive for their surgery on the planned date, resulting in valuable theatre time wasted in a setting where this resource is in high demand. This non-return of patients may be due various factors, i.e. the patient may have:

- had surgery elsewhere
- forgotten her date of return
- demised while waiting for surgery
- changed her mind regarding the operation
- not come due to family commitments

1.1 SMS does improve patient compliance

Koshy et al performed an observational study in the United Kingdom in 2006. The primary aim of this study was to determine whether SMS reminders for appointments at an Ophthalmology Clinic, situated at Baris and London Hospital, would lower the number of missed appointments. From April to December, 9959 ophthalmology appointments were booked. The intervention group consisted of 443 patients who each received a reminder SMS. The rest of the patients (9512) were enrolled in the control group and did not receive a reminder SMS.[1]

The patients received a reminder SMS one day before the appointment if the appointment was booked within a week. If the appointment was booked with a time interval longer than a week, the patient received a SMS 4 days before the appointment. This would give the patient adequate time to rebook if the date would be missed. The non-attendance rate in the intervention group was 11.2% (50/447) and in the control group, 18.1% (1750/9512). The final conclusion in this study was that missed appointments were 38% lower for patients reminded by SMS compared to those patients who were not reminded at all. [1]

During 2004, Downer et al in Australia at the Royal Children's Hospital in Melbourne found that SMS improved compliance. A cohort study with a historical control was performed. The trial group consisted of 22 658 patients who were recruited during October to December. All participants received a reminder SMS one day before the appointment. The historical control group were collected from October to December of the previous year and consisted of 22 452 patients. The results of return within the trial group showed 90.2% (20448/22658), compared to the control group of 80.5% (18073/22452). The number of patients who missed their appointments in the trial group was less than the control group (9.8% versus19.5%, $P<0.001$).[2]

Leong et al performed a randomized controlled trial on the use of text messaging to improve patient attendance at a primary health care clinic. A total of 993 participants were divided into three arms: a control group (n=335), a text messaging group (n=329) and a mobile phone call reminder group (n=329). Return rates for each group were as follows: control 48.1%, text messaging 59% and mobile phone call reminder 59.6% (odds ratio 1.59, 95% confidence interval 1.17-2.17, P=0.005). No statistically significant difference was found in return between participants who received a reminder text message or those who were reminded with a phone call. The cost of sending a text message was also lower than making a call to a mobile phone. The final result showed SMS reminders are effective and also less costly in reminding patients of appointments.[3]

At The National Children's Hospital in Dublin, Ireland, Geraghty et al did a retrospective review on the effect of SMS reminders on patient attendance at an ENT Outpatient Clinic. In August 2003, a SMS reminder system was installed. Patient files from August 2000 to

August 2006 were taken and participants were divided into 2 groups. The SMS reminder group had 3 981 patients with the mean non-return rate of 22% (range 21.9-22.2%) and the control group consisted of 4 985 patients with the mean non-return rate of 33.6% (range 32.1-34%) ($P<0.001$). The retrospective study showed SMS reminders to be effective in decreasing non-attendance at the outpatient ENT Clinic.[4]

Downer et al performed another cohort study with a historical control at The Royal Children's Hospital in Melbourne, Victoria. Different outpatient clinics were utilized: Dermatology, Gastro-enterology, General Medicine, Paediatric Dentistry and Plastic Surgery. During the month of September 2004, 2 151 participants made appointments to attend these clinics. One thousand three hundred and eighty two (64.2%) provided the clinic with a mobile contact number and received a reminder SMS three days before the appointment. These participants consisted of the trial group.[5]

The historical control group were participants scheduled to attend the clinics in August 2004. The control group consisted of 2 276 participants and 1 482 (65.1%) provided the clinic with a mobile telephone number. Participants were excluded from the trial if they did not provide a mobile number. The non-attendance rate between different clinics was 12-16% for the trial group and 19-39% for the control group. The non-attendance rate between the 5 clinics was 14.2% (trial group) and 23.4% (control group). The author concluded that SMS reminders reduced non-attendance at The Royal Children's Hospital. SMS-reminders may also be economical due to the relative low cost of sending bulk SMS-reminders.[5]

In October 2007, at the Department of Paediatric Dentistry in Edinburgh, Scotland, another study was undertaken to evaluate the effectiveness of text message reminders on patient attendance. The intervention group were elected from appointments made for October 2007. The intervention group received a SMS 24 hours before the appointment. A historical control group were selected from October 2006. Results showed 276 attendances (Female:146; Male:130) in the historical control group and 433 (F:228; M:205) attendances in the intervention group. In total 10.4% of the SMS intervention group and 23.9% of the historical control group did not attend. Text messages on a mobile phone can serve as a reminder and reduce missed appointments.[6]

According to Car et al, non-attendance at outpatient clinics in England results in large financial burden on National Health Service. Resources and time are wasted and patients need to be re-booked and this could lead to a large non-attendance cycle. One of the main reasons for non-attendance seems to be poor communication. There is a need for good evidence based research to prove that SMS-reminders are effective. SMS shows to be promising since it is instant, simple and less costly.[7]

During 2010, in Switzerland at the Geneva University Hospital, a study about reminding patients of appointments for clinic visits was done. The aim of this study was to assess the efficacy of repeated reminders on patients attending the primary care and HIV clinics. Reminders followed in sequence. Firstly, a phone call to the patient was made. If there was no answer, a SMS was sent. If there was no reply to the SMS or mobile phone, a postal reminder was sent to the postal address. Results showed a decrease in missed appointments

by 7.8% in the study group and 11.4% in the control group. Twenty-eight per cent of appointments were rescheduled for other eligible patients who could attend the clinic.[8]

With non-attendance, patient care is interrupted which can lead to higher morbidity. Da Costa et al studied the effect of appointment reminders sent in the form of SMS to the cell phones of participants. Over 29 000 appointments were made between 1 July 2007 and 31 May 2008 within four different outpatient clinics in São Paulo, Brazil. Seven thousand eight hundred and ninety (7 890) participants received a reminder SMS 24 hours before the appointment. Missed appointments dropped between the four outpatient clinics, 0.82% (P=0.590), 3.55% (P=0.009), 5.75% (P=0.022) and 14.49% (P<0.001). The mean "reduction rate of non-attendance" was 6.15%. A SMS reminder is both cost effective and decreases missed appointments effectively.[9]

