The single-unit delivery system—A safe alternative to home deliveries

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The need has arisen for the development of a health care/delivery system that can allow for a natural and personalized childbirth experience, within the safe confines of a modern obstetric unit. The single-unit delivery system (SUDS) is designed to achieve this objective by: strict prenatal screening of patients into low- and high-risk categories, utilization of a single room for the entire labor process, and close personalized supervision of women in "normal" labor by trained midwives/monitrixes. Physicians supervise the entire unit and are directly responsible for the management of all high-risk and complicated labors. The SUDS concept has been tried in clinical practice and has been proved to be an effective method of providing safe and satisfying obstetric care without compromising modern obstetric standards. (AM. J. OBSTET. GYNECOL. 132: 889, 1978.)

THE PAST FEW MONTHS have seen an increase in demand by the lay public in the United States for home deliveries,[1] a trend which is contrary to that of most other countries. For example, in the United Kingdom, where home deliveries have long been part of the obstetric tradition, the swing is now toward hospital confinements.

Some of the main arguments of proponents for home deliveries cite the right of the individual to decide where she should have her baby, the depersonalized approach and environment of institutions, and the high cost of hospital deliveries. Considered medical opinion, with awareness of the hazards—potential and real—of home deliveries, continues to advocate strongly against this practice.

The argument appears to have polarized into two diametrically opposed attitudes, namely, home births as the only way to have "natural" childbirth and hospital deliveries as the only way to ensure "safe" deliveries. In 1970, the single-unit delivery system (SUDS) was introduced into the Department of Obstetrics, Addington Hospital, Durban, Republic of South Africa, with the objectives of enhancing the efficiency and labor-cost of institutional deliveries and of ensuring an individual's need for privacy, comfort, and safety during labor. This communication briefly outlines the SUDS concept and is proposed as an alternative to the hospital/home delivery controversy.

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Principles concerning the SUDS concept

The success of the SUDS concept (introduced into a hospital staffed by both midwives and physicians with an annual delivery rate of 2,500 patients) was ensured by the enunciation of and strict adherence to the following four principles:

1. All patients were to be examined and evaluated by physicians at least twice during the prenatal period and on admission in labor and divided into normal and "at risk" categories. Midwives were responsible for the prenatal care of all normal pregnancies. Patients with problems developing during the prenatal period were referred for medical assessment and, if necessary, for continued medical supervision.

2. Normal patients were monitored and delivered in a single unit designed to provide privacy compatible with the home environment and which could allow for every obstetric contingency other than cesarean section. The deliveries were conducted by either midwives or physicians, depending upon the patient's preference.

3. To ensure a personalized approach without compromising reliability, every woman's labor was monitored by midwives trained to adapt to clinical practice the principles established by electronic monitoring.[2]

4. Any deviation from normal was assessed by a physician and the patient's subsequent management based upon accepted modern-day obstetric practice.

This included all "at risk" patients from the time of their admission.

Prenatal screening

The benefits of prenatal care are well established and are not germane to the present discussion, but a few points integral to the overall health care program deserve emphasis. High-risk factors vary with the population group being treated (private versus indigent subjects) and will determine, in large measure, the likelihood and type of obstetric abnormality. Some of the more frequent problems encountered are inherent factors such as pelvic contracture, nonobstetric complications such as severe anemia, diabetes, and renal and cardiac disease, and obstetric complications such as intrauterine growth retardation, pregnancy-induced hypertension, and a previous obstetric history of repeated fetal loss. Great care was taken to explain the significance of a particular complication to the patients concerned, and the need for specific and close medical/midwife supervision throughout pregnancy and labor was emphasized.

To ensure continuity of the patient's care and to personalize institution practice, the patient was seen by the same medical team at each prenatal visit. Specific obstetric "at risk" factors were clearly annotated on the patient's chart. "At risk" cards, briefly identifying the patient's salient prenatal features and designed for presentation by the patient on admission to labor and delivery, were also advocated. These cards facilitate the assessment and management of patients who present at times when their regular prenatal records are not readily available. They also serve to remind the patient that they are subject to certain "at risk" factors and that close medical surveillance of their prenatal *and* intrapartum course is both necessary and advisable.

