THE FAILURE OF A NEW COMMUNICATIONS TECHNOLOGY IN A LARGE HOSPITAL ORGANISATION

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The failure of a Patient Monitor Nurse Call (PMNC) system in a large metropolitan teaching hospital is reported and an evaluation is carried out to establish the reasons for failure and future design requirements.

Keywords: patient monitor nurse call system, communication technology, hospitals, nursing

INTRODUCTION

The aim of this study was to examine the failure of a new communications technology, namely the Patient Monitor Nurse Call (PMNC) system in a large metropolitan teaching hospital in Sydney. This study was based on the opinions of 25 registered nurses, all of whom had worked with the system for 12 months or longer, and was conducted over a period of 4 weeks in 1981. Broadly, the objectives of the study were:

(1) to evaluate the PMNC system using reports from nursing personnel, the prime users of the system;
(2) to ascertain the reasons behind the failure of the PMNC system; and
(3) to discuss implications which may be taken into account in a future design of a communications system in the study hospital.

Since the hospital studied has only ever functioned with an auditory communications system, it was impossible to draw an adequate comparison with any other system. However, in order to appreciate fully an auditory communication system and why it has failed, it is imperative that some comparison be drawn between the PMNC system and a traditional non-auditory system, such as those used by registered nurses interviewed in other hospitals and/or in their training prior to working in this hospital.

COMPARISON BETWEEN NON-AUDITORY AND PMNC SYSTEMS

Non-auditory systems normally provide for a patient to initiate a call from the bedhead by pressing a wall/locker button, or a hand-held button which causes a light indicator located outside the patient's room to come on and a buzzer to sound. Lights and buzzers are usually sited to provide a complete coverage of the ward or unit. Calls are cancelled by pressing a button which is located near the patient. This ensures that all calls made are answered by a visit to the patient from the nurse. In a non-auditory system, the disadvantage, of course, is that the associated buzzer usually sounds only while the patient persists in pressing the button, and not for the whole time a call remains unanswered. This results in a few calls being missed initially by the nursing staff, usually because the patient presses the button for a brief period only. It may not be until some time later when the light is seen to be on that such calls would be answered. This is an obvious deficiency.

The PMNC system retained the usual features of a non-auditory call system and provided in addition, two-way speech communication between each bedhead and a response point provided at a central position on each floor level of the hospital. This is staffed by auditory communication co-ordinator (ACC) operators. The speaker systems provided for patients are fitted into handset units connected to the wall near the bedhead. Calls are indicated as in non-auditory systems by a light indicator over the door and more recently, a buzzer has sounded in addition to this. (This latter modification was reputedly the result of a nursing recommendation.) The light indicator existed initially as a back-up in case the computer went down.

The verbal message from the patient was received by the ACC operator in the first instance. The unit at the ACC centre consisted basically of a visual display unit (VDU) and as the operator answered the call, the patient's name and bed number, plus any vital information (for example, patient is deaf, patient does not speak English, etc.) automatically appeared on the screen. This allowed the operator to know immediately to whom she was speaking. When the patient's message was known, the ACC operator typed it in and the call appeared at once on the lower half of the VDU screen (the VDU has a split screen facility). The ACC paged the nurse assigned for that patient on a 'beeper' once the message had been received. The call was processed further down the screen (it moves from the calling stage to the acknowledged

stage) as soon as the nurse was paged, although it was still in view of the ACC operator. There was a provision for eight simultaneous calls to appear at once on the lower half of the screen. The nurse who carried the beeper was the team leader, with one to three nurses working on a team, and several patients assigned to each team. Each time the shift changed (four times per 24 hour day), the paging units were re-programmed for different nurses with a different set of patients. When the beeper sounded, the nurse proceeded to the nearest phone to make the necessary inquiry. At this point, the nurse spoke to the ACC operator. There was no provision for a two-way speech facility from nurse to patient. The call was cancelled by the nurse arriving at the patient's bedside, or by the ACC operator herself, if in fact, she finalised the request. The PMNC system was used exclusively for patient-nurse communication relayed via the ACC operator. It could be switched over in an emergency arrest situation in order to alert the cardiac team. At this time a continual gong would sound.

