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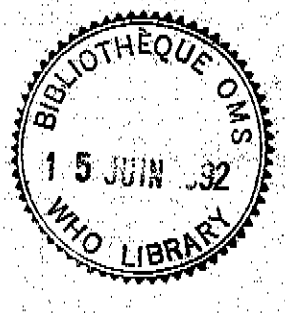
INTERNATIONAL DIFFERENCES IN THE USE OF OBSTETRICAL INTERVENTIONS

Report on a Study

by

P.A. Stephenson, ScD
Centrum för Folkhälsoforskning
Karlstad, Sweden



SCHERFIGSVEJ 8
DK-2100 COPENHAGEN Ø
DENMARK

TEL.: (45) 39 17 17 17
TELEFAX: (45) 31 18 11 20
TELEX: 15348

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EUR/HFA TARGET 31

This activity was organized by the WHO Regional Office for Europe to promote work aimed at achieving the following target in the health for all strategy.[a]

TARGET 31

QUALITY OF CARE AND APPROPRIATE TECHNOLOGY

By the year 2000, there should be structures and processes in all Member States to ensure continuous improvement in the quality of health care and appropriate development and use of health technologies.

Keywords

LABOR
CESAREAN SECTION
LABOR COMPLICATIONS — surgery
QUALITY ASSURANCE, HEALTH CARE
MEDICAL AUDIT
AUSTRALIA
CANADA
CZECHOSLOVAKIA
DENMARK
FINLAND
GREECE
HUNGARY
ISRAEL
NETHERLANDS
SLOVENIJA
UNITED KINGDOM
UNITED STATES

[a] *Updating of the European HFA targets.* Copenhagen, WHO Regional Office Europe, 1991 (document EUR/RC41/Inf.Doc./1 Rev.1).

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EXECUTIVE SUMMARY

A study was conducted to compare patterns of obstetrical practice in 12 countries: Australia (State of Victoria); Canada (Quebec Province); the Czech and Slovak Federal Republic (Czech Republic); Denmark; Finland; Greece; Hungary; Israel; the Netherlands; Slovenija; the United Kingdom (Scotland); and the United States (Washington state). The aims of the study were:

1. To determine the rates of obstetrical interventions and the way these have changed over time;

2. To determine the rate of caesarean section among women who have had a previous caesarean section and the rate of caesarean section for multiple birth pregnancies and low birthweight pregnancies;

3. To assess the contributions to the caesarean section rate of various indications;

4. To assess how much variation there is between hospitals in intervention rates in each country or region and how any such variation is associated with hospital characteristics; and

5. To determine how the rates of intervention vary within countries, and how any such variation is associated with population characteristics or medical facilities in those small areas.

Most countries provided data from routinely collected sources. Three countries conducted special surveys. Not all of the data requested by the W.H.O. study group were available for each participating country. The study period was 1983-88. The key findings are presented below.

Caesarean section rates varied 3-fold among the participating countries. Caesarean section rates increased in all countries over the observation period. Those countries with the highest rates had smaller net increases in rates of caesarean section in the latter years of the observation period. The countries with the lowest rates had more modest and gradual, but relentless increases. There was a decrease in the caesarean section rate during the last year of observation in Australia, Denmark and Finland.

Instrumental vaginal delivery rates varied 10-fold among the participating countries. Instrumental vaginal delivery rates appeared to be decreasing in several countries. In the other countries, rates remained relatively steady or increased slightly. The only sharp increase occurred in Greece.

In general, countries with high ceasarean rates also had high instrumental vaginal delivery rates. There was no consistent relationship between the use of ceasarean section and the use of instrumental vaginal delivery although in several countries increasing use of ceasarean section was accompanied by decreasing use of instrumental vaginal delivery. In other countries instrumental vaginal delivery rates remained stationary while the

caesarean rates rose slightly. In two countries (Greece and the U.S.) there were marked increases in both rates.

In several countries, the proportion of repeat caesarean sections made a significant contribution to the overall caesarean section rate. In others, repeat caesarean section rates were extremely low indicating a tendency not to intervene unless there is a clear medical indication to do so. There were also inter-country differences in the use of caesarean section for the management of multiple birth and low birthweight.

There was marked variation among hospitals within countries in their caesarean section and instrumental vaginal delivery rates. Indicators that a hospital was a referral centre (the size of a hospital's delivery service, availability of neonatal intensive care services, and being a teaching hospital) were positively correlated with hospital-specific caesarean section and instrumental vaginal delivery rates. However, these correlations were not consistent across countries.

Variation among regions (small areas) within countries was also noted. There were no consistent relationships noted between population parameters (proportion of primiparae or mothers 30 years old or greater giving birth within a region) and region-specific caesarean section and instrumental vaginal delivery rates.

These findings indicate that among industrialized countries, there is great variation in the frequency with which obstetrical interventions are used in the management of childbirth. The variation in the overall rates among countries, or in hospital-specific or region-specific rates within countries was far greater than could be explained on the basis of medical indication, population characteristics, referral patterns among hospitals, etc. It is likely that other, unmeasured factors (e.g., local practice norms, social influences, and differences among countries in methods of reimbursement for health care services) are the more powerful predictors of obstetrical intervention rates.

In an ecological study it is not possible to determine the proportions of women who did and did not receive appropriate obstetrical care. Still, one can at least infer that a significant proportion of interventions are unnecessary or only marginally beneficial. Continued increases in rates of obstetrical intervention are unlikely to result in improvements in birth outcome and may even result in a higher incidence of adverse outcome for mothers and their offspring.

SPECIFIC AIMS

Among industrialized countries there is great variation in the frequency with which obstetrical interventions are used in the management of childbirth. Variations in use appear to be largely independent of medical indication. This observation gives rise to concerns that obstetrical interventions are used to an extent which outweighs their possible benefit. Thus, many women and infants may be subjected unnecessarily to risks from the procedures themselves.

In order to address this issue, the European Regional Office of the World Health Organization conducted a study to compare patterns of obstetrical practice in 12 industrialized countries. The specific aims of the study were:

1. To determine the rates of obstetrical interventions (caesarean section, forceps, vacuum extraction, anaesthesia, induction of labour, acceleration of labour, and episiotomy) and the way these have changed over time;

2. To determine the rate of caesarean section among women who have had a previous caesarean section and the rate of caesarean section for multiple birth pregnancies and low birthweight pregnancies;

3. To assess the contributions to the caesarean section rate of various indications (previous caesarean section, breech position, dystocia, foetal distress);

4. To assess how much variation there is among hospitals in intervention rates in each country and how any such variation is associated with hospital characteristics; and

5. To determine how the rates of intervention vary according to region, and how any such variation is associated with population characteristics or medical facilities in those regions.

METHODOLOGY

Participation

The participating countries were: Australia (State of Victoria); Canada (Quebec Province); the Czech and Slovak Federal Republic (Czech Republic); Denmark; Finland; Greece; Hungary; Israel; the Netherlands; Slovenija; the United Kingdom (Scotland); and the United States (Washington state). Health authorities and obstetrical organizations in those countries were contacted and asked to provide data according to protocol (annex I). A listing of the co-investigators from each country is included (annex II).

Overview of Design

The study consisted of 6 parts:

Part A used the country as the unit of analysis for comparisons of time trends in obstetrical intervention rates and perinatal mortality rates. Data for the 5 most recent years were examined.

Part B involved more detailed comparisons of national data for the most recent year. Comparisons were made of elective vs. emergency caesarean section rates, primary vs. repeat caesarean section rates, the percentage of multiple births and low birthweight infants delivered by caesarean section, and the indications for caesarean section.

Part C used hospitals within countries as units of analysis. For the most recent year, comparisons were made of intervention rates. The associations between intervention rates and hospital characteristics (public vs. private, teaching vs. non-teaching, size of hospital, presence of neonatal intensive care) were examined.

Part D used geopolitical regions (small areas) within countries as units of analysis. For the most recent year, comparisons were made of intervention rates and these data were related to population characteristics. Most of the data requested in the protocol were not available for regions, therefore analyses were restricted to comparisons on 2 characteristics: the proportion of births to (or confinements of) women 30 years or older and the proportion of births to (or confinements of) primiparae.

Part E was an optional mailed survey to health care providers which was designed to measure preferences in the management of several common obstetrical problems. The original questionnaire (annex I) was designed by the W.H.O. Perinatal Study Group. It was used by the CSFR and Hungary. Investigators in Finland felt that the questionnaire was inappropriate for non-physician respondents. Accordingly, it was modified and then used in the Finnish survey of health care providers (annex III). A modified version of the questionnaire was also used in Slovenija (questionnaine not available). Detailed analyses of the survey of professionals is available from Dr. Elina Hemminki (address in annex I).

Sources of Data

Most countries were able to assemble data from routinely collected sources. In several countries, investigators mounted special surveys. The sources of data used by investigators in each country are given in Table 1.

Table 1. Sources of Data for Obstetrical Intervention Statistics

Country/Region	Sources of Data	Reporting Organization
Australia	Perinatal Data Collection Unit Perinatal Morbidity System Australia Bureau of Statistics 1986 Census of the Population & Housing Unpublished data from the Victoria Nursing Council, 1987	Health Dept. Victoria
Canada	Ministry of Health & Social Services Quebec Bureau of Statistics Registry of the Popn. Fichier Med-echo	Ministry of Health & Soc. Services
Czech & Slovak Fed. Republic	Ministry of Health and Social Affairs Federal Statistics Office Inst for Care of Mother & Child	Inst for Care of Mother & Child
Denmark	Medical Birth Registry	Sundhedsstyrelsen
Finland	Special survey of hospitals Ministry of Social Affairs & Health, National Board of Health	Univ Helsinki Dept Public Health
Greece	Special survey of hospitals 1983-complete 1988-sample	Athens Univ
Hungary	Ministry of Health statistics	Ministry of Health
Israel	Special survey of hospitals (90% of deliveries)	Hebrew Univ
Netherlands	Central Bureau of Statistics Hospital Morbidity Statistics National Survey of Preterm & Very Low Birthweight Infants	Ministry of Welfare, Health & Cultural Affairs
Slovenija	Natl Inst for MCH Natl Inst for Statistics Inst for Med Information	Univ Med Ctr Ljubljana
U.K.	Registrar General Scotland Maternity Discharge Data	Scottish Health Services Common Services Agency
U.S.	Dept Health Services Vital Record System	Univ Washington

Definitions of Terms

Delivery: The expulsion or extraction from its mother of one or more infants (living or dead) and other products of conception.