Unit design

Each delivery unit was completely self-contained and designed to meet the needs for most obstetric procedures. Rooms were bright and airy and allowed for free movement around the bed by as many as two or three additional attendants. The walls and drapes were in attractive colors, the object being to allay fear and apprehension and to instill an atmosphere of positiveness and cheerfulness. Each bed had a unit equipped with a three-channel radio for selected programs and a two-way address system that communicated with a central nurse's station; patients were thus able to *talk* to a member of the nursing staff at the push of a button.

Piped oxygen and suction outlets were situated behind the patient's bed. The beds were not ideal but did were comfortable and wide enough for the patient to move freely without fear of falling off and the bottom half of the bed could be disarticulated to allow for obstetric stirrups to be secured in the upper portion. However, they lacked the ability to be placed into the head-down and lateral tilt positions and did not provide for adequate back support—essential features of any obstetric bed. Suitable adaptable obstetric beds are now available.[3]

To avoid the appearance of a surgical unit, the equipment required for the delivery was kept in prepacked sterile containers and stored in cupboards situated outside the SUDS room. This included selections of prepacked obstetric forceps, vaccuum extractors, suturing equipment, and additional instruments and linen.

A mobile plug-in operating room light was used in preference to a permanent fixature. This provided an efficient source of light and was moved into the delivery area only when needed. This saved floor space and helped to avoid a "surgical" atmosphere.

A small area of the room was curtained off for a wash basin with elbow-operated faucets and an infant resuscitation unit. The latter was attached to the wall with a special overhead light and included an adjustable angled table top (for easier intubation and resuscitation) and shelves for necessary equipment such as laryngoscopes, sterile disposable endotracheal catheters, glucose and sodium bicarbonate solutions, etc. By drawing the curtains the physician could thus attend to the baby out of view but within easy access of the patient.

Most obstetric procedures were performed with local or epidural analgesia, but facilities for general anesthesia were available.

A list of essential equipment was maintained in each room and was checked by the nursing staff twice daily. The general anesthetic equipment was checked daily.

The SUDS rooms thus served as the patient's (and accompanying husband's) own private "bedroom" for the entire duration of labor and the immediate puerperium.

Delivery with the SUDS

Details regarding the principles and practice of utilizing midwives for the monitoring of labor have been discussed elsewhere.[2] In brief, all patients were examined on admission and if no abnormal features were found were designated for normal delivery. One pupil midwife was allocated to two patients, with a trained midwife supervising approximately four patients. When the patient was left unattended, she could communicate with the duty room via the bedside two-