It seems that the initial purpose of introducing an auditory system (although in reality this was difficult to ascertain) may have been based on the following three assumptions gleaned from interviewing those connected with the maintenance or use of the system:

(1) The physical structure of the level and wards has reduced patients' opportunities for making verbal contact with nursing staff, thereby creating a greater need for a communication system of this type.

(2) Nursing time can be saved because having an ACC operator assess and relay the message first may save the need for the nurse going to the patient's bedside. It also enables certain types of calls to be finalised without a nurse visit.

(3) If a nursing intervention was deemed necessary, it allowed the nurse to collect en route, any equipment likely to be required.

EVALUATION OF THE PMNC SYSTEM

Was the PMNC system successful from the nurses' viewpoint? Seventy-five per cent of those nurses surveyed agreed that the PMNC system had not been successful. The following is a list of reasons volunteered by nurses, which have been ranked in order of highest frequency to lowest:

(i) It was less effort in terms of time and energy expended by the nurse to attend to the patient immediately when the

light illuminated than to walk to a nurse assistance phone and call the ACC operator.

(ii) It took too long for the ACC operator to answer the patient's call and then page the nurse.

(iii) Nurses had to wait too long to be answered on the nurse assistance phone by the ACC operator.

(iv) Nurses did not utilise the system in the correct manner and always found a short-cut which sabotaged the system.

(v) Occasionally patients' calls were left unattended because some nurses strictly adhered to the instruction of answering only the calls of patients assigned to them.

(vi) The PMNC system was not always the most efficient way to cater for certain types of patients; for example, seriously-ill patients; the elderly patient; those patients with speech, hearing or language problems.[1]

(vii) If a nurse was busy with a patient, it was difficult to turn the beeper off or to respond to it, especially if scrubbed or attending to patient's direct physical care. It was also difficult to communicate to another nurse that a patient was in need of attention. This caused the nurse concern because (s)he could never be completely sure that another nurse would respond to the light indicator, particularly in the situation where the patient was not part of the other nurse's assignment.

Those nurses who reported that the PMNC system had been successful gave the following reasons:

(i) It served as a reminder to the nurse that (s)he had other responsibilities if too much time was being spent with a particular patient.

(ii) When attending to people in closed bathrooms, it was helpful to be paged because the nurse could not see the light indicator.[2]

(iii) It was comforting for patients to be able to switch a button and immediately have a human voice answer.

In order to verify some of the reports made, the following investigations were made:

(1) Time taken (as estimated by nurses, who frequently timed calls) to raise a response from the ACC operator once a nurse had phoned in. In terms of their time evaluations, approximately eighty per cent of nurses interviewed, agreed that the ACC operator did not answer their calls quickly enough to warrant use of the PMNC system. The range reported was 30 seconds to 20 minutes. the average time reported was 4.10 minutes. Some nurses felt that the

time taken for the ACC operator to respond varied according to their workload. This was substantiated by the fact that response time was shorter on night shift. A registered nurse (medical) made the following comment:

> When we complain that it takes a long time for them (ACC operators) to answer, they say it's because we're not using it, and if we used it more often, we might be more responsive to you. But I just find that if you look up and see the light, you can go to see that patient quicker unless you actually are in doing a dressing or in the middle of doing something with another patient. Then you can ring through your handset and ask through that, but if you are just around in one of the rooms you can look out and see the light.

All nurses interviewed believed that the patient-waiting time to see a nurse using a traditional non-auditory system was much shorter: the range reported was 30 seconds to 3 minutes, with average waiting time estimated to be approximately 1.50 minutes. For patients in a traditional 'Nightingale' ward, waiting time was considerably less than this. Most nurses felt that in this situation the request could be made known immediately, even if not finalised immediately, since a nurse was always visible.

(2) Time taken for ACC to page nurse. Over half the nurses reported that they were immediately paged after the patient had made a request to the ACC operator.