In the UK, a study was conducted to assess the influence of SMS reminders on non-attendance of patients at out-patient clinics at a paediatric hospital in Glasgow. The sample studied consisted of all appointments scheduled in August and September 2004 which added up to 16 400 appointments. For 16.1% of these appointments SMS reminders were sent. The results proved that SMS-reminders did indeed reduce non-attendance, but at a minimal rate of 0.2-3.4%.[10]

The author also calculated from the results that the cost incurred to avoid one missed appointment equalled the cost of 50 SMS-reminders sent, which was £7.50. This showed to be more cost-effective and faster than other forms of communication, e.g. sending letters to

remind patients. It was concluded that although SMS-reminders showed to have only a modest positive influence on wasted appointments, the cost-effectiveness and speed of this way of communication still makes it the better choice for reminding patients of appointments.[10]

According to the Cochrane Library review published in 2012, Carr et al did a major review specifically on SMS with mobile phones and the effect on missed appointments. One of the major reasons for non-return is the inability of the patient to remember the appointment. It was thought that reminding patients would decrease this problem. Different forms of reminders exist, e.g.reminding in person, letters via postal service, phone calls via land lines and SMS via mobile phones. SMS and Multimedia Message Service (MMS) are less costly and possible effective ways of reminding patients.[11]

According to Carr et al, The Cochrane Central Register of Controlled Trials (Central The Cochrane Library 2009, Issue 2), Medline, EMBASE, PsycINFO, CINAHL, LILACS and African Health Anthology (all from January 1993 to June 2009) was searched. Carr also reviewed "grey literature", those researchand reports that are difficult to find because they are not generally published in well-known journals.[11]

The type of research included were randomized controlled trials (RCT), quasi-randomized controlled trials (QRCT), controlled before and after studies (CBA) and interrupted time series (ITS). Trials not evaluating the effect of SMS and/or MMS on mobile phones as well as call to mobile phones and postal letters compared to SMS/MMS were excluded. [11]

From all the studies reviewed, only four RCT's were included with 3 547 patients. The main authors included Cheng 2008, Fairhurst 2008, Koury and Leong 2006. SMS reminders improved return of patients to clinics compared to patients who were not reminded at all (RR 1.10, 95%, CI 1.03-1.17) and also when compared to those reminded by postal letters (RR 1.10, 95%, CI 1.02-1.19). SMS reminders and phone calls to mobile phones had the same effect on missed appointments (RR 0.99, 95%, CI 0.95-1.03).[11]

Finally, Carr et al found evidence to show that SMS reminders improve the return of patients. SMS reminders together with postal letters are more effective than postal letters alone. A call to a mobile phone could be as effective as SMS. More research is needed on SMS reminders for scheduled dates and times at health care facilities because the current research is not of a high quality.[11]

1.2 Telemedicine as part of health care for the future

Telemedicine is that division of medicine that provides health care to patients who arefar from hospitals and clinics. This technology allows the health care worker to assess, diagnose and treat a patient over a long distance. Telemedicine is useful for people staying in remote communities and villages.Three forms of telemedicine exist:

Real-Time Telemedicine:

This involves basic telecommunication discussions to complex robotic surgery. Both parties, e.g. the doctor and the patient, needs to be present. Interaction takes place in real-time. Video-conferencing is closely related to telemedicine.

Store-and-Forward Telemedicine:

Medical data, for example a type of skin rash, can be transmitted to a doctor or medical specialist, which can be viewed in the practitioner's own time. The healthcare provider does not need to be online.

Remote Monitoring:

A patient can be monitored from the comfort of his home via the wireless communication network, i.e. patient sends blood pressure readings through to the healthcare worker via SMS. This technique is especially useful for monitoring chronic diseases.[12]

Other forms of telemedicine exist:

Telepharmacy provides pharmaceutical advice and counselling to patients in remote locations, including drug therapy monitoring. Telerehabilitation provides rehabilitation to patients who are unable to travel to the clinic. This is beneficial in cases of disability and high cost of travelling. Telecardiology involves ECG's sent via a wireless network to the cardiologist for interpretation and advice. In Telepsychiatry, videoconferencing is used for patients who need Cognitive Behavioural Therapy. Teleradiology images, live ultrasound,

CT-and MRI-scans can be sent via broadband. Telepathology includes histopathological tissue diagnoses from images sent via wireless communication network. Other examples of specialities in telemedicine includeTeledermatology, Teledentistry and Teleaudiology. [13]

1.3 Telemedicine has proven to be an effective technique globally

In Madrid, Spain, a prospective randomized interventional study was performed on patients with gestational diabetes. A telemedicine system was used comprising of the Internet and SMS.The aim of the study was to improve communication between the patient and the professional. In the past, only traditional face-to-face visits were used to monitor patients. One hundred patients were enrolled and 97 completed the study. The women were randomized into a telemedicine group (49) and a control group (48). The women in the telemedicine group received a gluco meter with a mobile phone. The mobile phone received data via infrared from the gluco meter. The data was sent via SMS to a database for interpretation by a diabetic team. In the group using the telemedicine system, there were fewer needless face-to-face visits(62%) compared to the control group (87.2%). Thus, technology can be used to monitor patients and face-to-face visits are not always necessary.[14]

An SMS can be sent to one or more mobile phones at a time. The sender of the SMS is able to determine if his or her message has been delivered to the recipient by delivery reports.