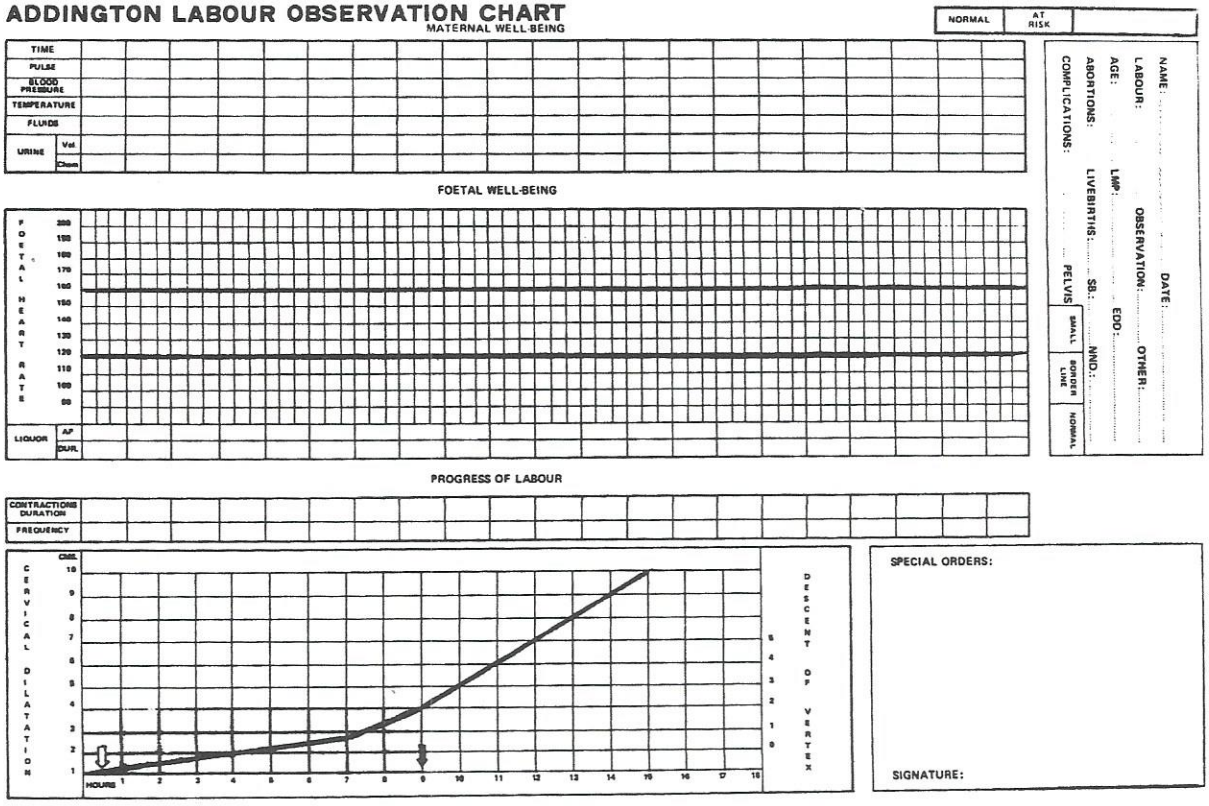

Fig. 1. Labor observation chart. This allows for continuous assessment of fetal and maternal well-being and progress of labor. Patient's obstetric status is classified as "normal" or "at risk." Type of "at risk" factor annotated in space provided.

and patterns (before, during, and after contractions) auscultated and uterine contraction characteristics recorded every 15 minutes; maternal vital signs were noted every half hour, and cervical dilatation was assessed by pelvic examination every two to four hours. All observations were plotted on a labor monitoring graph and retained by the patient's bedside (Fig. 1). The maternal and fetal responses and progress of labor could thus be assessed by simply scanning these graphic recordings. Deviations from normal were readily detected and appropriate corrective measures were introduced. A closely supervised but personal and human relationship was thus maintained.

Patients were allowed to ambulate in early labor until they reached a cervical dilatation of 6 cm. or until the membranes broke. They were then encouraged to sit up in bed (rather than to lie supine) with the backs of the patients at a 45° angle to the horizontal until full dilatation was reached. The type of beds used was not ideal (see above) but did allow for easy access to the perineum and the performance of any obstetric procedure other than cesarean section. A modified squatting position has since been found to facilitate bearing down efforts and is now the preferred position[4] (Fig. 2).

The delivery of normal patients was conducted by either the midwife or the patient's personal physician. Close vigilance of the patient and fetus was maintained during the second stage of labor; at the first detection of an abnormality, medical help was immediately sought. By the same token, our trained midwives were often able to intercede in the unexpected delivery of private patients before the physician's arrival. The labor/delivery unit had 24 hour coverage by the resident medical staff.

Intravenous infusions were not routinely required. The patients were, however, restricted to the sucking of hard glucose candy (as a source of calories) and bland fluids. Potential "at risk" patients (for example, grand multiparous patients) had intravenous lines secured by insertion of heparinized "butterfly" needles; this did not impede mobility but allowed for immediate intravenous infusion if necessary. Deliveries were conducted in the routine fashion.

The patient was offered tea or coffee after she had been bathed and the baby taken to the nursery. Postpartum observations were recorded for two hours and the patient was then discharged to the postpartum ward.

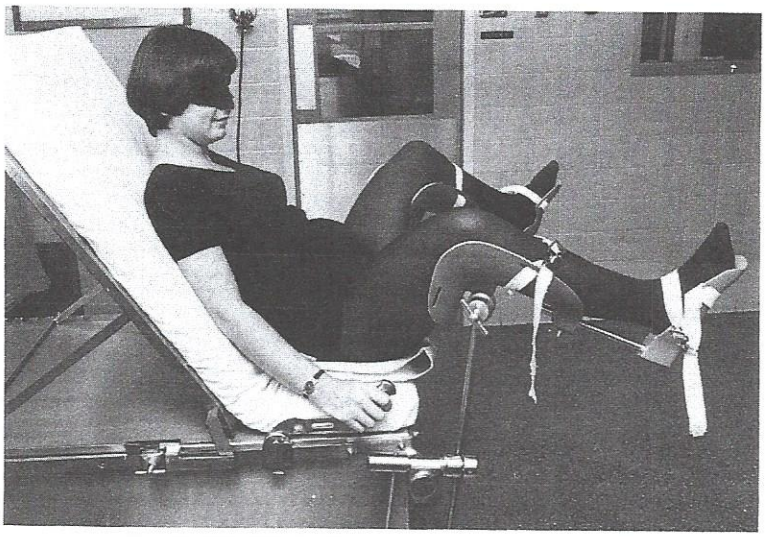

Fig. 2. Modified squatting position to maximize bearing-down efforts during the second stage of labor.