Birth: Live birth and/or foetal death

Live birth: (W.H.O. recommended definition) The complete expulsion or extraction from its mother of a product of conception irrespective of the duration of pregnancy which, after expulsion or extraction, breathes or shows other evidence of life such as beating of the heart, pulsation of the umbilical cord, or definite movement of the voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered live borne.

Foetal death: (W.H.O. recommended definition) Death prior to the complete expulsion or extraction from its mother of a product of conception irrespective of the duration of pregnancy; the death is indicated by the fact that after separation, the foetus does not breathe or show any evidence of life such as beating of the heart, pulsation of the umbilical cord, or definite movement of the voluntary muscles.

Late foetal death: (W.H.O. recommended definition) A foetal death which occurs during or after the 28th week of gestation.

Early neonatal death: (W.H.O. recommended definition) A neonatal death which occurs before 7 days.

Caesarean section: All types of surgical operations wherein products of conception are delivered through the abdominal wall.

Elective caesarean section: (Perinatal Study Group definition) One which has been decided in advance.

Emergency caesarean section: (Perinatal Study Group definition) One that is done in rapid response to a clinical situation.

Primary caesarean section: First caesarean birth regardless of the number of previous births.

Repeat caesarean section: Second or higher order caesarean birth.

Forceps delivery: All high, medium and low forceps deliveries together with breech with forceps of the aftercoming head.

Vacuum extraction: Method of assisted delivery using an instrument consisting of a disk-shaped cup through which a vacuum is applied to the foetal scalp.

Episiotomy: An incision into the perineum made before delivery in order to enlarge the area of the outlet.

Induction of labour: The deliberate use of a manoeuvre or chemical method to initiate labour and which results in contractions.

Augmentation of labour: (Also referred to as acceleration) The deliberate use of a manoeuvre or chemical method to shorten the length of labour which has already started.

Anaesthesia: Obstetrical anaesthesia includes all general (inhalation and intravenous) anaesthesia, epidural anaesthesia, high spinal anaesthesia, caudal anaesthesia, subarachnoid, pudendal and paracervical blocks.

Multiple birth: Twins, triplets or higher order multiple gestations.

Low birthweight: Infants weighing less than 2500 g at birth.

Breech: Presentation in labour of the buttocks or feet of the foetus.

Dystocia: Difficult (or slow) birth caused by abnormalities in the foetus or mother, e.g., excessive size, mechanical obstruction, or abnormal forces of labour.

Foetal distress: Foetus exhibits signs of hypoxia.

Type of hospital: Hospitals are classified differently in each country. Two classes are used in the data analysis, public and private.

Neonatal intensive care: (Perinatal Study Group definition) Defined by 3 levels: I - paediatrician available but not present in each complicated birth; II - grade II neonatal unit; III - grade III neonatal unit.

Teaching hospital: One in which medical students of post-graduate physicians receive all or part of their clinical training.

Primipara: (Perinatal Study Group definition) A woman who has had no previous pregnancies reaching the stage of viability.

Multipara: A woman who has had one or more previous pregnancies reaching the stage of viability.

Calculation of Rates and Presentation of Data

Perinatal mortality rate: (W.H.O. recommended definition) The recommendations in the International Classification of Diseases state that national perinatal statistics should include all foetuses and infants delivered weighing at least 500 g (or, when birthweight is unavailable, the corresponding gestational age (22 weeks) or body length (25 cm crown-heel)), whether alive or dead. However, for the purpose of international comparisons it is recommended that countries report 'standard perinatal mortality statistics' in which both the numerator and denominator of all rates are restricted to foetuses and infants weighing 1000 g or more (or where birthweight is unavailable, the corresponding gestational age (28 weeks) or body length (35 cm crown-heel)).

Therefore, the two perinatal mortality rates recommended by W.H.O. are:

i. foetal deaths plus early neonatal deaths weighing 500 g or more (or 22 weeks gestational age or 25 cm body length) per 1000 live births plus foetal deaths weighing 500 g or more (or 22 weeks gestational age or 25 cm body length).

ii. foetal deaths plus early neonatal deaths weighing 1000 g or more (or 28 weeks gestational age or 35 cm body length) per 1000 live births plus foetal deaths weighing 1000 g or more (or 28 weeks gestational age or 35 cm body length).

Definitions used by participating countries:

Australia: W.H.O. recommended definition ii was used in the calculation of rates where foetal deaths under 1000 g (or less than 28 weeks gestational age when weight was unknown) were excluded. The only foetal deaths weighing less than 1000 g included in the denominator of total births (live births + foetal deaths) are twins where one twin has survived. Neonatal deaths were defined as infant deaths occurring within the first 7 days of life where the weight is at least 1000 g or, if the weight is unknown, estimated gestational age of 28 weeks or more.

Canada: Foetal deaths and live births <500 g are excluded. Timing of occurrance of neonatal deaths is 0-6 days.

Czech and Slovak Federal Republic: Foetal deaths before the 28th week of pregnancy irrespective of birthweight (or 1000 g if gestational age is unknown) are excluded. Timing of occurrance of neonatal deaths is 0-7 days inclusive.

Denmark: Not stated

Finland: Before 1986 all early (0-6 days) neonatal deaths and foetal deaths of 28 weeks gestation and/or 1000 g were counted. In 1987 the definition changed so that foetal deaths of 22 weeks and/or 500 g were counted.

Greece: Not stated

Hungary: Not stated

Israel: Not stated

Netherlands: Neonatal deaths from 0-7 days are counted plus foetal deaths occurring during or after the 28th week of gestation. No weight criterion is used.

Slovenija: W.H.O. definitions for live births and foetal deaths are used. Prior to 1986, perinatal statistics include only births of 1000 g or more. After 1986, all births of 500 g are included. Statistics presented include births <1000 g prior to 1986. Timing of occurrance of neonatal deaths is 0-6 days inclusive.

United Kingdom: Not stated

United States: W.H.O. definitions of live birth and foetal death are used. All foetal deaths ≥20 weeks gestational age, (i.e., all reported foetal deaths) are included in statistics. Timing of occurrance of neonatal deaths is 0-6 days inclusive.

Given that the definitions of perinatal mortality varied among countries and over time within countries, and that such variation in rates can lead to large differences in the rates reported, this variable was dropped from the analysis.

Caesarean section, forceps, vacuum extraction rates: Countries have different methods of recording obstetrical events. Events are recorded either by confinement (delivery) or by birth. Because the differences are slight, rates for the 12 countries are compared in the results section to follow.

Rates are calculated as follows:

$$\frac{\text{No. of women having CS (or forceps or vacuum)}}{\text{Total no. of birthing women}} \times 100$$

or

$$\frac{\text{No. live births + foetal deaths by CS (or forceps or vacuum)}}{\text{Total no. live births + foetal deaths}} \times 100$$

Instrumental vaginal delivery rate: Forceps rate + vacuum rate

Total operative delivery rate: Forceps rate + vacuum rate + caesarean section rate.

RESULTS

Specific Aim 1

Caesarean section rates varied considerably among countries (Figure 1). In the most recent year, there was a 3-fold difference between the highest and the lowest rates. Canada, the United States (U.S.), Australia and Greece had the highest rates. The United Kingdom (U.K.), Israel, Hungary, Finland and Denmark reported moderate rates. The lowest rates were reported by Slovenija, the Czech and Slovak Federal Republic (CSFR) and the Netherlands (Table 2).

Over the 5 year study period, the most dramatic net increase in the caesarean section rate occurred in Greece and the U.S.. Moderate or small net increases occurred in the other countries.

Forceps were most popular in Australia, Canada, the U.K. and the U.S. (Figure 2; Table 2). Forceps were used infrequently in the other countries. There was very little net change in forceps rates over the study period except in Australia, Canada and the U.S. where there was a net decrease in forceps use.

Vacuum extraction was used extensively in Greece and Denmark (Figure 3; Table 2). Over the study period significant net increases in the use of vacuum extraction occurred in Canada, Greece and the U.S.. There were slight increases or decreases in the use of vacuum extraction in the other countries over the study period.

Since it is a matter of medical convention whether forceps or vacuum is mostly used in each country, the rates were combined in order to see more clearly the overall trends in instrumental vaginal delivery (Figure 4; Table 2). Net decreases in rates of instrumental vaginal delivery occurred in Australia, Canada, Hungary, Israel and the U.K.. Rates for the other countries or regions remained relatively steady or increased slightly. A sharp increase occurred in Greece.

In general, countries with high caesarean section rates tend to also have high rates of instrumental vaginal delivery. In Canada, Australia, Greece and the U.S. approximately one out of every three births were operative births. There was no clear relationship between use of caesarean section and use of instrumental vaginal delivery. One might expect that there would be a moderating influence of rising caesarean section rates on instrumental vaginal delivery rates. In several countries (Australia, Canada, Hungary and Israel) we did observe decreasing use of forceps and/or vacuum with increasing use of caesarean section. In contrast, in the CSFR, the Netherlands, the U.K. and Slovenija instrumental vaginal delivery rates remained relatively steady as caesarean rates rose modestly over time. In the U.S. and especially in Greece, there were marked increases in both rates.

Table 2. Caesarean section, forceps, vacuum extraction, instrumental vaginal delivery, and total operative delivery rates in the most recent year according to country or region.

Country	Year	Rates C-S	Forceps	Vacuum	Inst Vag	Total Oper
Victoria	1988	16.1	13.7	0.7	14.4	30.5
Quebec	1988	19.5	10.1	4.3	14.4	33.9
Czech Republ.	1988	7.7	1.3	0.2	1.5	9.2
Denmark	1987	12.1	0.3	9.2	9.5	21.6
Finland	1988	14.4	0.3	5.1	5.4	19.8
Greece	1988	16.7	0.5	14.7	15.2	31.9
Hungary	1987	10.2	0.2	2.1	2.3	12.5
Israel	1987	10.2	1.5	3.3	4.8	15.0
Netherlands	1988	7.2	2.4	4.9	7.3	14.5
Slovenija	1987	7.4	0.2	2.4	2.6	10.0
Scotland	1988	14.4	11.1	0.6	10.8	25.2
Washington	1988	19.1	6.2	4.8	11.0	30.1

Figure 1. Caesarean section rates for the 5 most recent years.