A systemic review done in Columbia in May 2008 assessed the impact of cell phone communication on patients suffering from diabetes and obesity. A search was done on Medline (1966-2007).Twenty articles containing 18 studies were found describing the use of cell phones to provide health information to diabetic and obese patients. Thirteen of the eighteen studies assessed health outcomes and the other 5 assessed processes of care. The studies that measured HbA1c showed improvement for those who received education and care. These studies done on the impact of cell phones did prove to improve the outcome of diabetes and morbidity associated with obesity.[15]

By late 2005, 98.6% of the population in Taiwan were using mobile phones for communication. During 2005-2006 a study was done in Taiwan to evaluate the effectiveness of SMS in decreasing anxiety levels of women obtaining maternal blood screening for Down's syndrome. With a single SMS, patients could be informed about the status of blood results, thus decreasing anxiety and avoiding the long wait till the next follow-up appointment.[16]

Since mobile phones are available and used globally, theyare especially important in areas of limited resources. In Kenya the use of cellular phones has increased to over 60% and Africa carries the highest number of new mobile phone users. In Nairobi, Kenya, a study was done to determine whether SMS would help remind HIV positive patients to adhere to the anti-retroviral (ARV) program and therefore increase quality of life and decrease resistance to ARV's. The results showed that reminding patients does give positive results. The primary outcome revealed that adherence at 12 months was more than 95% and suppression of viral load was≤400 copies/ml. Patients had better adherence to the anti-retroviral therapy

programwhen reminded by SMS. The study showed that health as well as quality of life had improved.[17]The World Health Organisation has made it a priority to use newer telecommunications in areas of lower resources to improve health care.[18]

1.4 Is reminding by SMS always the answer?

There are setbacks to the use of telemedicine. Hou et al performed a randomized controlled trial using daily text-message reminders to improve compliance with oral contraceptives. Eighty-two women with a mean age of 22 years were randomly assigned. The mean number of missed pills per cycle did not show much difference between the intervention and control groups: 4.9 ± 3.0 for the text-message group and 4.6 ± 3.5 for the control group (P= 0.60). There were more missed pills per cycle during the course of the study, but no major difference between the two groups. Thus, daily reminders by SMS did not improve compliance.[19]

Marquez Contreras et al performed a randomized controlled trial in Spain. They used SMS reminders to improve compliance withanti-hypertensive medication. A total of 64 individuals were recruited: thirty four participants were recruited to the intervention group and 33 participants to the control group. Therate of compliance in the control group was higher at 85.1% compared to the intervention group of 84.4%. The final outcome showed that telephonic SMS reminders did not improve compliance with anti-hypertensive medication.[20]

One could argue that the sample sizes of both of these studies were too small and not an adequate representation of the population of hypertension, bearing in mind that hypertension is a frequently occurring condition. Clearly more research is needed in the field of SMS reminders to patients.

Hasvold and Wootton did a systematic review in which telephonicreminders were used to lower the non-attendance rate in hospital appointments in North Norway. Two types of reminders were used:manual phone calls and automated SMS.Manual reminders decreased the non-attendance rate by 39% and automated reminders by 29%. Thus, a reminder by a health care worker seemed to be more successful than an automated SMS reminder by a computer. [21]

1.5 Disadvantages of SMS

- It is possible to break confidentiality between the health care worker and the patient.
- It could become quite impersonal and discourage personal communication as it lacks physical proximity.
- A message sent by SMS could be misleading and cause the patient to panic if read and understood incorrectly.
- At times there could be a delay in receiving the SMS by the client due to logistical reasons, for example breakdown of wireless network and patients may receive the

message later than intended. The patient may travel through a geographical area where there is no wireless network coverage and does not receive the message.

- Patients might lose their cell phone by misplacement or theft and not receive important information.
- At times the cell phone may go off the network due to a flat battery and the patient may only receive an important message once cell phone has been charged.

1.6 Advantages of SMS

- This is a quick delivery of important information.
- Construction of a mobile network is much faster than installing fixed telephone lines.[22]
- If used correctly, it could decrease anxiety and deliver valuable results to the patient.
- A cell phone is almost always at hand, thus messages are always available to the user.
- It allows direct contact with the health care worker and, if by prior arrangement, availability for 24 hours a day.
- With most cell phone packages or "pay as you go" systems, airtime is not needed to receive aSMS.
- No funds are needed to send a "please call me" to a health care worker if the patient runs out of airtime.

1.7 SMS messages should betailor-made to fit the recipient

Indealing with stigma related diseases like HIV, patients could be reminded by SMS to take their medication in cases of poor adherence.Curioso et al used 24 HIV-positive patients in their study. They remindedHIV-positive individuals to take their anti-retroviral medicine regularly. Words like HIV or antiretroviral would not be used as wording in the SMS because of the sensitive nature of the disease. There is always the possibility that confidential information can be read by an unwanted recipient. To prevent this one could use a code-system which is familiar to the patient. An example of SMS used in this study was "This is the time of your life…" and it meant "nowit is time to take your medicine."[23]

Norman described that all reminder messages have two important considerations: firstly, the signal or notification aspect (something has to be remembered) and secondly, the insight of the message (what has to be remembered).[24]The signal aspect of Curioso's study pointed out that text messages are preferred to voicemail messages. Text messages are easier to obtain than trying to listen to a recorded message which could sometimes not be heard properly. The insight to the message is related to the characteristics of the message. Patients can feel that someone cares and can be motivated to take their medicine.A message that is short and to the point is valued more than long phrases. [23]

The last findings of Curioso's study that are of importance are "anthropomorphic features". Humans are emotional beings. No message is read without causing an emotion. Thus,certain

individuals start to see their received reminders as a “friend” or “helping hand”. A long-term relationship could be initiated with the repetitive reminders over a period of time.[23]

The characteristics of a text message can determine whether or not it is accepted by the recipient and ifit would have an effect. Gold et al used SMS to remind young people about the importance of sexual health. This topic is ofa sensitive nature and thus SMS is ideal for health promotion. Some of the characteristics of importance hereinclude message style, language and broadcasting times.[25]

Message style entailshumour and rhyming and attracts more attention to the message. Message length is important, as long messages might be more difficult to remember and tend to be boring. When leaving one’s name at the end of a message, makes the message more trustworthy and professional. The language used could be formal as well as informal. Younger generation readers prefer informal messages.Broadcasting times would imply that the reader receives a message at an appropriate time of the day or week, for example promoting sexual health via SMS on Fridays.[25]