(3) Time taken for ACC to respond to patient's request. Only 20 per cent of nurses reported that patients had complained to them about a delayed response from the ACC operator when calling for nurse assistance.

(4) The contention by most nurses that the PMNC system wasted time. The reasons given were as follows:
   (a) The requirement of the nurse to phone ACC;
   (b) The length of time the nurse has to wait for the ACC operator to respond;
   (c) When the patient simply requested a 'nurse needed', without elucidating the exact nature of the request;
   (d) The delay in ACC operator receiving the message and transmitting the call to staff; and
   (e) If patient had explicitly stated request, this did not correlate with the message received by the nurse from the ACC operator.

(5) Knowledge of the system. Just over half the nurses maintained that patients did not understand how to use the PMNC system.

(6) Other functions. Most nurses claimed that the PMNC system was useful for admitting patients, while only half thought it was useful for discharging and transferring patients.

The major purpose of the calls

The reason for calls made by patients as reported by nurses were categorised and ranked in order of highest frequency to lowest:

(1) bedpan, urinal
(2) assistance to toilet
(3) complaint about pain
(4) request for analgesic to relieve pain
(5) discomfort — needs back care, re-positioning, etc.
(6) assistance to reach item in room
(7) tray positioning and sitting up at meal times
(8) phone message
(9) to gain assistance in caring for baby — breast feeding, etc.
(10) to talk about side effects of operation
(11) to find out whether a procedure will be performed before visitors come
(12) reassurance that someone is available when required.

Most of the calls made, as reported by nurses, fell into one of the first five categories. In category (1), where a specific article was required to be taken to the patient, it generally saved the nurse time/walking distance if (s)he responded to this call with the aid of the PMNC system, and then collected the item on the way to the patient. Requests for services only (e.g., back care, re-positioning, etc.) resulted in a nil opportunity for nurse savings in terms of time/walking distance. Moreover, some requests (e.g., analgesics) required that the nurse first visit patients in order to assess their condition and then notify the medical officer. In addition, a large number of calls was made which did not disclose the nature of the request. Since nursing administration did not permit, in theory, the practice of patients disclosing the purpose of their calls, and where strict adherence to this instruction existed, it reduced the opportunity for nursing staff to save walking distance/time.

Time-saving

It is important to indicate that there may be a time-saving for the nurse using the PMNC providing it is used as designed. The following is a hypothetical description. A nurse answers the page by responding via the nurse assistance phone to ACC operator at point A. The nurse learns that patient at point B requires an

additional pillow, for example, which the nurse obtains from point C. Since the nurse in this situation has learned the patient's requirements prior to attending to the patient at the bedside, the total walking distance involved in finalising this type of request or a similar request, is the sum of the distances from A to C, and from C to B. However, if there had been a non-auditory system on the ward, the nurse, after being alerted by the buzzer/light, would have initially visited the patient at point B to learn the nature of the request before going to point C to collect the necessary equipment. Hence the walking distance involved would be the sum of the distances from A to B, B to C and C to B. Note that point A was the position where the nurse was positioned when first alerted by the buzzer/light. In this hypothetical example, it would appear that the distance calculated for the non-auditory system would exceed the actual distance for the auditory system.

The other saving to the nurse in terms of time and energy under a PMNC — type of communication system could be as follows. The patient phones the ACC operator to ascertain, say, the times of visiting hours. In this situation, the ACC operator is able to supply the appropriate information and therefore finalise the call without nurse intervention. Of course, the reverse situation can occur where the ACC operator initiates the call to inform the patient of a phone message and so on.

Almost all nurses interviewed in this study, maintained that the use of the PMNC system in their work did not save them time, nor did it cut down on the walking distance involved in their work. The only situation where nurses believed that the system saved them time was when they required a wardsman who was not on the unit/ward.