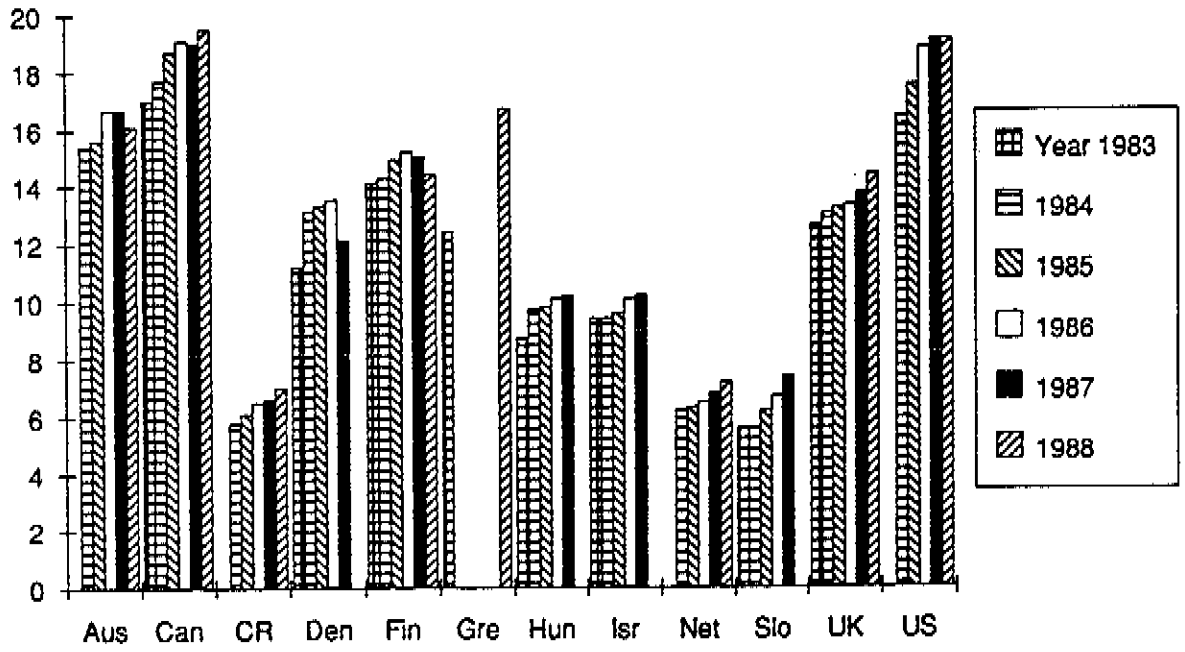


Figure 2. Trends in forceps rates 5 most recent years.

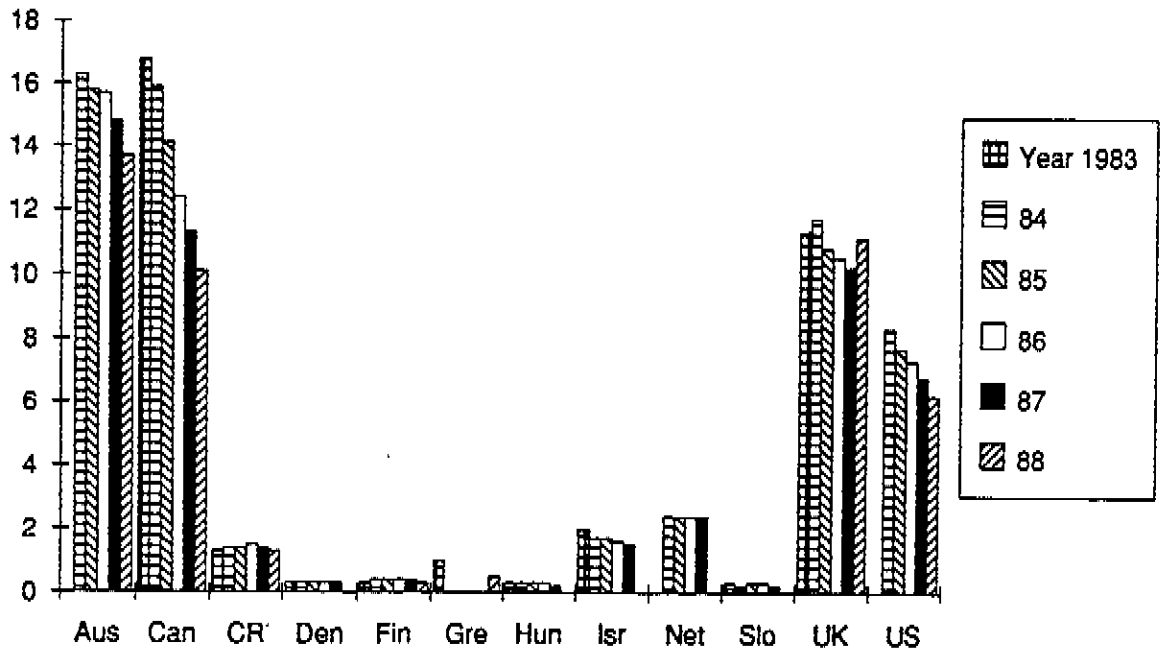


Figure 3. Trends in vacuum rates 5 most recent years.

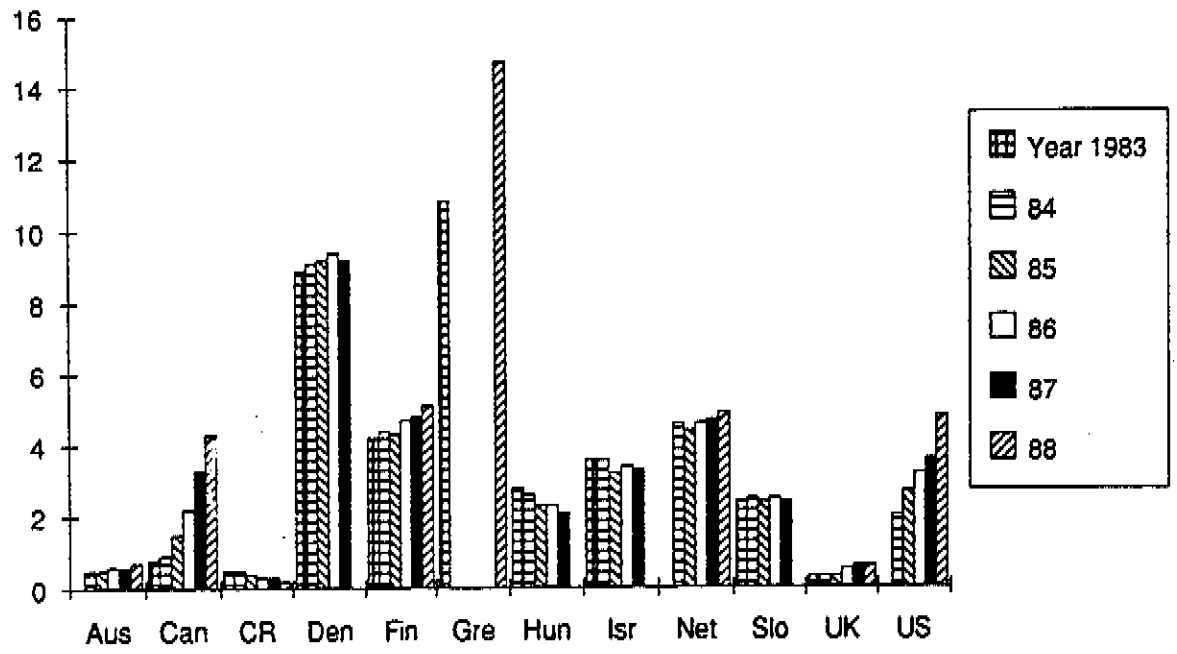
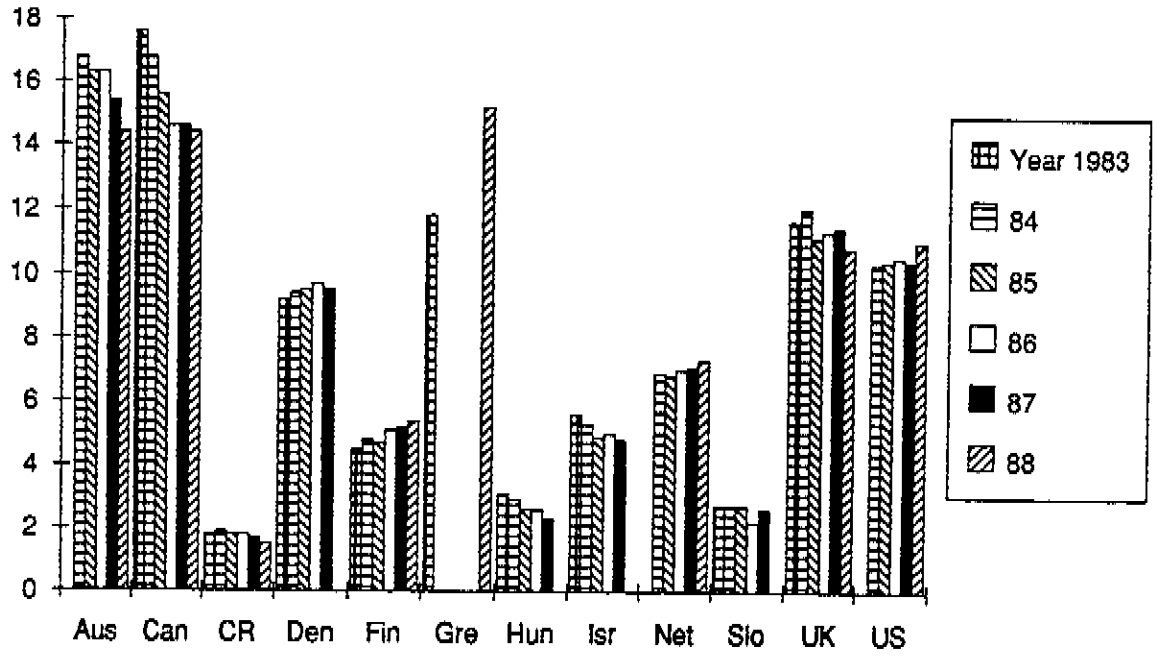


Figure 4. Trends in operative vaginal delivery rates for the 5 most recent years.



In the 5 countries that were able to provide data, the rate of oxytocin use in labour was compared with the respective caesarean and instrumental vaginal delivery rates. The rates of oxytocin use in Greece (80%), Finland (41%) and Victoria (37%) were quite high. In the U.K. and the U.S. the rates were 20% and 12% repectively. There was a moderate positive correlation between use of oxytocin in labour and the rate of operative vaginal delivery (r=0.44, NS). There was no relationship between oxytocin use and caesarean section rates (r=-0.17, NS). Few investigators were able to report country-wide or detailed data on episiotomy or use of obstetrical anaesthesia.