1.8Text messaging can be used as a tool in research

Previously,data was collected from populations by means of paper questionnaires. Nowadays cell phones seem to be a better methodbecause of their widespread use. It is also more environmentallyfriendly. Haller et al performed a randomized controlled trial using text

messaging in primary research. Some patients received a SMS about overall satisfaction after consultation in medical practiceand others would get a response card to fill in. Text messaging responses were not significantly lower than card responses. Thus text messaging is generally accepted as a way of responding to research questions.[26]

Two important points made by Haller et al are that mobile phones used close to medical equipment, especially less than one metre away, may cause interference. The correct location of the researcher in practice is important. Secondly, due to constant improvement in technology of medical equipment, electromagnetic fields of a cell phone are likely to be of less concern in the future.[26]

1.9Waiting for elective gynaecological surgery

Waiting times for elective surgery differs between institutions due to various reasons. At our institution the reasons are mainly service delivery demands and unforeseen logistical problems like power outages, which results in cases being postponed. Cases are prioritized according to urgency especially with respect to oncology patients. In March 2008, the Society of Obstetricians and Gynaecologists of Canada (SOGC) published a policy statement on waiting times in obstetrics and gynaecology. The purpose was to create a standard time for each individual procedure or problem.It was important to define what would be acceptable by the majority of patients. Waiting times for surgery are a significant problem worldwide. Other factors that may affect elective surgery are theatre facilities and

equipmentshortage specific for gynaecological procedures, qualified surgeons and available post-operative theatre beds.[27]

1.10 Society of Obstetricians and Gynaecology of Canada (SOGC)

Referral to a gynaecologist:

If a woman is referred from a primary care facility with abnormal uterine bleeding or a prolapse, she must be seen by a gynaecologist within a 12 week period.

Surgery for conditions of the uterus and adnexa that is non-malignant:

If conservative therapy has been unsuccessful and a decision was made to perform surgery, it should be done within a 12 week period.

Surgery for prolapse:

If advanced uterine prolapse present and conservative treatment has failed, a hysterectomy and pelvic floor surgery should be performed within 12-24 weeks.

Gynaecological malignancy:

Referral for pre-invasive disease by a primary care facility, e.g. abnormal Pap smear of the cervix, vagina and vulva must be triaged and seen within 2-4 weeks.

Referral for invasive disease:

These women should be seen within 2 weeks by a gynaecologist or gynaecologic oncologist.

Treatment for gynaecological malignancies:

A time scale, noting the time from decision to surgery to actual operation was invented:

Priority 0:Immediate

Oncology emergencies (airway obstruction and bleeding, etc.)

Priority 1: 2 weeks

Fast growing tumours.

Priority 2:4 weeks

These include invasive cancers which do not fall in priority 1 and 3.

Priority 3:12weeks

Patients with slow growing tumours.

Treatment for urogynaecological problems:

Referral for incontinence:

If a woman is referred from a primary health care provider, she should be assessed by a specialist within a 12 to 24 week period. In the event of conservative treatment failure, surgery should be performed within a 12 week period.[27]

Another point stressed by the SOCG is the effect of waiting for surgery on women, specifically those with abnormal pap smears showing precancerous lesions of the cervix and invasive cancer.[27]

Long waiting times causes significant emotional stress and increases morbidity and mortality. In 2007, Dietsch and Davies argued the effects of waiting time on women, referred to as the "noncebo" effect. This would include the "iatrogenic, unintended harmful consequences" of waiting for surgery.[28]

It is interesting to note what happens to women who are on a long waiting list for sterilization.In April 1991, Arntzen and Skjeldestadfoundthatat the University Hospital of Trondheim,Norway, the waiting time for sterilization was greater than two years. The following consequences were noted from 687 women that were questioned: 22 women fell pregnant, 15 underwent induced abortion and most women fell pregnant within the first year of waiting. It wassuggested that sterilizations be prioritized to decrease the waiting time to less than three months.[29]

Oudhoff et al performed a study to gain more understanding about the effect of waiting for elective surgery on quality of life pre and post-surgery. Concerning the waiting group, the perception of general health seemed to be worse: decreased quality of life and increased anxiety levels. Post-operatively, all these problems seemed to improve ($p<0.05$). Anxiety is better tolerated if the waiting period is known to the patient.[30]

1.11 Null Hypothesis

In this study the researcher would like to show a difference in the return of patients for gynaecological surgery.We hypothesise that women who receive an SMS reminder are more likely to return for surgery than those that do not receive a reminder SMS.

By conducting this study, the researcher would like to show an innovation in improving patient compliance by using telemedicine in a middle income country. This proposed study is innovative since this type of study has not been done on gynaecological patients in South Africa.

1.12 Objectives

1. To evaluate whether there is better patient compliance in patients who received a SMS reminder of the date for their elective surgery as opposed to the patients who did not receive a reminder SMS.

2. To describe demographic and clinical information of women who are booked for elective gynaecological surgery.

2.METHODS

2.1 Setting

This study was done at a major teaching hospital, Chris Hani Baragwanath Academic Hospital, associated with the University of the Witwatersrand in Johannesburg. Chris Hani Baragwanath Academic Hospital functions as a referral centre for gynaecological surgery and has elective theatre lists that are allocated to four clinical units on different days. There are significant waiting times from the booking of the operation to the date of surgery at this hospital.

The procedure for elective gynaecological surgery at Chris Hani Baragwanath is as follows:

1. Traditionally patient'sdetails are entered into a gynaecological elective surgery book.
2. They are then expected to return to hospital on a date preceding the actual day of surgery. This gives the gynaecological unit enough time to prepare patients for surgery, i.e. taking bloods for testing, performing x-rays and obtaining results of Pap smears and other investigations.

3. In the past, and presently, only the elective surgery booking book has been used. A note used to be made in the patient's outpatient file informing them of the date of surgery and the nature of the operation. However, due to medico-legal purposes, these files have to be handed back to the hospital clerks when the patient leaves.
4. An appointment card with the relevant details is then given to the patient instead.

2.2Study design

This was a double-blinded randomized controlled trial, comparing the use of a reminder SMS in addition to the traditional methods of ensuring return for gynaecological surgery. Patients reminded by SMS comprisedthe intervention group. The control group consisted of patients followed up according to the traditional method.