Table I. A comparison of the perinatal mortality rate and surgical interference before and subsequent to the introduction of the SUDS system*

	Year				
	1965	*1966*	*1970*	*1971*	*% Decrease*
Perinatal deaths (No./1,000 live births)	35.6	33.2	22.1	21.2	37.7
Surgical procedures† (%)	7.6			17.6	

*Introduced in 1970.

†Indicated forceps, vacuum extractions, and cesarean sections.

High-risk and assisted deliveries

The medical staff, with the cooperative involvement of the midwives, supervised and conducted the labor and delivery of all high-risk pregnancies and intervened in "normal" deliveries in which an unexpected complication had developed. Active participation (judged by some to be aggressive) by the medical staff was encouraged, as it was felt that early correction and management of dysfunctional labor, dystocia, etc., would result in improved perinatal survival. This has been experienced by others[5] and appeared to be the case in our own unit, as illustrated by the results in Table I. Thus, the perinatal mortality rate was reduced by 37.7 per cent during the five-year study period, while the rate of surgical intervention—indicated forceps, vacuum extractions, and cesarean section—rose from 7.6 to 17.6 per cent. The SUDS was introduced in practiced, the labors being supervised in the main by midwives, without the stricter guidelines and system laid down by the SUDS concept. Full-time medical staff was employed, but they, in turn, were not as closely supervised by full-time attending physicians. No single feature of the four SUDS principles could explain the improved rate of survival; the improved results were probably due to a combination of factors. It should be noted that under the SUDS system about 60 to 70 of all spontaneous vaginal deliveries were still conducted by the midwifery staff.

Advantages of SUDS

Distinct advantages accrued to both the patients and the medical staff.

Patients. The patients received care in an attractive atmosphere, free of the tension usually found in present-day labor and delivery suites. The music, referred to previously, was found to set the tone and help relax the patients (and the staff). There were two notable advantages: (1) The privacy of a SUDS unit allowed for the presence of the husband without the disruptive effect of other patients and/or their visitors; (2) the patients did not "watch the clock," anticipating their transfer from the first-stage room to the delivery room. Patients were comforted by the absence of electronic monitoring devices and surgical apparatus yet were secure in the knowledge that immediate medical intervention was readily available if necessary. In short, the patients were allowed to experience a natural childbirth in the full meaning of the term, without exposing themselves or their babies to unnecessary risks.

Physicians and midwives. The SUDS system allows pa-

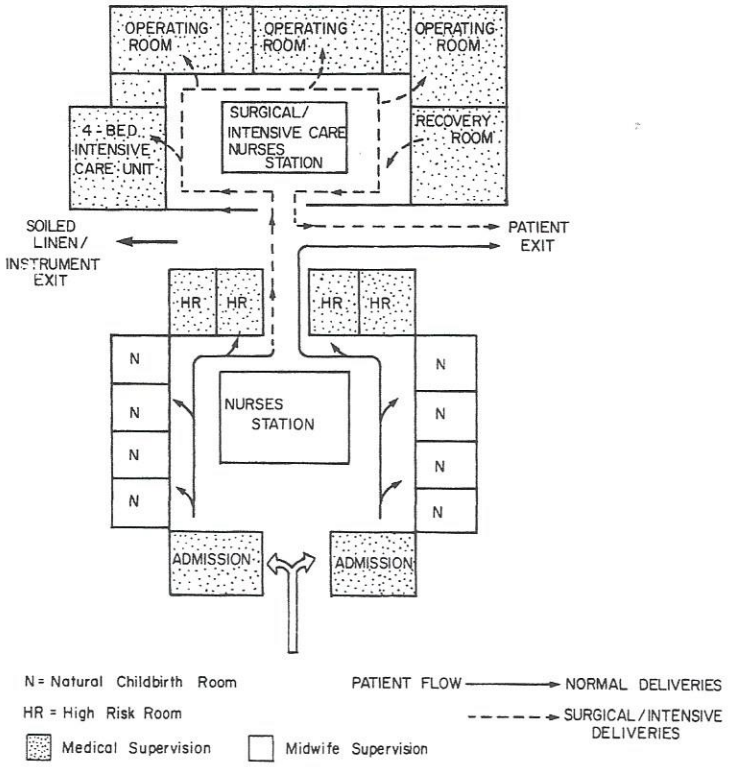

Fig. 3. Basic floor plan of the SUDS figure-of-eight uniflow delivery system. Patient "traffic" is unidirectional; this allows for easier control of semisterile and aseptic areas. Physician and midwife supervised areas for separate but co-operative participation in overall patient care.