Specific Aim 2

Table 3 presents primary and repeat caesarean section rates in the most recent year. In all countries the proportion of repeat caesarean sections made a significant contribution to the overall caesarean section rate (16-45% of the total rate). In Israel, Hungary, Canada, the U.S. and Greece repeat caesarean section rates made up 37-45% of the respective total rates indicating a tendency in these countries to adhere to the adage 'once a caesarean, always a caesarean'. In the CSFR and Slovenija repeat caesarean section rates were extremely low indicating a tendency not to intervene unless medically necessary.

There were also inter-country differences in the use of caesarean section for the management of multiple birth and low birthweight (Table 4). 33-52% of multiple birth pregnancies were delivered by caesarean section; a 1.6-fold difference. 9-31% of low birthweight infants were delivered by caesarean section; a 3.4-fold difference. The incidence of both multiple birth and low birthweight was similar among these countries or regions and did not explain the differences in rates of caesarean section.

Specific Aim 3

Table 5 displays the proportion of each country's caesarean section rate due to various indications (proportional rates add to 100%). In Australia, Canada, Israel and the U.S. the most frequently cited indication for caesarean section was previous caesarean section. Dystocia was the second most frequently cited indication, breech third and foetal distress fourth. The proportion of the total caesarean section rate attributed to breech was remarkably similar among countries or regions. In the CSFR foetal distress was the most important indication for caesarean section followed by dystocia, breech and previous caesarean. Slovenija followed the pattern of the majority with the exception that dystocia was a more important indication than previous caesarean section.

Specific Aim 4

As expected, there was marked variation among hospitals within countries in their caesarean section and instrumental vaginal delivery rates (Table 6). In several countries, the distributions of caesarean and/or instrumental vaginal delivery rates were quite

Table 3. Primary and Repeat Caesarean Section Rates by Country, Most Recent Year

Country	Year	C-S Rates	
		Primary	Repeat
Canada	1988	12.6	7.3
CSFR	1988	6.8	1.3
Greece	1988	10.4	6.3
Hungary	1987	5.6	4.6
Israel	1987	5.6	4.6
Slovenija	1987	5.7	1.6
U.K.	1988	10.5	3.9
U.S.	1987	12.1	7.0

Table 4. Caesarean Section Rates by Type of Complication and Country, Most Recent Year

Country	Year	Multiple Birth	Low Birthweight
Australia	1988	32.5	30.8
Canada	1987	51.6	31.3
CSFR	1988	42.2	15.3
Greece	1988	--	22.0
Israel	1987	35.0	--
Slovenija	1987	34.1	17.6
U.S.	1987	46.1	9.2

Table 5. Percent of Births Delivered by Caesarean Section by Indication and Country, Most Recent Year

Country	Year	Repeat C-S	Breech	Dystocia	Foetal Distr.	Other
Australia	1987	29.9	17.3	23.5	7.3	22.0
Canada	1987	39.0	14.6	31.4	6.4	8.6
CSFR	1988	6.4	16.9	20.0	33.5	23.2
Greece	1988	40.8	15.0	17.4	10.8	16.0
Israel	1987	35.4	17.2	9.7	17.4	20.4
Slovenija	1987	23.7	12.5	33.8	10.9	19.1
Washington	1987	36.7	13.0	22.1	2.9	18.0

skewed indicating that some hospitals contribute disportionately to the overall rates. (To see this more clearly the reader should compare the medians in this table with the country-wide rates presented previously.)

The size of a hospital's delivery service was an important correlate of hospital-specific caesarean section and instrumental vaginal delivery rates in some countries (Table 7). In all countries except Finland, Greece, Israel and Slovenija, larger delivery services were more likely to have higher intervention rates.

The relationship between neonatal intensive care availability and intervention rates was less clear (Table 8). Only in the U.K. was there a distinction between hospitals with NICU services and those without: hospitals with NICUs had higher intervention rates than hospitals without NICUs.

In most of the participating countries or regions, all hospitals are public hospitals. Only 3 countries reported data for both public and private hospitals (Table 9). Hospital type was positively associated with the rate of caesarean section in the U.S. where 'private' means 'private-for-profit'. Public and private non-profit hospitals had similar caesarean section rates, close to the average for the state as a whole. Private for-profit hospitals, on the other hand, had rates nearly 2 times higher than public or private non-profit hospitals.

Teaching hospitals generally had somewhat higher intervention rates compared with non-teaching hospitals (Table 10). This was particularly true in the U.K..

Specific Aim 5

Table 11 shows the variation in intervention rates among regions (small areas) within countries. Greece, Canada and the U.S. had the widest range in both caesarean section and operative vaginal delivery rates.

The proportion of births or deliveries to women 30 years and older was positively associated with region-specific caesarean section and operative vaginal delivery rates only in Greece. The proportion of births or deliveries to primiparae was positively associated with region-specific instrumental vaginal delivery rates in Australia and the U.S. (Table 12).

Table 6. Median (M) and Range (R) of Hospital-Specific Caesarean Section and Instrumental Vaginal Delivery Rates by Country, Most Recent Year

		C - Section		Inst. Vaginal	
Country	Year	M	R	M	R
Australia	1987	10.3	0.0-36.7	10.5	0.0-47.7
Canada	1987	18.2	0.0-30.1	9.6	0.0-39.1
CSFR	1987	6.4	0.4-15.8	1.4	0.0-7.2
Finland	1988	14.8	0.0-27.6	5.2	0.0-10.7
Greece	1988	10.0	0.0-40.0	6.7	0.0-50.0
Israel	1987	10.3	5.4-15.0	4.8	2.3-11.2
Slovenija	1987	6.7	5.0-14.2	2.8	1.3- 5.1
U.K.	1987	0.0	0.0-21.3	4.0	0.0-17.8
U.S.	1987	17.8	0.0-42.5	5.0	0.0-31.1

Table 7. Correlation of Number of Births or Deliveries per Hospital with Hospital-Specific Caesarean Section and Instrumental Vaginal Delivery Rates by Country, Most Recent Year

Country	Year	C-Section	Inst. Vaginal
Australia	1987	0.35***	0.27***
Canada	1987	0.38***	0.41***
CSFR	1987	0.31***	0.22***
Finland	1988	0.13	-0.01
Greece	1988	0.07	0.13
Israel	1987	-0.14	-0.12
Slovenija	1987	0.00	-0.44
U.K	1987	0.81***	0.77***
U.S.	1987	0.28***	0.44***

Test-statistic: Pearson product-moment correlation

* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

1-tailed test of significance

Table 8. Hospital-Specific Caesarean Section and Instrumental Vaginal Delivery Rates by Hospital NICU Level, According to Country, Most Recent Year

		NICU Level I		II		III		
Country	Procedure	X	(SD)	X	(SD)	X	(SD)	p
Australia (1987)	C-Section	9.1	(9.1)	16.3	(5.3)	13.3	(9.0)	**
	Inst. Vag.	10.4	(8.1)	13.2	(4.5)	13.7	(9.3)	NS
Canada (1987)	C-Section	15.8	(7.5)	18.5	(3.9)	22.0	(1.5)	NS
	Inst. Vag.	10.9	(9.6)	13.7	(9.3)	19.0	(9.1)	NS
CSFR (1987)	C-Section	6.0	(2.6)	6.6	(2.6)	9.5	(2.9)	***
	Inst. Vag.	1.6	(1.1)	1.4	(1.2)	1.6	(0.8)	NS
Finland (1988)	C-Section	14.6	(3.4)			14.4	(5.6)	NS
	Inst. Vag.	5.2	(1.9)			5.2	(1.8)	NS
Israel (1987)	C-Section	6.6	(0.0)	11.0	(2.7)	10.0	(1.9)	NS
	Inst. Vag.	3.4	(0.0)	5.4	(2.4)	5.3	(2.3)	NS
Slovenija (1987)	C-Section	7.3	(2.6)			9.2	(0.0)	--
	Inst. Vag.	3.1	(1.1)			1.1	(0.0)	--
U.K. (1987)	C-Section	1.1	(3.5)			14.1	(2.9)	***
	Inst. Vag.	2.5	(3.3)			10.5	(3.8)	***
U.S. (1987)	C-Section	15.9	(10.2)	17.0	(7.5)	17.6	(3.4)	NS
	Inst. Vag.	6.2	(6.8)	9.2	(7.4)	11.5	(8.4)	NS

Test statistics: Student's t; One-way ANOVA

* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$
NS not significant

2-tailed tests of statistical significance

Table 9. Hospital-Specific Caesarean Section and Instrumental Vaginal Delivery Rates by Hospital Type, According to Country, Most Recent Year

		Hospital Type						
		Public		Private		Other		
Country	Procedure	X	(SD)	X	(SD)	X	(SD)	p
Australia (1987)	C-Section			11.7	(9.4)	9.6	(8.9)	NS
	Inst. Vag.			12.4	(9.2)	10.3	(7.3)	NS
Greece (1988)	C-Section	9.8	(7.5)	12.1	(6.7)			NS
	Inst. Vag.	7.6	(7.1)	9.5	(9.4)			NS
U.S. (1987)	C-Section	20.3	(--)	36.0	(9.6)	19.3	(--)	*
	Inst. Vag.							