2.3 Study population and sampling

The study population included all women scheduled to undergo surgery with a waiting list of at least one month. Women who did not have mobile phones and women who objected to receiving SMS communications from the researcher on their mobile phones were excluded. Other exclusions were women less than 18 years of age, inability to comprehend English SMS and refusal to participate in the trial. Sampling was done in the gynaecological outpatient department (GOPD) when the researcher was on duty or when he was available.

In order to calculate the sample size, we assumed that the reminder SMS would increase the rate of return for surgery from 50% to 85%.Thus, for a power of 80% and a p-value of 0.05 for statistical significance, a sample size of 66 participants was needed.

2.4Recruitment of participants and baseline data collection

After providing the necessary information to eligible women and obtaining informed consent, the researcher completed a data sheet on essential demographic and clinical information. Data collected for each woman included age, parity, marital status, educational level, type of dwelling, employment status, reason for attending GOPD, date of booking the surgery, and type of operation to be performed. The participant was told that she would receive SMS communication from the researcher, in addition to the traditional method used. The researcher was not specific about what kind of SMS would be sent, in keeping with the single-blinding of the participant, which was explained during the informed consent process.The researcher ensured that the participant received the usual return-date information that was given to all women booked for gynaecological surgery in the department.

Between 48 and 72 hours after recruitment, the researcher sent all participants an SMS confirming that they had been booked for gynaecological surgery, with the return-date and date of operation. Up to that point, neither the participants, nor the researcher knew who has been allocated to the intervention group or the control group of the study.

2.5Randomization and intervention

Women recruited for the study were allocated numbers after they had been recruited. These numbers were randomized by block randomization after recruitment,into intervention and control groups in blocks of five, to ensure a more-or-less equal spread of intervention and control participants. The random numbers were generated by a random number computer program: Research Randomizer Form v4.0. This was done by the supervisor.

The numbers were issued to the researcher by e-mail/SMS. The supervisor was not involved with the recruitment of subjects for the study. The researcher then knew which of the participants were to receive a reminder SMS (intervention group). Between 48 and 72 hours before the expected date of arrival to hospital for surgery, the intervention group received an SMS from the researcher reminding them of the return date for operation. The reminder SMS read as follows: "Dear Patient. Kindly be reminded of your admission for operation at Chris Hani Baragwanath Academic Hospital on (date). Please report to gynaecology outpatients department at 8 o'clock. Regards, Dr Potgieter". All the SMS messages had the same basic content and only the date and time would be different. The delivery reports on the cell phone of the researcher showed that the participant received the message but it is uncertain if the message was read.

2.6 Outcome measure

At, or just after the expected day of return for surgery for each participant (in both intervention and control groups), the researcher checked the gynaecological wards to see if the participant had returned for surgery. This was the primary outcome measure and there was no need for any contact with the researcher, other than a courteous visit to thank the participant for taking part in the trial. The researcher contacted participants who did not return for surgery, to find out why they did not return to the hospital for surgery. Any other telephonic contact regarding the gynaecological surgery or the study was noted in the data sheet.

2.7Data management and analysis

Data management was done using STATA11 software. Quantitative demographic and clinical information was expressed using frequencies with percentages, means with standard deviations, or medians with ranges. The Student's T-test and Wilcoxon Rank Sum Testwas used to compare the intervention and control groups in terms of frequencies of return to hospital for surgery. A p-value of < 0.05 was considered to be statistically significant.

2.8Tool

The researcher used his personal mobile phone: Nokia 6730 Classic.

2.9Ethics:

Ethics permission was granted from the Human Research Ethics Committee (Medical) of the University of the Witwatersrand. Reference number: M110317.The hospital authority of Chris Hani Baragwanath Academic Hospital also granted permission to perform the study.

2.10Consent:

All participants gave written consent once they decided to participate in the study.

2.11ISRCTN Registration

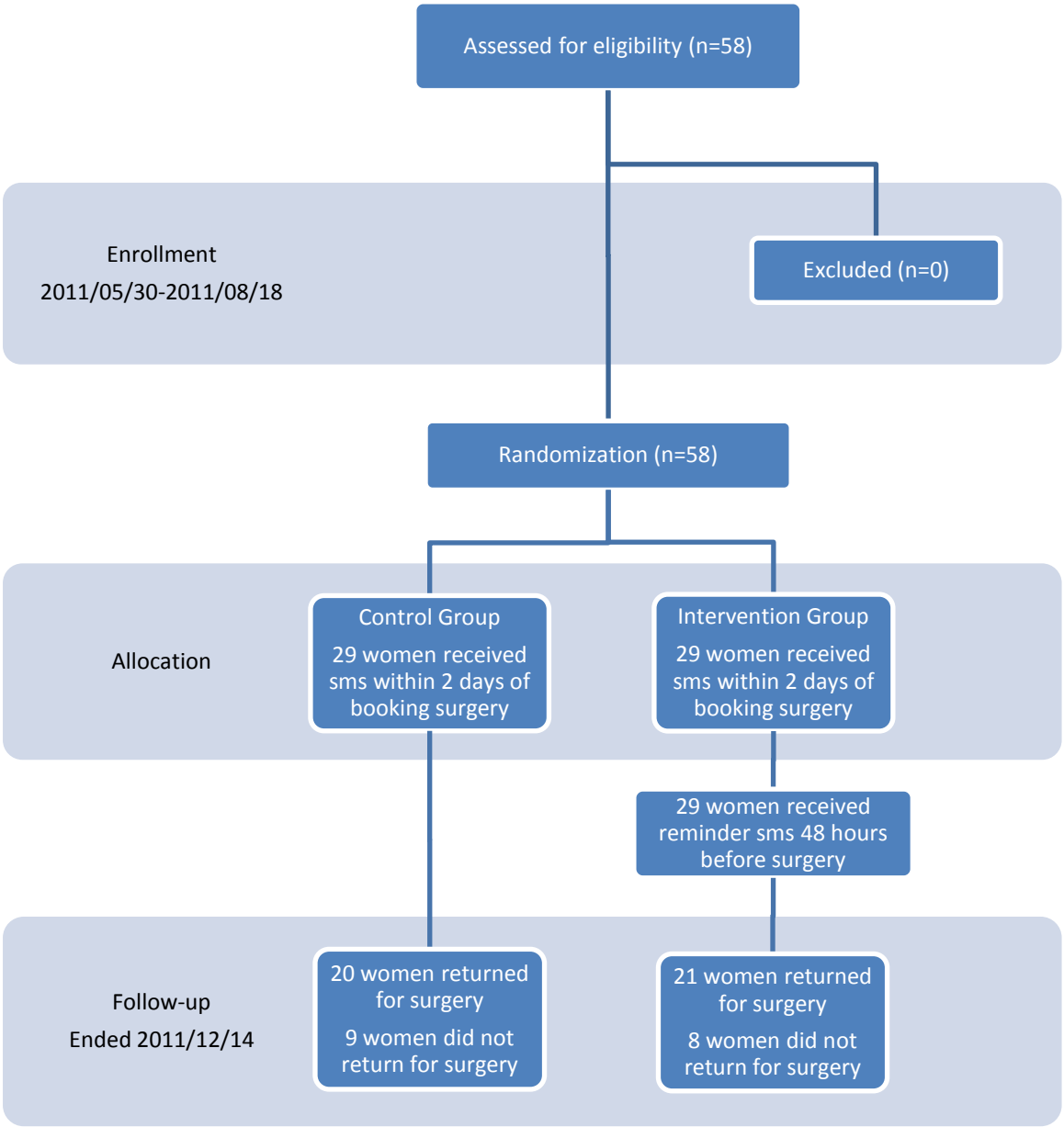
This study has been registered on the International Randomised Controlled Trials Register. Date assigned: 29/07/2011. Number identification: ISRCTN66279562. The protocol can be accessed @: http:www.controlled- trials.com/ISRCTN66279562/