It was important to ascertain whether nurses felt that the type of call was associated with the adequacy of the system in alerting nurses to their patient needs. In other words, was the verbal request by the patient conveyed to the nurse via the ACC operator an adequate representation of the reason for the patient's call? Most nurses interviewed felt quite strongly that it was not, the major reason being, nurses claimed, that patients in the main did not like to speak to a person whom they could not see, particularly concerning matters which they perceived to be highly personal in nature. Further, nurses often reported that the message received by them from the ACC operator was not subsequently reflected in the patient's request when nurse and patient were face-to-face. Nurses complained that there was no way they could assess the real need of the patient, nor its degree of urgency unless face-to-face. Further, it is interesting to note that the requests made, as listed earlier, by

the patient via the PMNC system were largely associated with a need for equipment or services relating to physical care. Only two types mentioned (apprehension and reassurance) were related to psycho-social needs. It may be that people feel it is legitimate to request something related to tangible needs, but it may be taboo to ask for anything related to the intangible for fear of being labelled 'sick' in the derogatory sense of the word. Hence, it seemed that the PMNC system had altered the traditional patient-nurse relationship.

The PMNC system was used more frequently by some types of patient than others. These can be categorised and ranked as follows from highest to lowest frequency:

(a) the patient in the single room, especially older children being 'barrier nursed'
(b) the anxious patient
(c) the patient who is confined to bed
(d) the patient in the room with more than one occupant
(e) male patients older than 50 years
(f) all other age groups and sexes (except children), and except
(g) male patients aged between 30-49 years.

Infringement of nursing practice

Nurses were divided on the issue of whether the system infringed nursing practice. Fifty per cent of nurses used the PMNC system when calling for assistance from another nurse while attending to a patient. Nurses stated that this would arise only in the situation where it was impossible to go looking for a nurse, when the nurse needed to stay with a patient (e.g. when disorientated or scrubbed) and the handset phone close by could be used. The remaining fifty per cent maintained that it was much quicker to call out for help because of the waiting time involving in using the PMNC system. All nurses conceded it would be easier and faster to use the light/buzzer to attract another nurse to the room.

All nurses believed that they would answer a patient's call light even though they might not have been paged specifically for that patient. Some nurses felt that it was 'just habitual' for nurses to answer calls whenever they saw a zone light illuminated. Nurses interviewed felt it was faster and more convenient for them and the patient to answer the light rather than be paged. Others felt that the call may be an emergency, while others claimed it was important to set an example to student nurses that it was necessary to attend immediately to the patient's needs. This entailed the immediate response of nurses to a patient's illuminated zone light.

Almost all nurses in this study maintained that they responded to a patient's zone light, even though the patient was not assigned to them. The major reason given was that the ACC operator was not able to evaluate the workload of the nurse being paged. Other nurses working directly with the nurse being paged knew (s)he was too busy to respond to the page and therefore would go straight to the patient making the call. Most nurses found it difficult not to go in to see a patient where the zone light indicated a request had been made. Nurses were not prepared to wait to be called in case the patient was distressed.

Over half the nurses interviewed declared that they would not leave a patient in order to look for a nurse if assistance was necessary. However, if the patient was able to be left unattended safely, they would do so in order to find a nurse personally, because it would be faster than using the PMNC system.

Conclusions

It has been demonstrated in this study that the perceived savings of walking distance/time by nurses were negligible and relatively insignificant when compared with reports about non-auditory systems by nurses. Further analysis of the type of call on which savings were reputedly made, namely, those concerned with the collection of bedpans, etc., showed that a provision for bedpans and similar facilities was provided in close proximity to the patients' rooms. Hence, any opportunity to make savings in terms of time/walking distance using the PMNC system was diminished. Such an arrangement also would presumably produce a saving of nursing time on wards/units where non-auditory communication systems were in use.

Nurses reported that patients in single rooms and confined to bed usually required the greatest assistance from nurses, and were more likely to make calls. This effect decreased as the size of the bed groupings increased. It was found that the number of calls made were further influenced by: (a) ward design, (b) number of ambulant patients, and (c) age and sex of patient.