Test-statistics: Student's t; One-way ANOVA

* p < 0.05
** p < 0.01
*** p < 0.001
NS not significant

2-tailed tests of statistical significance

Table 10. Hospital-Specific Caesarean Section and Instrumental Vaginal Delivery Rates by Teaching/Non-teaching Status According to Country, Most Recent Year

		Teaching		Non-teaching		
Country	Procedure	X	(SD)	X	(SD)	p
Australia	C-Section	19.0	(4.3)	15.9	(7.5)	NS
(1987)	Inst. Vag.	21.4	(10.4)	10.0	(8.6)	***
Finland	C-Section	15.3	(3.5)	13.2	(6.0)	NS
(1988)	Inst. Vag.	5.3	(1.1)	5.3	(2.4)	NS
Greece	C-Section	9.7	(3.6)	11.0	(7.3)	NS
(1988)	Inst. Vag.	8.0	(4.6)	8.6	(8.6)	NS
Israel	C-Section	10.9	(2.0)	9.2	(2.6)	NS
(1987)	Inst. Vag.	6.0	(2.5)	4.1	(1.3)	*
Slovenija	C-Section	9.2	(0.0)	7.3	(2.6)	--
(1987)	Inst. Vag.	1.6	(0.0)	3.1	(1.1)	--
U.K.	C-Section	16.1	(0.8)	4.9	(6.7)	***
(1987)	Inst. Vag.	14.3	(2.9)	4.6	(4.6)	***
U.S.	C-Section	16.6	(6.3)	16.1	(9.9)	NS
(1987)	Inst. Vag.	12.7	(7.1)	6.2	(6.8)	**

Test statistics: Student's t; One-way ANOVA

* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$
NS not significant

2-tailed tests of statistical significance

Table 11. Median (M) and Range (R) of Region-Specific Caesarean Section and Instrumental Vaginal Delivery Rates by Country, Most Recent Year

		C - Section		Inst. Vaginal	
Country	Year	M	R	M	R
Australia	1988	16.2	13.6-17.3	13.2	11.8-16.0
Canada	1987	19.1	12.5-22.4	10.3	4.7-25.6
CSFR	1987	6.8	5.6- 9.0	1.6	0.9- 2.1
Greece	1988	11.2	5.7-15.5	10.8	3.4-16.3
Israel	1987	10.2	8.8-11.6	4.8	2.8- 7.7
U.S.	1987	20.0	13.5-25.7	4.7	0.0-18.0

Table 12. Correlations between Region-Specific Caesarean Section and Instrumental Vaginal Delivery Rates and Proportions of Births to Primiparae and Women 30 Years and Over Residing in Regions, According to Country, Most Recent Year

Country	Procedure	Maternal age >=30	Primiparity
Australia	C-Section	0.52	0.45
(1988)	Inst. Vag.	0.63*	0.46
Canada	C-Section	0.34	0.45
(1987)	Inst. Vag.	0.46	0.34
Greece	C-Section	0.79**	0.29
(1988)	Inst. Vag.	0.66*	0.05
U.S.	C-Section	0.02	0.02
(1987)	Inst. Vag.	0.23	0.46*

Test statistic: Pearson product-moment correlation

* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

1-tailed test of significance

DISCUSSION

A levelling-off of caesarean section rates in the early 1980s was noted in a previous, multinational comparison study (1). In this study of practices between 1983 and 1988 such a levelling-off of rates was not apparent except in 3 countries where the caesarean section rates actually decreased during the final year of observation. In general, smaller increases in rates of caesarean section occurred in the latter years of the observation period in those countries with the highest rates; more gradual increases occurred in countries with lower rates.

Much attention has been given in the literature to the problem of rising caesarean section rates, but little to the problem of overuse of instrumental vaginal delivery. Several participating countries had very high instrumental vaginal delivery rates throughout the study period, given the rather limited indications for this procedure and the fact that many of the indications for instrumental vaginal delivery are also indications for caesarean section. Indeed, the countries with the highest instrumental vaginal delivery rates generally had high caesarean section rates as well. Thus, the total proportion of operative deliveries (instrumental delivery + caesarean section) was staggering: approximately a third of all births in Australia, Greece, Canada and the U.S..

This finding is almost certainly an indication that a large proportion of interventions are unnecessary or only marginally beneficial. Continued increases in rates of obstetrical intervention are unlikely to lead to improvements in birth outcome (1-6) and may even result in a higher incidence of adverse outcome for mothers and their offspring. The risks associated with caesarean section include: damage to uterine blood vessels; accidental extension of the uterine incision; damage to the urinary bladder; anaesthesia accidents; wound infections; maternal mortality; depressed Apgar score; higher rates of neonatal respiratory distress; shortened mean length of gestation; and higher perinatal mortality in subsequent pregnancies (7-13). Forceps delivery and vacuum extraction are associated with maternal pelvic injury, lowered Apgar score, foetal scalp injuries, intracranial injuries, higher use of anaesthesia and analgesia for pain relief, and neonatal hyperbilirubinaemia (14).

Lomas and Enkin argue that as higher rates of caesarean section are reached, they may have a moderating effect on the instrumental vaginal delivery rate (15). While this argument may be correct, the data reported here are not sufficient to explain underlying trends in clinical decision-making that lead to increases or decreases in intervention rates over time. More detailed data could be used to compare caesarean and operative vaginal delivery rates over time for selected complications, but even this type of analysis would be limited by inter-country differences in diagnostic procedures and reporting (1).

Neither the approach taken here, nor a search for the scientific rationale driving medical decisions and thereby trends in obstetrical practice, is likely, in the end, to explain the inter-country variation in rates of obstetrical intervention or the disparate patterns in the use of caesarean section and operative

vaginal delivery. It is more likely that medical decisions are subject to a variety of economic and social influences (16-22) which differ in importance from country to country and even from one year to the next.

A disturbing finding of this study was the tendency in some countries to 'hurry labour along' with oxytocin. It is most unlikely that 20-80% of women in the participating countries needed oxytocin induction or augmentation, or benefited by it.

There are situations when induction of labour is clearly beneficial: to avoid maternal mortality or morbidity from fulminating preeclampsia; or to avoid prolonging the psychological distress of carrying a dead foetus (23). Post-term pregnancy, another indication for induction of labour, is a rare occurrance; its true incidence is only 4-6% of pregnancies of 28 weeks or more (24). Moreover, in the majority of cases, post-term pregnancy is a variant of normal and is associated with a good outcome regardless of management (24). Clinical trials of oxytocin induction for post-term pregnancy have not demonstrated a reduction in perinatal mortality, abnormalities in foetal heart rate or depressed Apgar scores (24).

Augmentation of labour for slow progress is an intervention that has a place in obstetrical care only after other more simple measures have been tried. Allowing women the freedom to walk around and to eat and drink as tolerated are *at least* as effective as oxytocin augmentation (25).

A number of investigators have shown that oxytocin induction, and perhaps augmentation, has been used for the convenience of physicians, women or both (5,26,27). This practice, as well as a widely held (but scientifically unfounded) belief that slow progress is the most frequent complication of labour, must account for the excessively high rates of oxytocin use in several countries. Oxytocin use for these reasons should be discouraged.

Oxytocin use is not without risks. The findings of this study are consistent with others which have documented a positive association between oxytocin use and operative vaginal delivery (but not caesarean section (24). Induction of labour with oxytocin increases the incidence of neonatal hyperbilirubinaemia (28). Uterine hyperstimulation can also occur with oxytocin use and may lead to inadequate placental blood flow oxygenation and foetal compromise (28). Rarely, uterine rupture or iatrogenic preterm delivery occur as a result of oxytocin use (28). However, Chalmers and Keirse report that in at least one population, the gestational age and birth weight distributions were shifted downwards as elective delivery became more widely used (23,29).

Clinicians in several countries persist in favouring forceps delivery over vacuum extraction for operative vaginal delivery in spite of clear evidence that vacuum extraction is preferable. In clinical trials, women allocated to the forceps arm required more anaesthesia and analgesia for pain relief, and were more likely to sustain serious injury compared with women allocated to the vacuum extraction arm. There was no evidence of an effect of delivery method on Apgar scores. Vacuum extraction was more likely to

cause cephalohaematoma but forceps delivery was more likely to cause other types of scalp injuries (14).

Marked differences in hospital-specific obstetrical intervention rates were noted in several countries. In 4 countries, caesarean section and instrumental vaginal delivery rates over 30% were noted in some hospitals. Naturally, the highest hospital-specific intervention rates and the greatest variation in the same was seen in the countries with the highest rates overall. In these countries, the practices of some hospitals skewed the overall rate for the whole country.

In the U.S. the profit motive explained hospital-specific caesarean section rates that were high even by United States standards. This result was consistent with those reported by other investigators (16,17,19). In the U.S. many private health insurance packages reimburse physicians and hospitals by the procedure rendered. Therefore, more tests and procedures per patient means more income for the physician and greater revenue for the hospital. For-profit hospitals cater to those in socioeconomic brackets high enough to have private insurance coverage of maternity services. At the population level, women in this income bracket are much lower risk than women who are self-pay or women who are enroled in public insurance programmes. Further, for-profit hospitals in the state of Washington do not offer high risk obstetrical care or neonatal intensive care. Therefore, it is difficult to imagine how these hospitals could justify medically, their excessive caesarean section rates.

Other hospital characteristics, especially indicators that a hospital was a tertiary level referral centre, were also expected to be associated with intervention rates. There was no consistency across countries, but overall size of delivery service, availability of NICU, and being a teaching hospital were all factors positively associated with intervention rates. Previous studies have reported higher caesarean section rates for hospitals with larger delivery services (30,31), although in several studies, hospitals with the largest delivery services had lower caesarean section rates than those with medium size services (32,33). In contrast to our findings, other studies have reported lower caesarean rates for teaching hospitals compared with non-teaching hospitals (32-34) and no clear relationship with level of newborn care (35,36).

The data reported herein have several important limitations. Firstly, there are difference among countries in the manner in which data are collected. The variation in completeness of reporting across countries is not known. Undoubtedly there is some variation, and it may, in ways unknown to us, affect systematically the findings reported. Secondly, definitions of events differ somewhat from country to country. As previously mentioned, there is variation as to whether infants or women are counted in the numerators and denominators of some of the rates. For the countries that presented data both ways, it was comforting to see that the difference this made was negligible and did not affect the results or conclusions whatsoever. Thirdly, much of the very detailed data sought could not be obtained or if collected, was not felt to be reliable.

SUMMARY AND RECOMMENDATIONS

The variation in country-wide, hospital-specific or jurisdiction-specific rates within countries was far greater than could be explained on the basis of medical indication, population characteristics, referral patterns among hospitals, etc. It is likely that other, unmeasured factors (e.g., local practice norms, social influences, and differences among countries in methods of reimbursement for health care services) are the more powerful predictors of obstetrical intervention rates.

In an ecological study, it is not possible to determine the proportions of women who did and did not receive appropriate obstetrical care. Still, one can at least infer that a significant proportion of interventions are unnecessary or only marginally beneficial. Continued increases in rates of obstetrical intervention are unlikely to result in improvements in birth outcome and may even result in a higher incidence of adverse outcome for mothers and their offspring.

The question remains: how can countries, communities, or hospitals change practice and improve care? Several strategies have been tried with varying degrees of success.

Consensus conferences are a good first step. These increase awareness about the problem and provide clinical guidelines for appropriate care. They do not, however, seem to have any real impact on the behaviour of physicians and other health providers (37-40).

Clinical review of all births by caesarean section is another strategy (40,41). This type of intervention must be initiated at the level of the hospital. Therefore, the success or failure of such an intervention is likely to depend on the motivation of the staff, and the enthusiasm of the chief of obstetrics.