Funding:

The funding of the ISRCTN was provided by the Department of Obstetrics and Gynaecology Syndicate at Chris Hani Baragwanath Hospital. The rest of the costs were covered by the researcher.

3.RESULTS

Figure 1: A flow diagram demonstrating the randomization of patients for this study



3.1 Descriptive and Analytical Results

Table 1: Demographic characteristics of women booked for elective gynaecological surgery.

		All participants (n=58)	Intervention Group (n=29	Control Group (n=29)	P-value
Mean age in years		41.4 ± 14.0 (Range: 18-78)	39.9 ± 13.4	42.9 ± 14.6	0.41
Race	African	54 (93%)	29 (100%)	25 (86%)	0.11
	Coloured	4 (7%)	0 (0%)	4 (14%)	
Education Level	Primary School	14 (24%)	6 (21%)	8 (28%)	0.10
	High School	26 (45%)	17 (59%)	9 (31%)	
	Completed High School (Matric)	18 (31%)	6 (21%)	12 (41%)	
Employment	Employed	12 (21%)	9 (31%)	3 (10%)	0.10
	Unemployed	46 (79%)	20 (69%)	26 (90%)	
Marital Status	Married	24 (41%)	11 (38%)	13 (45%)	0.79
	Single	34 (59%)	18 (62%)	16 (55%)	

In this study, most patients (93%) that were booked for gynaecological elective surgery were African. The majority of the patients did not finish matric. Most of the patients were unemployed and (59%) were single at the time of the study.

The control group had older patients. All coloured patients were in the control group. The intervention group had a higher number of participants in High School, but had fewer candidates who completed matric. The intervention group had more single patients compared to the control group.

Table 2: Comparison of the symptoms of the patients in the intervention group and the control group and the number of patients undergoing major and minor surgery. The interval in months from date of booking for surgery until admission is also noted.

		Intervention Group (n=29)	Control Group (n=29)	P-value
Bleeding		9 (31%)	12 (41%)	0.59
Pain		20 (69%)	14 (48%)	0.18
Mass		17 (59%)	18 (62%)	1.00
Surgery	Major Surgery	19 (65%)	21 (72%)	0.78
	Minor Surgery	10 (35%)	8 (28%)	
Interval (Mean ± SD in months)		3.7 ± 1.4	3.2 ± 1.2	0.13

Overall, the main complaint was the presence of a mass, followed by pain and bleeding. Other symptoms volunteered by the patients included itching of the vulva, pus draining from a Caesarean Section wound, missed periods, vulvar warts and inability to fall pregnant.

In the control group the presence of a mass and bleeding were the most common complaints. The control group had slightly more patients undergoing major surgery. The interval in months from booking to actual date of admission for surgery was shorter in the control group. In the intervention group, pain was the main complaint and waiting times for surgery was slightly longer. The intervention group had more patients booked for minor surgery.

The following definitions were created by the author for intentions and purposes of this study:

Major Surgery: surgery involving mainly the peritoneal cavity, i.e. total abdominal hysterectomy, myomectomy and exploratory laparotomy for an adnexal mass.

Minor Surgery: involvingthe extra-peritoneal cavity and genital tract surgery, i.e. cauterization of vulvar warts, diagnostic laparoscopy and removal of old caesarean section wound suture.

The majority of the patients enrolled in the study underwent major surgery. The most frequent procedures that patients were booked for were diagnostic laparoscopy and TAH/MFU.

Table 3: Main Results: A Comparison of the number of patients that did not return for surgery between the intervention group and the control group, as well as the reasons for not returning for surgery.