Hence, it is concluded here that only a very substantial and entirely unforeseeable increase in the use of the PMNC system may produce significant savings of nurse time and energy. Further, the study findings and nurse reports would disagree strongly with the statement made by the supply company executive:

> . . . the PMNC system is trying to cut down the donkey work, the leg work and keep the nurse as close to the patients as possible . . . and it means patients are getting a faster response to their calls . . . it is a boon to nursing rather than a threat.

The PMNC system, according to nurses interviewed,may give patients an earlier indication that a call will be answered than the non-auditory system. This was only true if the ACC operator answered the call on average faster than a nurse could respond to the illuminated indicator. (However, this was not so in a 'Nightingale' ward where patients would receive an immediate response from the nurse, although the patient may have to wait for that request to be finalised). This was the only significant advantage revealed for the PMNC system by this study.[3]

Non-auditory systems certainly meet patients' needs since the nurse is the first trained person to assess the exact nature of the request in conjunction with the patient's condition at that particular time. Finally, the major problem, perhaps, was that adequate implementation of the PMNC was based on an inappropriate assumption regarding patient-nurse communication in an Australian nursing culture. This has implications for nursing practice in attempting to achieve the prime objective of adequate patient care.

WHY DID THE PMNC SYSTEM FAIL?

The answer to this question is multifarious. First, the PMNC system was at the time the study was conducted the only one of its kind in Australia. It had never been tested, prior to implementation, in an Australian nursing context. The implementation of this system seems to have been characterised by the 'let's have the latest' syndrome rather than any thoughtful planning. No one interviewed could offer an explanation as to why this system had been chosen over any other, or what were the objectives underlying the use of the system. Second, there was a lack of consultation and participation of nursing staff prior to the decision to implement the PMNC system. An executive from the supply company suggested that nurses had not been directly involved in the decision-making process. There was a nurse consultant plus the Director of Nursing to advise on variations to the system which they thought applicable in this hospital, but this occurred at a later stage in the implementation process. Third, a major component of the traditional non-auditory system, a light indicator, was used in parallel with the auditory system. The result was that staff withheld full support and utilization of the PMNC system in favour of what they perceived to be a traditional and time-tested one.

Fourth, from the reports of the registered nurses surveyed, it seems that they had been trained to the extent that they knew how

to use the system adequately, but did not perceive any real advantages in the system. Indeed, nurse education generally seems to be characterised by this feature. When asked specifically about preparation for using the PMNC in terms of formal instruction, only half of the nurses agreed that they had received adequate training. The other 50 per cent commented that there had been either

> . . . no preparation at all. You need to work with it to understand it. (Registered nurse, medical)
>
> or
>
> . . . had a vague idea, but after a few months, I got used to it. (Registered nurse, surgical)

Most nurses agreed that the instruction and/or demonstration which they received from a colleague on the unit/ward where they worked was more beneficial than the formal instruction received prior to this. One nurse claimed that it was ". . . better than orientation because I could see what they were talking about" (Registered nurse, paediatrics). Nurses reported that the objectives of the PMNC system or variations of that system had not been explained. This was demonstrated by a modification which included a gong sounding in addition to the light indicator at the time when a patient made a call. Previously, a gong had sounded only at the time of a cardiac arrest alarm, and this was what nurses reputedly thought was happening at the time of the modification to the system.

Fifth, nursing administrators decided that nurses should not be instructed by non-nursing personnel in regard to patient requests, because this might lead to:

(i) misinterpretation of request; and
(ii) control of nurses by non-nursing staff members.

Thus patients were advised when instructed in the use of the PMNC system simply to request a nurse when making a call.

> The whole idea was for the ACC operator to call the nurse and say Mrs. Brown wants you. I don't think that's been happening — they've been relaying the messages. At one stage (after the PMNC system had been implemented), there was a lot of discussion. We used to have a PMNC committee with representatives from nursing, medicine, administration and engineering, and they thought the ACC operator would be able to tell the nurse what to do — 'go and get a bedpan, etc.' The Director of Nursing came down on them like a ton of bricks and said this wouldn't happen. They would just say patient x needs you and the nurse would go off to the patient (Nurse Educator).