Community intervention strategies using opinion leaders and educational materials have also met with success (42). One study of this type was a variation of the classic network studies wherein an opinion leader was given an educational intervention designed to produce a change in clinical practice decisions. Others associated with the opinion leaders then gradually modified their practice in accordance with that of the opinion leader.

The effects of adjunct technologies on obstetrical intervention rates should also be accounted for in future studies. For example, the increase in use of electronic foetal monitoring during labour is blamed, in part, for the substantial rise in the caesarean section rate. Interventions directed towards the reduction of inappropriate use of this technology may also help to stem the tide of unnecessary caesarean sections (43).

Changes in physician payment, changes in hospital payment, medical malpractice reform and public dissemination of hospital caesarean section rates are among the other strategies that have been suggested as ways to reduce ceasarean section rates (40). The type of strategy most appropriate for a given country will depend on the cultural and health systems factors behind the increasing

rates. Regardless of the approach taken, the strategy should seek to improve the concordance between actual practice and the scientific basis for practice. It is not so much the rate of obstetrical intervention in a population that is at the heart of the issue, but rather the extent to which interventions are used appropriately to maximize the likelihood of a good outcome.

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ANNEX I

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PROTOCOL

Study of the Determinants of
Obstetrical Interventions

Introduction

In its publication "Having a baby in Europe", the Regional Office for Europe of the World Health Organization presented data showing great variation in the rates of certain obstetrical interventions among the European countries. Furthermore there was little or no significant correlation between these intervention rates and the perinatal mortality in these same countries. This same publication included a discussion of the problem of the rapid expansion of obstetrical interventions and obstetrical technology in the more recent years and the urgent need to evaluate more carefully these interventions and, in turn, modify the intervention rates when appropriate. WHO/EURO selected a number of countries which represented the range of obstetrical intervention rates and approached health authorities and obstetrical organizations in each country. Data on obstetrical interventions will be collected in each of these countries and then sent back to the practising obstetricians, midwives and general practitioners involved with perinatal care in each country.

AIMS

1. To determine the rates of obstetric interventions (caesarean section, forceps,, vacuum extraction, anaesthesia, induction/acceleration, episiotomy) and the way these have changed over time.

2. To determine the rate of caesarean section (CS) among (a) women with previous CS, (b) among multiple births, (c) among births of under 2500 g.

3. To assess the contributions to the CS rate of the various indicators (previous CS; breech; dystocia; foetal distress).

4. To assess how much variation there is between hospitals in intervention rates in each country.

5. To determine how the rates of intervention vary with area of residence of the mother, and is any such variation associated with demographic features or medical facilities available in those areas.

6. To describe the variation between professionals in their attitudes to the timing and indications for intervention in each country.

7. To feed back all of the above data to the health professionals involved with perinatal care in each country. The feedback will be done experimentally using different strategies and the effect of each strategy on the intervention rates will be subsequently measured.

METHODOLOGY

In order to carry out such aims, a variety of different data sets are required and set out as below.

	Data	Aim
A.	National time trends	No. 1
B.	National detailed data for 1 recent year	Nos. 2, 3
C.	Hospital based data	No. 4
D.	Area based data	No. 5
E.	Attitudes	No. 6
F.	Descriptive data	No. 6
G.	Prospective data collection	No. 2, 3, 4

Data required

It is possible that not all data will be available. The need for the investigators to obtain such data should be assessed by the number of asterisks - the more asterisks the more important the data item. Three asterisks indicate that this information is vital to the study; two that it would be very valuable and one that it would be desirable.

A. National data for the whole country for the 5 most recent years

*** (1) No. of births

*** (2) No. of caesarean sections

** (3) No. of forceps deliveries

** (4) No. of vacuum extractions

* (5) No. of episiotomies

* (6) No. of inductions and/or accelerations of labour (see Appendix I)

* (7) No. of mothers given anaesthesia prior to or during birth of the baby (see Appendix 1)

* (8) No. of mothers with none of 2 to 7

*** (9) Birthweight-specific perinatal mortality rates

* (10) Gestational age-specific perinatal mortality rates

[NB Definitions are provided in the Appendix]

B. National data for the most recent year

** (1) Numbers of caesarean section that were elective as opposed to emergency; number by type of incision (see definition in Appendix I).

* (2) Number of women who had had previous caesarean section and the number of those who had a caesarean section for this birth, regardless of whether this was the indication.

* (3) Number of multiple births and number of these delivered by caesarean section.

* (4) Number of low birthweight babies (see Appendix I) and number of these delivered by caesarean section.

*** (5) The indications for each caesarean section (see Appendix I).

C. Hospital based data

For the most recent year, and for each hospital in the country:

*** (1) The intervention rates (as detailed in A (1)-(8)).

*** (2) Type of hospital (see Appendix I).

** (3) Availability of neonatal care (see Appendix I).

* (4) The postnatal hospital stay of all birthing women according to whether or not they had a caesarean section (see Appendix I).

* (5) The numbers of women having fever or wound infection in postpartum period according to whether or not they had a caesarean section.

* (6) The proportion of women with a third degree perinatal tear.

* (7) The numbers of women suffering trauma to the urinary tract.

** (8) The indications for caesarean section coded as in Appendix I.

*** (9) Method by which data obtained.

** (10) Does this hospital have neonatal intensive care facilities?

** (11) Proportion of private patients.

D. Area-based data

The national data should also be analysed by the area of residence of the mother. Each country should choose those area boundaries for which they can most easily obtain the data. In general these will be administrative boundaries. Ideally, there should be at least 10 such areas per study country. Please give information for each such area, however small. Include the whole country. Also send a map.

The data for each area for the two most recent years should be compiled as follows:

*** (1) Total no. of births.

*** (2) Total no. of caesarean sections.

** (3) Total no. of forceps births.

** (4) Total no. of vacuum extractions.

* (5) Total no. of episiotomies.

* (6) Total no. of inductions and/or accelerations of labour (see Appendix I).

* (7) Total no. of mothers given anaesthesia prior to or during birth of the baby (see Appendix I).

* (8) Total no. of mothers with none of (2) to (7).

** (9) No. of registered obstetricians (see Appendix I).

* (10) No of hospital beds in area (i.e. non-chronic beds).

** (11) No. of maternity beds.

** (12) No. of registered midwives.

** (13) Total population.

** (14) Area (sq. km).

** (15) Proportion of births attended by (i) obstetrician (ii) other physician (iii) midwife (iv) other.

** (16) Proportion of births to primiparae.

** (17) Proportion of births to women of ages (i) under 20, (ii) 20-29, (iii) 30-34, (iv) 35 or more.

** (18) Proportion of private births (see Appendix I).

** (19) Proportion of births in teaching hospitals

* (20) Proportion of births to ethnic minorities

* (21) Proportion of births to women by socio-economic status (see Appendix I).

This list is not exhaustive. Any country that feels that they have additional important and available data that should be included is welcome to do so. Please inform this Office of details.

E. Attitude questionnaire

In order to compare the attitudes of health care workers to various intervention strategies, we suggest that the enclosed questionnaire be translated into your local language and given to a randomly selected group of obstetricians and midwives. See Appendix I for methods of choosing a representative sample. The aim of this part of the study is to assess how much divergence of opinion there may be within each country concerning the criteria for intervention. Although the attitude questionnaire is not mandatory, we hope most countries will choose to use it.

F. Descriptive data

The obstetrical intervention rates in each country must be put into the context of the characteristics of the perinatal services system in that country. Each participant has already contributed the general characteristics of the health care system of each country. In addition to this, we need further description of several particular characteristics of the perinatal care. This will be general descriptive information and in most cases probably cannot be quantitative. Each country will simply provide whatever information it can on the features of antepartum and intrapartum care under the following headings:

** (1) Is there any continuity of care between the antenatal, intrapartum and postpartum periods in regard to (i) care by the same physician, (ii) care by the same midwife, (iii) care by the same team of obstetricians and midwives, (iv) care by the same institution? Have there been any attempts at trying to overcome these problems?

*** (2) Please describe, in general, how the different providers of care get paid in both the private and the public sector. In particular is it by (i) salary with no additions, (ii) fee per birth regardless of particular interventions that may or may not have occurred, (iii) fee per intervention, (iv) any of the above with other official and/or unofficial payments.

** (3) How much choice do most mothers have over the following: (i) accompanying partner/friend/relative at birth, (ii) place of birth, (iii) rooming in (of baby with mother), (iv) shaving, (v) position of mother during birth, (vi) type of birth (i.e. caesarean section, vaginal), (vii) analgesia/anaesthesia, (ix) choice of birth attendant, (x) electronic fetal monitoring, (xi) episiotomy, (xii) enema, (xiii) mobility during labour.

For any of the above, if there is any qualitative or quantitative data, please give details.

G. Prospective data collection

For countries where current data on obstetric procedures are lacking, it is suggested that a study be mounted on either all births in the country or a stratified sample of hospitals using the questionnaire reproduced in Appendix II.

FEEDBACK

When all the results have been received from each country and both the within-country and between-country analyses completed, then all of this information will be fed back to the health care workers involved with perinatal care in each country. The purpose of such feedback is to attempt to influence the practices of these health providers toward more appropriate obstetrical intervention rates. Each country will develop several different strategies for feeding back this information to these health workers. These different strategies will then be applied experimentally and any changes in intervention rates subsequently measured. In this way, we can scientifically determine the best strategies in each country to influence practices. There

will be extensive collaboration among the countries with regard to generating various strategies and sharing the experimental results. WHO will assist in the development and evaluation of these strategies for feedback. All of this feedback and evaluation will comprise Phase II of this Study.

APPENDIX I

Details and definitions

Below are listed the definitions that should ideally be used. Where this is not feasible, but data exist that is similar, these should be sent to WHO with details of any discrepancies in coding.

Birth: all stillbirths and livebirths, using usual definitions for your country.

Forceps: all high, medium and low forceps deliveries together with breech with forceps to the aftercoming head. Data for each category can be given separately or combined.

Induction: Induction is the deliberate use of a manoeuvre or chemical method to initiate labour and which results in contractions.

Acceleration: Acceleration or augmentation is the use of a manouvre or chemical method to shorten the length of labour which has already started.

Data on induction and acceleration should also be combined - remembering that the categories will not be additive, since they are not mutually exclusive.

Anaesthesia: Births should be divided according to whether the mother received (a) general anaesthesia, (b) epidural anaesthesia, (c) spinal anaesthesia, (d) other anaesthesia, (e) no anaesthesia.