	Intervention Group (n=29)	Control Group (n=29)	P-Value
Did not return for surgery	8 (28%)	9 (31%)	1.00
Reasons for not returning for surgery*	Reason 3 x 1 (3.4%) Reason 4 x 2 (6.8%) Reason 5 x 1 (3.4%) Reason 9 x 2 (6.8%) Reason 10 x 1 (3.4%) Reason 11 x 1 (3.4%)	Reason 2 x 1 (3.4%) Reason 4 x 2 (6.8%) Reason 6 x 1 (3.4%) Reason 7 x 1 (3.4%) Reason 8 x 1 (3.4%) Reason 12 x 1 (3.4%) Reason 13 x 1 (3.4%) Reason 14 x 1 (3.4%)	N/A

***Reasons for not returning for surgery**	
Reason 1	Not Applicable
Reason 2	Patient presented to GP with heart failure
Reason 3	Patient had family commitments
Reason 4	Patient was contacted numerous times with no success/not answering voicemail
Reason 5	Patient decided against operation with help of her husband. Re-consultation was advised
Reason 6	Death in the family
Reason 7	Vaginal warts disappeared
Reason 8	Fear of the operation
Reason 9	No money for transport
Reason 10	Patient passed away due to complications of diabetes (2011/09/09)
Reason 11	Patient had a family crisis
Reason 12	Unable to attend operation due to tertiary education commitments
Reason 13	Patient forgot about appointment
Reason 14	Patient felt better and thought that operation was unnecessary

The control group showed a higher number of participants that did not return for surgery (one more than the intervention group). Both groups had 2 participants that were lost to follow-up. Money for transport seemed to be more of a problem in the intervention group. The participant who forgot about the operation was in the control group.

The majority of the patients did return for surgery, as opposed to the 17 out of 58 patients that did not return (29%).The patients with longer waiting times up to admission were more compliant compared to the patients with shorter waiting times.

Table 4: Demographic variables of the women who returned and the women who did not return for surgery.

		Did return (n=41)	Did not return (n=17)	P-Value
Age		38.5 ± 12.4	48.4 ± 15.4	0.01
Race	African	39 (95%)	15 (88%)	0.57
	Coloured	2 (5%)	2 (12%)	
Education	Primary School	8 (20%)	6 (35%)	0.26
	High School	18 (44%)	8 (47%)	
	Completed High School (Matric)	15 (36%)	3 (18%)	
Employment Status	Employed	10 (24%)	2 (12%)	0.48
	Unemployed	31 (76%)	15 (88%)	
Marital Status	Married	16 (39%)	8 (47%)	0.77
	Single	25 (61%)	9 (53%)	

Older patients did not return as frequent as younger patients. The group of patients who returned were higher educated at every level of education than those who did not. Women who were employed and single tended to return for surgery.

Table 5: Comparison of the main symptoms of the patients that did return for surgery versus the patients that did not return for surgery, as well as major and minor surgery. The interval in months from date booked for surgery until actual day of admission are also compared.

		Did return (n=41)	Did not return (n=17)	P-Value
Bleeding		26(63%)	11(65%)	1.0
Pain		17(41%)	7(41%)	1.0
Mass		16(39%)	7(41%)	1.0
Surgery	Major Surgery	30	10	0.35
	Minor Surgery	11	7	
Interval (Months)		3.6 ± 1.2	3.2 ± 1.4	0.39

Intervention Group
Control Group

There were fewer women with bleeding, pain and a mass that did not return for surgery compared to the group who did return.Most of the patients who did return for surgery underwent major surgery (52%). The interval in months for patients who arrived for surgery was longer(but not significantly so) compared to the group who did not arrive.

4. DISCUSSION

The primary outcome for this study was to see if reminding patients of appointments by SMS for booked elective gynaecological surgery would make a difference in compliance.However, the study showed that reminding patients of appointments did not make a significant impact. In the control group there was only one less patient that did not return for surgery, compared to the intervention group (20 versus 21). Thus no significant association were found between SMS reminders and better return for gynaecological surgery.

Various possible factors could have influencedthe results of this study. Patients who did not want to or could not wait for surgery may have looked for help at other health institutions. Some patients might have soughta second opinion from a traditional healer and decided not to have surgery.After consultation with family members, a participant might have changed their mind about proceeding with the surgery, as seen in this study.

Fear of the surgery could also be a valuable factor to consider, which highlights the importance of proper patient counselling for the procedure. It should be done in a language the patient understands and if necessary, an interpreter should be used.

Interpretation of the message by the participant is of importance as this could also lead to poor return for surgery.Althoughinability to comprehend English SMS were part of the

exclusion criteria, it may have been helpful to send the reminders in the patient's home language, for example Zulu or Sotho.

Most of the patients within this study were African. The group of patients that did return for surgery showed a higher level of education compared to the patients who did not. It was also clear that fewer of the patients who did not return for surgery had less bothersome clinical symptoms like bleeding, pain and masses.

The younger patients in need for major surgery tended to return. Older women were less compliant. It may be that younger patients are more comfortable with communication via SMS. The control group were also marginally older than the intervention group.

Sending the reminder SMS at an appropriate time could influence the effectiveness of the message. Gold et al highlighted the importance of this by reminding young people about sexual health on Fridays. [25]The reminders in this study were sent to the participants between 15:00 and 21:00. It may have been that the message did not reach some of the participants at a time that suited them best.

Other possible logistical problems that might have caused a participant not to receive the reminder in time may entail network problems, the cell phone may have been switched off or the battery may have run down.

The percentage of patients that returned for surgery, compared between the different intervals in months, showed interesting results. The longer the interval in months from the time of booking for surgery until the actual admission date, the larger the number of patients that arrived for surgery. Waiting times causes significant emotional stress to patients. Dietsch and Davies described the "noncebo" effect.[28] Patients could have been anxious about the long waiting time and made sure they returned for surgery. Also, while waiting for long period, patients may have suffered worsening symptoms and this would have insured compliance with surgery.

A pitfall of the SMS reminders was the inability of the researcher to see if the participant had read the message. The delivery reports on the cell phone of the researcher confirmed that the recipient had received the message. However, it could not be established if the participant actually read the message. To eliminate this problem in future, the participant could be asked to send a return SMS or a "missed call" to the researcher's cell phone. Other studies could remind patients to reply with Y/N to establish their commitment. By doing this other patients on the waiting list can be brought forward. This may lead to less wastage of theatre time.

Four of the patients were lost to follow-up and the researcher was unable to contact these participants. Their cell phones could have been lost or stolen and a second contact number could have been useful in this scenario.