tients to have a natural childbirth within the confines of a fully equipped obstetric unit, with the additional assurance that the progress of labor and well-being of both fetus and mother can be closely supervised by trained personnel. Practical advantages to this method included, for example, the avoidance of having to decide when to transfer the patient to the delivery room, with the complete elimination of "passage" and unprepared bed deliveries, and the utilization of one room and one bed with considerable saving of both linen and labor in setting up and maintaining the delivery area. Although the patients were not routinely managed with intravenous infusions, etc., the latter, together with any other obstetric procedure (for example, fetal scalp sampling), were readily available within each individual unit. Separation of the labor room population into normal and "at risk" groups allowed the physicians to concentrate on the latter category, with the knowledge that the normal patients were being well supervised and that help would be requested when, and if, the need arose.

Practicality of SUDS

The SUDS system of hospital delivery is not experimental. It has been proved to work to the physical and psychological satisfaction of both the patient and hospital staff without compromising the fetal outcome. The practicality of introducing SUDS systems will vary from unit to unit and will involve two main factors: cost and the employment of suitably trained personnel. The main cost factor concerns the reconstruction and alteration of the labor and delivery area into separate subunits. This obviously would be modified to the needs of a particular institution. A suggested design is the "uniflow" figure-of-eight pattern illustrated in Fig. 3. This incorporates two centralized nursing stations, one to serve the delivery area and the other an operating room/intensive care section. It thus separates the concentrated and intense activity of a surgical area from the quieter and less active natural childbirth section. The number of separate SUDS rooms and their allocation into normal and high-risk categories will depend on the ratio of high-risk to normal patients. All SUDS rooms should have facilities for electronic monitoring.

The SUDS concept relies heavily on nurse-obstetricians (midwives). An alternative would be to train monitrixes[3] who would be able to monitor effectively the patient's progress in labor and provide the continuity of human care. This should be an interim mea-

sure, however, as monitrixes are not able to function in obstetric emergencies when the help of medical staff is not immediately available; it is in these unexpected circumstances that trained hands are able to deal with situations (for example, shoulder dystocia) that would otherwise signal the death of or irreparable damage to the fetus.

Although an additional financial investment may be needed initially, the public support that such units are bound to attract would soon increase their popularity and enhance profitability. A further pertinent point is that a substantial proportion of the staff in teaching units will be composed of student midwives, who, as students in training, will command a lower salary commensurate with their contribution to the overall workload.

Concern was initially expressed by some of the senior personnel at Addington Hospital that the SUDS system would not permit adequate opportunity for the teaching of midwives, medical students, and resident staff. This fear proved to be unfounded. Adequate clinical experience was obtained by each participant in the medical team by closely supervising the allocation of every patient to a certain member of that team, depending upon the patient's clinical condition and classification. A unified and true "team spirit" was thus engendered.

Comment

It is a basic tenant of modern obstetric care that every fetus has the right to be well born. By the same token, the physical and emotional well-being and rights of the mother need to be considered. The solution is to define a health care/delivery system that can meet these two basic demands. SUDS allows for a natural and personalized childbirth experience within the safe confines of a modern obstetric unit. It is thus appropriate to the needs and rights of both mother and child.

REFERENCES

1. Rebirth for midwifery, Time, August 12, 1977, p. 66
2. Notelovitz, M.: The graphic monitoring of labor, S. Afr. Med. J. **47:** 3, 1973.
3. Carlson, B., and Sumner, P. E.: Hospital "at home" delivery: A celebration, J. Obstet. Gynecol. Nurs. **5:** 21, 1976.
4. Notelovitz, M.: Unpublished data.
5. Studd, J.: The partographic control of labor, Clin. Obstet. Gynecol. **2:** 127, 1975.