Birthweight specific mortality rates — mortality rates for the birthweight groups: less than 1000 g, 1000-1499, 1500-1999, 2000-2499, 2500-2999, 3000-3499, 3500-3999, 4000-4499, 4500+. Data should be given for (a) perinatal deaths per 1000 total births; (b) stillbirths per 1000 total births; (c) early neonatal deaths (0-7 days) per 1000 live births; (d) late neonatal deaths (8-28 days) per 1000 live births.

Elective caesarian section — one which has been decided in advance.

Emergency caesarian section — one that is done in rapid response to a clinical situation.

Uterine incision: — Classical, where the upper part of the uterus is cut vertically; lower uterine segment, where the incision is confined to lower uterine segment.

Multiple birth: — A twin, triplet, quadruplet, etc. When discussing caesarean section, distinction should be made if possible between sections for a first twin and sections for a second twin (*).

Low birthweight: — Less than 2500 g.

Indications for caesarean section: — These should be grouped as follows:

(1) repeat CS
(2) breech
(3) dystocia
(4) fetal distress
(5) other

Where more than one indication is coded, use the above list in order of precedence from repeat CS downwards. Thus, if there is fetal distress and breech, the code should be breech.

Dystocia: Dystocia (literally means "difficult labour") is characterized by abnormally slow progress of labour. It is the consequence of four distinct abnormalities that may exist singly or in combination: decrease in uterine forces; difficult second stage; faulty presentation or lie; abnormalities of the birth canal. We recommend using all ICDIX classifications covered by code numbers 653, 660, 661 (excluding 661.3), 662. If you do not use ICD, please use whatever system is available and let WHO know details of system used.

Type of hospital: For each hospital for which statistics are derived, the following classification should be used:
A. Teaching hospital (one in which full postgraduate obstetric training takes place).
B. Other public hospital with registered obstetricians.
C. Community hospitals with no registered obstetrician.
D. Other (specify).

Postnatal stay: Numbers of women staying: less than 3 days, 3-5 days, 6-8 days, 9-11 days, 12+ days.

Neonatal intensive care: (i) paediatrician available but not present in each complicated birth, (ii) grade 2 neonatal unit, (iii) grade 3 intensive neonatal unit.

Area based data: It is recognized that in some areas, special efforts may have to be made to get approximate data concerning the intervention rate. If, for example, information from hospitals are used, one may have to assume that the area of residence of the mothers is the same as the area in which the hospital is located. In any event, full details should be returned to WHO.

Registered obstetrician: One who has the full qualifications required to practice on his/her own. This will not include persons still in training.

Primipara: A woman who has had no previous pregnancies resulting in either a livebirth or a stillbirth.

Private birth: The birth of a baby as a consequence of which parents have to make financial contribution. In many countries there are particular distinctions between public and private patients. Use the local definition, but let WHO know the details of the categorization.

Ethnic minority: Each country should define as appropriate to their population. The classification should be clearly documented.

Socio-economic status: Use classifications relevant to the country - whether based on income, parental education or parental occupation. If possible, divide into 3 groups: the 20% of the population who are most advantaged, the 20% most deprived and the remainder.

Administering the attitude questionnaire

The attitude questionnaire which is attached consists of a number of case histories and questions as to when (if at all) intervention should take place. This questionnaire should be mailed to a sample of obstetricians and a sample of midwives selected at random. All obstetricians working in teaching hospitals should be put on one list and one-third of the total sample of obstetricians selected randomly from this list by giving each obstetrician a number and then drawing numbers blindly until the predetermined sample size has been reached. All midwives working in teaching hospitals will be put on a list and one-third of the total sample of midwives selected randomly from this list. Then a list of all practising obstetricians not working in teaching hospitals will be made and the other two-thirds of the total sample of

obstetricians randomly selected from this list. Then a list of all practising midwives not working in teaching hospitals will be made and the other two-thirds of the total sample of midwives randomly selected from this list. The size of the total sample of obstetricians and midwives should be as large as possible and will be determined by each country but the minimum sample size is 50 obstetricians and 50 midwives.

Reminders should be sent at intervals so that a response rate of at least 80% is achieved. Before any mailing takes place, however, the questionnaire should be piloted by allowing at least 10 health workers to fill in the questionnaire and make comments on the wording and possible clarification that is needed. Changes in content are not possible but improved translation and wording can be achieved such through pre-testing.

APPENDIX II

Suggested items for questionnaire for those countries doing prospective collection of data

(to be used in those countries where data is not already available)

- Case number.
- Country.
- Place (county) of permanent residence.
- Place (county) in which the birth took place (if different).
- Age of the mother.
- Mother's insurance - who is going to pay? (i) insurance only, (ii) insurance and private payment, (iii) private payment only.
- Mother's education (years of schooling).
- Father's education (years of schooling).
- Parity.

- Did you ever have caesarean section before? If so, how many?

- Date of first day of your last menstrual period.
- Are you sure about it?
- Did you have any of the following conditions during pregnancy? (a) urinary tract infection, (b) diabetes, (c) heart disease, (d) hypertension, (e) active TB, (d) else.

- Maternal height
- Highest blood pressure before onset of labour.
- Proteinuria before onset of labour? (Slight, moderate, severe).
- History of bleeding before onset of labour?
- Was mother admitted to the place of birth: (a) not in labour, (b) in labour (booked), (c) in labour (unbooked), (d) as emergency.

- Was it initially intended that the mother should give birth in this hospital?
- If no, what was the reason for the transfer (describe).
- The birth took place in: (a) a state hospital, (b) a private clinic, (c) a teaching hospital, (d) other.

- The onset of labour was: (a) spontaneous, (b) induced, (c) unknown.
- If labour induced, the reason was: (a) postmaturity, (b) toxaemia, (c) other reason.

- If the labour was induced, the method used was: (a) surgical rupture of membranes, (b) pitocin, (c) combination, (d) other, (e) unknown.
- Was the labour accelerated (yes, no)?
- The membrane rupture was: (a) spontaneous, (b) surgical, (c) unknown.
- What was the presentation of the baby at birth?
- Was episiotomy carried out?
- What was the method of actual birth? (a) spontaneous, (b) vacuum extraction, (c) forceps, (d) elective caesarean, (e) emergency caesarean.
- In case of caesarean section, type of section (see Appendix I).
- If birth was not spontaneous what was the reason for intervention? (a) repeat caesarean section, (b) breech, (c) dystocia, (d) foetal distress, (e) other.
- If foetaldistress, was it: (a) passage of meconium, (b) foetal heart rate abnormality.
- What drugs were used during labour? (a) none, (b) spasmolytic only, (c) syntocin only, (d) combination, (e) other, (f) not known.
- If spasmolytic: (a) pethidine, (b) sparine, (c) other.
- If ocytocin: (a) pitocin, (b) prostaglandins, (c) spartane.
- Anaesthesia (see Appendix I).
- At what stage?
- Who was responsible during labour: (a) obstetrician, (b) midwife, (c) other doctor, (d) no trained person, (e) no-one, (f) not known.
- Who attended the birth.
- Actual time and date of birth.

- (a) live birth, (b) stillbirth
- (a) single birth, (b) twin A, (c) twin B, (d) triplet, (e) twin not known.
- Weight at birth in grammes (see Appendix I).

- Did the baby require resuscitation? (a) yes, (b) no, (c) only aspiration of air passages, (d) not known.
- If yes: (a) intratracheal oxygen, (b) i.v. drugs, (c) intercardic drugs, (d) combination.

- Length of stay of mother: less than 3 days, 3-5 days, 6-8 days, 9-11 days, 12+ days.
- Length of stay of baby: less than 3 days, 3-5 days, 6-8 days, 9-11 days, 12+ days.
- Caesarean section wound infection: common, severe.
- Pyrexia, postpartum: yes, no.
  Antibiotics: yes, no.
- Was there a third degree tear?

Fate of the infant on the 6th day of life: (a) alive, (b) dead.

BIRTH ATTENDANT ATTITUDE INTERVIEW SCHEDULE

1. Name _____ (code number)

2. Country _____

3. Town/area _____

   (1) rural (2) semi-urban (3) urban

4. Work address _____
   _____
   _____
   _____

   (1) public practice only
   (2) private practice only
   (3) both public and private
   (4) other

5. Sex (1) female (2) male

6. Age (in years)

7. Professional training and status:

   (1) midwife, formal training, direct entry
   (2) midwife, formal training, indirect entry
   (3) midwife, no formal training
   (4) nurse
   (5) obstetrician
   (6) G.P.
   (7) other

8. Number of years in practice

9. Number of deliveries in 1987

10. Where do you do most of your deliveries?

(1) home
(2) freestanding birth centre
(3) hospital-based birth centre
(4) conventional hospital unit with birthroom
(5) conventional hospital unit without birthroom
(6) hospital-based maternity unit
(7) maternity home

11. What was the total number of births taking place in your work setting in 1987?

HYPOTHETICAL CASES

For each of the three hypothetical cases presented below, please indicate how you would manage the patient described by checking the appropriate box.

1. A 22-year-old woman, para 1 gravida 2 at 36 completed weeks gestation, has had an uneventful pregnancy to date. The fetus is in vertex presentation, average size for dates. Her first delivery was by lower segment caesarean section for breech presentation. She would prefer a vaginal delivery on this occasion.

(a) Would you permit a trial of labour for this patient? ☐

OR

(b) Would you schedule her for elective caesarean? ☐

2. A 34-year-old woman, para 1 gravida 2, enters hospital in active labour. Her cervix is 4cms. dilated, membranes intact. X-ray confirms the examination findings of breech presentation and shows that it is a frank breech with well flexed head. The fetus is average size. Her first baby weighed 8 lbs. and delivery was uneventful.

(a) Would you allow this woman to continue in labour? ☐

OR

(b) Would you schedule her for an emergency caesarean section? ☐

3. A woman having her first baby is certain of her dates, obstetric conditions are favourable and she asks for induction 3 days before her expected day of confinement.