Apparently, this strategy was not clearly conveyed to all nursing

personnel, because at least half of the nurses interviewed reported that they were unaware of this practice. Subsequently, a very confusing situation for both the patient and the nurse arose, with any one or a combination of the following outcomes:

(1) Patients made explicit requests to the ACC operator (since not all patients had been instructed not to do so), and these were transmitted as accurately as possible to the nurse.
(2) Patients made explicit requests and the message received by the nurse from the ACC operator was that the patient requested a nurse. The patient wondered why the nurse arrived without the requested equipment or information.
(3) Patients simply requested a nurse, which often left the nurse confused because (s)he wondered why the patient could not have been more explicit.

Sixth, there were numerous other factors which purported to influence the use of the PMNC system by nurses; e.g., the number of nursing staff on duty on a given shift, the number of ambulant patients, bed occupancy, and the design and layout of the ward/unit.

After interviewing the supply company executive, it was evident that there was little or no understanding of nursing practice by the very people who were instrumental in introducing the equipment into the hospital. The following quote will exemplify this point:

> I think the PMNC is being welcomed by the nurse in that their greatest frustration in the past (sorry, one of the greatest frustrations) was going to the patient, responding to his call, finding out what he wanted, coming back to the patient with the item, going away and then, when finished, coming back and taking it away (Executive, supply company).

This remark was surprising in the light of the fact that the executive freely stated that he had never spoken to a nurse in any of the hospitals where his company was responsible for introducing equipment. It was also ironical to find out that the prime reason underlying the failure of the PMNC system was that nurses in fact still preferred to go directly to the patient making the call rather than first respond to the ACC operator. This finding conflicted with the executive's statement. Thus, nurses, upon seeing the light indicator, and either prior to being paged or indeed, having been paged, decided to proceed directly to the patient. Further, nurses reported that they did not hesitate to visit a calling patient regardless of whether that patient was part of their patient assignment.

This implies that registered nurses in the majority of cases, did

not endorse patient assignment nursing (that is, where nurses look after the total needs of the patients assigned to them for the duration of their stay in hospital), or the PMNC system as an aid for the patient assignment model. It also suggested that instead of being assigned patients on the basis of intensity of illness and nurse skills (which is the very goal of patient assignment nursing), registered nurses were assigned patients on a geographical basis since the nurse had to be in the vicinity of the calling patient in order to see the light indicator. Furthermore, the practice of nursing seriously-ill patients close to the nursing stations meant that the distance between these patients and nursing staff was small. Hence few or no savings in terms of time or energy were made, or could be attributed to the PMNC system. Just over half the nurses reported that patients in this category rarely requested a nurse via the PMNC system either because a nurse was already present or they were too ill to use the system.

SOME FURTHER DISCUSSION

Further discussion of the underlying assumptions made in relation to the PMNC system is called for. In an American study focusing on social network systems, proximity (in terms of face-to-face contact) was a vital factor in alleviating stress systems.[4] It seemed apparent from the nurses' reports in this study that patients in traditional 'Nightingale' wards are much less prone to a feeling of isolation than those in small wards. This was due to a greater opportunity for face-to-face contact in the open ward system, with nurses constantly in direct physical communication with patients. Hence patients in open wards may have less need of the reassurance that it is assumed an auditory system provides for patients in a closed ward system.

A major aspect of daily interaction in a traditional hospital ward situation is that it is informal. In observing this type of situation, it is characterised by frequent comments, quips, etc., which help to maintain a certain rapport between nurses and patients. Although there appears to be a lack of quantitative research on this component of social interaction in everyday situations (including hospital settings), speculative opinion in regard to the salience and efficacy of such interaction has been well-founded.[5] Future research should consider whether communication systems which make this type of casual and unplanned interaction difficult, and hence personally costly, induce stress in the users (the nurse and the patient). It is well accepted that social interaction, or the lack of

it, serves a variety of functions for the individual.[6] Social interaction in the hospital context may be a vital source of information for patients in terms of their own condition or what is happening around them. Social comparison theory[7] and theories of privacy[8] would attest to this fact.