Hou et al used daily SMS reminders, as mentioned before, but found no improvement in regular taking of oral contraceptives.[19]Equally, Marquez Contreras et al found no

improvement in compliance with patients taking hypertensive medication.[20] In both of these studies the sample sizes were small. One could argue that a bigger sample size in our study could have made a difference to the outcome. The limitation with recruiting patients for elective gynaecological surgery in this study was limited booking space. Chris Hani BaragwanathAcademic Hospital is a busy hospital. The Gynaecological Out-Patients Department (GOPD) sees approximately100 patients per day. The elective surgery booking books for 2011 had been already filled by mid-August up to December. Patients were not given dates at that time (in August) to return for surgery scheduled for 2012. Thus, no further bookings could be made. Due to time constraints only 58 patients were recruited. A larger study population for future studies may show different results.

All the patients in this study came from the same geographical area, i.e. Soweto and surroundings. In future studies, populations from other parts of the country could be recruited. Perhaps a more heterogeneous study sample may do away with cultural and traditional influences which could have played a role in the response to SMS reminders and return for surgery.

5.CONCLUSION

No significant difference was found between the intervention and control groups with regards to the return for booked elective gynaecological surgery.This finding refuted our hypothesis. It is possible that a larger sample size could make a difference in future studies. This study was done mostly on patients from Soweto. Generally, the majority of the patients were African, unemployed and single.Thus, a study with a more heterogeneous group of patients from different parts of Johannesburg would give a better varied sample.

Wireless communication networks are part of the future and are likely to remain in place. The advances in technology create the opportunity for more people to have access to mobile phones. If we are able to show the effectiveness in enhancing patient care in South Africa, a middle-income country, we would be able to improve the standard and quality of medical service provided.

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APPENDIX A

Patient Information and consent form

Hello. My name is Dr Potgieter. I am a doctor in this hospital. I work in different areas in the hospital including theatre and often many women do not come back for their operations. I am trying to speak to different women to find out why some women come for their operations and some do not.

By taking part in this study you will be helping us to find better ways to make sure women do not miss out on their chance to have their operations that they have waited so long for. You will not be benefitting directly from this study, but what we find out about you may help others.

To take part in this study you need to have access to a cell phone. All that you have to do is allow me to send you a SMS on the day after tomorrow (48hrs after your visit here) reminding you of the date of your operation. I will send the same message to **all** the women taking part in the study. Then **some** of you will be called 2 days before your operation to remind you to come. I cannot tell you in advance who of you will be sent an SMS to as my supervisor is in control of that.

If you do not wish to have any part in the study your treatment here will not be affected in any way. You will still be appropriately treated by our doctors and nurses.

If you have decided to take part and then change your mind for any reason, there will be no ill-effects. You will still receive the care you are entitled to.

In taking part in this study you will not have to experience any uncomfortable or painful procedures. All we are interested in is whether or not the SMS helps you to come back for your operation.

If you decide to participate in this study the standard of care you will receive will be the same as all the patients in the ward. You will not be given anything extra in return e.g. food or money for your participation in the study

You can contact me at any time in connection with the study. My name is Dr Potgieter and I be contacted on this number: 082 3000656.

There is a committee that checks to see that you are not being hurt, abused or exploited by the people doing the research. They are the HREC and can be contacted on (011)717 1234.

If you are willing to be a participant in this study, kindly sign that you have understoodall that has been explained to you and that you are a willing to take part in this study.

Patient name: Date:

Patient signature: Witness (if required):

APPENDIX B

M110317

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Dr Johannes FA Potgieter

CLEARANCE CERTIFICATE	**M110317**
PROJECT	A Randomised Study of Women Reminded by Short Message Service for Elective Gynaecological Surgery
INVESTIGATORS	Dr Johannes FA Potgieter.
DEPARTMENT	Department of Obstetrics & Gynaecology
DATE CONSIDERED	25/03/2011
DECISION OF THE COMMITTEE*	

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 06/05/2011 **CHAIRPERSON** .....
pp (Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Dr K Frank

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

APPENDIX C

DATA SHEET

Study number..... Recruitment date.....

Mobile phone no. 1.....

2.....

Hospital.....

Date of surgery..... Interval in completed months.....

Age..... Para..... Race.....

Dwelling..... Education level.....

Employment..... Marital status.....

Clinical presentation(YN): Bleeding.....

Pain.....

Mass.....

Other.....

Planned operation.....

Usual system for ensuring return for surgery.....

SMS sent at 48-72 hours.....

Randomisation: Intervention..... Control.....

Arrived for surgery (YN).....

Reason why did not come for surgery

Patient forgot to return for surgery.	
Patient demised.	
Patient changed her mind regarding surgery.	
Patient could not come due to family commitments.	
Patient did not have money for transport	

Any other possible reasons for not coming for surgery……

APPENDIX D

MEDICAL ADVISORY COMMITTEE

CHRIS HANI BARAGWANATH HOSPITAL

PERMISSION TO CONDUCT RESEARCH

Date: 08 March 2011

TITLE OF PROJECT:

The use of short message service as a reminder for elective gynaecology surgery: a randomised controlled trial

UNIVERSITY: Witwatersrand

Principal Investigator Dr JFA Pogieter

Department: Obstetrics and Gynaecology

Supervisor (If relevant):. Dr K Frank

Permission Head Department (where research conducted) Yes

Date of start of proposed study: May 2011

Date of completion of data collection October 2011

The Medical Advisory Committee recommends that the said research be conducted at Chris Hani Baragwanath Hospital. The CEO /management of Chris Hani Baragwanath Hospital is accordingly informed and the study is subject to:-

- Permission having been granted by the Committee for Research on Human Subjects of the University of the Witwatersrand.
- the Hospital will not incur extra costs as a result of the research being conducted on its patients within the hospital
- the MAC will be informed of any serious adverse events as soon as they occur
- permission is granted for the duration of the Ethics Committee approval.

PROF JOHN PETTIFOR
MBBCH, FCP (S.A.)
CHIEF PAEDIATRICIAN

Recommended

(On behalf of the MAC)

Date: 08 March 2011

Dr. P. Lingham
M B B Ch (Rand); DCH(S A); DOH(Rand)
Deputy CEO
Chris Hani Baragwanath Hospital
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Approved/~~Not Approved~~

Hospital Management

Date: 09/03/2011