The PMNC system, according to nurses interviewed, failed to give patients the opportunity to modify the type and degree of interaction according to individual needs. These individual needs for interaction vary from person to person and minute to minute. This is particularly poignant in the hospital context where people (especially patients) can oscillate between extremes of emotional orientations: anxiety, confusion, elation, relaxation and so on. This would depend upon the type of information which has been conveyed to them and the person (e.g., nurse, doctor, paramedic, relative) delivering it. Moreover, patients are a particularly vulnerable group because they have been thrust into the 'sick role'[9], and into an environment which seemingly makes control of interaction difficult. As a result, any communication system may have a greater range of consequences for them. Hence, the effectiveness of the system has implications for continued satisfaction of needs, and the control over the time and place for nurse-patient interaction.

When nurses are out of sight of the patient for long periods, it may be that a patient, in an isolated bay, is more likely to experience negative feelings because of this structure. Some nurses believed that the PMNC system may assist in alleviating the sense of isolation that patients felt, because "a human voice was only a telephone call away". In an American study, looking at the effects of environmental stressors (such as isolation) on individuals, it was found that a cohesive social network can have a mediating effect on such stressors.[10]

This would suggest that direct face-to-face contact with nurses whom the patient can expect to see, and relatively, to trust may be more beneficial than a call to a person unknown via the handset. For example, Jackson found that "when trust exists, content is more freely communicated, and the recipient is more accurate in perceiving the sender's opinion".[11] Hence, the likelihood of patients communicating more freely their intimate, personal needs to the nurse may increase. Further, the PMNC system may have wrenched patients' more intimate needs from the private sphere into a public arena and this may also be more stressful for patients. Also, the PMNC system seems to have influenced the nurse's perception of personal control, in that it has restricted the communication channel and flow. This fact has implications for

patients' perception. It may be that when individuals perceive themselves to be in control, they in fact perform better. This was confirmed by findings in two separate American studies.[12]

FUTURE REQUIREMENTS

If the PMNC system is to continue, future requirements deemed necessary for patients by nurses interviewed were as follows:

(1) Call buttons should be readily accessible and require a minimum of physical effort to operate.
(2) The system should include call facilities in all parts of a ward used by patients and should provide the means for a prompt reply to be given.
(3) Patients should be given an immediate indication that a call has received a successful response from the nurse.
(4) There should be a minimum of disturbance from lights to buzzers, particularly at night.
(5) There should be a provision for nurse to patient two-way speech facility.
(6) There should be provision for nurse to nurse two-way speech facility to foster the development of team nursing.
(7) There should be a provision for nurse to nurse two-way speech facility. The implications of this would be that team nursing would be more of a reality than it is now.

For nurses the system should provide an immediate indication of calls made — visual or audible — in all parts of the ward/unit where nursing staff may be present.[13] To guard against a call being missed, it is desirable for the nurse to be continually paged intermittently by the ACC operator. If after a certain time (approximately two minutes) the page has not been acknowledged, another nurse should be paged. Nurses should not have to respond to the ACC operator, but should proceed directly to the patient. The nurse can acknowledge the call from the patient's bedside. In this way, the ACC operator is merely a back-up to prevent calls remaining unanswered.[14] The following major problems/disadvantages with the PMNC system, according to nurses, must be dealth with:

(1) The nurse's 'beeper' may be turned of;
(2) Other staff may answer the light in the corridor and the nurse wastes time responding to the ACC and then going to the patient;
(3) The nurse leaves the unit/ward with the paging unit;
(4) Nurses are unable to ask for equipment using the PMNC

system because the ACC operator is unfamiliar with the terminology; and

(5) Patients are hesitant in expressing their needs unless speaking directly to a nurse.

NOTES AND REFERENCES

1. This latter category was included as a result of the author's own observations.
2. This no longer applies because of modification of the gong feature of the system.
3. The author does not consider this advantage sufficient to warrant the additional cost.
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13. This modification has been made recently.
14. This is a personal recommendation resulting from the author's own observations.