There are no medical indications but she wants induction so that the baby will be born before the mother has to go back to Australia. Would you advise her to:

Wait	1
Try an induction	2
Do not know/unsure	3

4. A 30-year-old 1 para goes into labour a few days over certain term. Labour starts with ruptured membranes at 6 p.m. At 8 p.m. she is in hospital - only dilated about 2 cm. Clear amnion, heartbeat good, no contractions. Would you:

Induce after 6 hours	1
Induce next morning	2
Induce immediately	3
Wait	4
Give penecillin and wait	5
Do not know/unsure	6

5. A woman having her third child. She has been in labour for 8 hours. She is now fully dilated and has been so for 2 hours. The caput is almost on the pelvic floor. The foetal heart is fine. The mother is exhausted. It is 3 a.m. Sunday morning. Would you:

Do a caesarean section	1
Give her an epidural	2
Try forceps	3
Try vacuum	4
Put up a drop	5
Do not know/unsure	6

6. 1 para has been in labour for 10 hours and is now 6 cm dilated and has been that for 3 hours. The contractions are very painful. Would you:

Suggest caesarean section	1
Suggest an epidural	2
Put up a drip	3
Encourage her to walk around	4
Put her into a hot tub	5

ANNEX II

CO-INVESTIGATORS AND CONSULTANTS

WORLD HEALTH ORGANIZATION, EUROPEAN REGIONAL OFFICE

Marsden G. Wagner
WHO EURO
Scherfigsvej 8
DK-2100 Copenhagen
Denmark

AUSTRALIA

Judith Yates
Perinatal Data Collection Unit
Health Department Victoria
555 Collins Street
Melbourne 3000
Victoria, Australia

Judith Lumley
Centre for the Study of Mothers' and Children's Health
Monash University
Clayton, Victoria 3168
Australia

CANADA

Madeleine Levasseur
Direction de l'Evaluation
Ministere de la Sante et des Services Sociaux
1075 CH. Ste-Foy, 3
Quebec QC G1S 2M1
Canada

Raynald Pineault
Dept. of Social and Preventive Medicine
University of Montreal
Pavillon Marguerite d'Youville
2375, chemin de la Cote Ste-Catherine
CP 6128, Succursale A
Montreal, Quebec H3C 3J7
Canada

CZECH AND SLOVAK FEDERAL REPUBLIC

Zdenek Stembera
Research Inst. for Mother and Child Care
Nab. K. Marxe 157
147 10 Prague 4
Czech and Sloval Federal Republic

DENMARK

Lisbet Knudsen
Sundhedsstryrelsen
Amaliegade 13
Postboks 2020
1012 Copenhagen K
Denmark

FINLAND

Elina Hemminki
Dept. of Public Health
University of Helsinki
Haartmaninkatu 3
002 90 Helsinki
Finland

Risto Tuimala
Dept. of Obstetrics and Gynecology
Tampere University Central Hospital
335 20 Tampere
Finland

GREECE

Chrysanthi Bakoula
First Dept. of Pediatrics
Athens University
Aghia Sophia Hospital for Sick Children
Athens 115 27
Greece

Denis J. Araventinos
Dept. of Obstetrics and Gynecology
University of Athens
12 Lykavittou Street
106 73 Athens
Greece

HUNGARY

Janos Tiba
Semmelweiss University Medical School
1st Dept. of Obstetrics and Gynecology
Baross u. 27
1088 Budapest
Hungary

ISRAEL

Joseph Schenker
Dept. of Obstetrics and Gynecology
Hadassah Medical Organization
Kiryat Hadassah
P.O.B. 12000
il-91120 Jerusalem
Israel

NETHERLANDS

Hans Verbrugge
Medical Officer of Maternal and Child Health Care
Dept. of the Chief Medical Officer of Health
P.O. Box 5406
2280 HK Rijswijk
The Netherlands

SLOVENIJA

Jelka Zupan
Centers for Disease Control
NCEHIC, DBDD, Developmental Disabilities Branch
MS F-37
Atlanta GA 30333
USA

or

University Dept. of Obstetrics
Slajmerjeva 3
6100 Ljubljana
Slovenija

UNITED KINGDOM

Susan K. Cole
Scottish Health Services Common Services Agency
Information and Statistics Division
Trinity Park House
South Trinity Road
Edinburgh EH5 3SQ
Scotland

UNITED STATES

Patricia Stephenson
Centre for Public Health Research
Landstinget i Värmland
651 82 Karlstad
Sweden

CONSULTANTS

Susanne Houd
Skt. Thomas Alle 6
1824 Fredericksberg C
Denmark

Jonathan Lomas
Centre for Health Economics and Policy Analysis
Dept. of Clinical Epidemiology and Biostatistics
McMaster University
1200 Main Street West
Hamilton Ontario L8N 3Z5
Canada

Francis C. Notzon
Office of International Statistics
National Center for Health Statistics
USDHHS, PHS, CDC
6525 Belcrest Road
Hyattsville MD 20782
USA

ANNEX III

BIRTH ATTENDANT QUESTIONNAIRE

1. Are you currently offering obstetrical care to your patients?

   ____ Yes

   ____ No

2. What type of patients do you currently see in your practice?

   ____ public patients only

   ____ private patients only

   ____ both public and private patients

   ____ other

3. What is your sex?

   ____ female

   ____ male

4. What is your age (in years)? _____

5. Your professional training and status is:

   ____ obstetrician

   ____ nurse-midwife

   ____ nurse-practitioner

   ____ G.P./family practioner

   ____ other

6. How many years have you been in practice? _____

7. How many deliveries did you perform in 1987? _____

8. Where do you do most of your deliveries?

   ____ home

   ____ hospital maternity unit with birthroom

   ____ hospital maternity unit without birthroom

   ____ freestanding birth centre

   ____ maternity home

   ____ home

HYPOTHETICAL CASES

For each of the six hypothetical cases presented below, please indicate how you would manage the patient described by checking the appropriate box.

1. A 22-year-old woman, para 1 gravida 2 at 36 completed weeks gestation, has had an uneventful pregnancy to date. The fetus is in vertex presentation, average size for dates. Her first delivery was by lower segment caesarean section. She would prefer a vaginal delivery on this occasion.

   (a) Would you permit a trial of labour for this patient? [ ]

   OR

   (b) Would you schedule her for elective caesarean? [ ]

2. A 34-year-old woman, para 1 gravida 2, enters hospital in active labour. Her cervix is 4 cm dilated, membranes intact. Sonogram confirms the examination findings of breech presentation and shows that it is a frank breech with well flexed head. The fetus is average size. Her first baby weighed 8 lbs. and delivery was uneventful.

   (a) Would you allow this woman to continue in labour? [ ]

   OR

   (b) Would you schedule her for an emergency caesarean section? [ ]

3. A woman having her first baby is certain of her dates, obstetric conditions are favorable and she asks for induction 3 days before her expected day of confinement. There are no medical indications but she wants induction so that the baby will be born before the mother has to go back to Australia. Would you advise her to:

Wait	[ ]
Try an induction	[ ]
Do not know/unsure	[ ]

4. A 30-year-old para 1 goes into labour a few days over certain term. Labour starts with ruptured membranes at 6 p.m. At 8 p.m. she is in hospital - only dilated about 2 cm. Clear amnion, heartbeat good, no contractions. Would you:

Induce after 6 hours	[ ]
Induce next morning	[ ]
Induce immediately	[ ]
Wait	[ ]
Give antibiotic and wait	[ ]
Do not know/unsure	[ ]

5. A woman is having her third child. She has been in labour for 8 hours. She is now fully dilated and has been so for 2 hours. The caput is almost on the pelvic floor. The foetal heart is fine. It is 3 a.m. and the mother is exhausted. Would you:

Suggest a caesarean section	[ ]
Suggest epidural	[ ]
Try forceps	[ ]
Try vacuum	[ ]
Put up a drip	[ ]
Do not know/unsure	[ ]

A para 1 has been in labour for 10 hours. She is now 6 cm dilated and has been so for 3 hours. The contractions are very painful. Would you:

Suggest caesarean section	[ ]
Suggest an epidural	[ ]
Put up a drip	[ ]
Encourage her to walk around	[ ]
Put her into a hot tub	[ ]
Do not know/unsure	[ ]

BIRTH ATTENDANT QUESTIONNAIRE

1. Are you currently practicing midwifery?
   ____ Yes
   ____ No
2. What type of patients do you currently see in your practice?
   ____ public patients only
   ____ private patients only
   ____ both public and private patients
   ____ other
3. What is your sex?
   ____ female
   ____ male
4. What is your age (in years)? _____
5. Your professional training and status is:
   ____ licensed midwife
   ____ nurse-midwife
   ____ midwife, unlicensed, formal training in another state or country
   ____ midwife, no formal training
   ____ nurse-practioner
6. How many years have you been in practice? _____
7. How many deliveries did you perform in 1987? _____
8. Where do you do most of your deliveries?
   ____ hospital maternity unit with birthroom
   ____ hospital maternity unit without birthroom
   ____ freestanding birth centre
   ____ hospital-based birth centre
   ____ maternity home
   ____ home
9. Did you attend any home births in 1987?
   ____ Yes
   ____ No

HYPOTHETICAL CASES

For each of the six hypothetical cases presented below, please indicate how you would manage the patient described by checking the appropriate box.

1. A 22-year-old woman, para 1 gravida 2 at 36 completed weeks gestation, has had an uneventful pregnancy to date. The fetus is in vertex presentation, average size for dates. Her first delivery was by lower segment caesarean section. She would prefer a vaginal delivery on this occasion.

   (a) Would you permit a trial of labour at home for this patient? [ ]

   OR

   (b) Would you refer her to a physician or hospital-based midwifery service? [ ]

2. A 34-year-old woman, para 1 gravida 2, is in active labour. Her cervix is 4 cm dilated, membranes intact. Examination finds breech presentation. The fetus is average size. Her first baby weighed 8 lbs and delivery was uneventful.

   (a) Would you allow this woman to continue in labour at home? [ ]

   OR

   (b) Would you transfer her to hospital? [ ]

3. A woman having her first baby is certain of her dates, obstetric conditions are favorable and she asks for induction 3 days before her expected day of confinement. There are no medical indications but she wants induction so that the baby will be born before the mother has to go back to Australia. Would you advise her to:

Wait	[ ]
Try an induction	[ ]
Do not know/unsure	[ ]

A 30-year-old para 1 goes into labour a few days over certain term. Labour starts with ruptured membranes at 6 p.m. At 8 p.m. she is only dilated about 2 cm. Clear amnion, heartbeat good, no contractions. Would you:

Transfer to hospital after 6 hours	[ ]
Transfer to hospital the next morning	[ ]
Transfer to hospital immediately	[ ]
Wait	[ ]
Give antibiotic and wait	[ ]
Do not know/unsure	[ ]

5. A woman is having her third child. She has been in labour for 8 hours. She is now fully dilated and has been so for 2 hours. The caput is almost on the pelvic floor. The foetal heart is fine. It is 3 a.m. and the mother is exhausted. Would you:

Transfer to hospital	[ ]
Try forceps	[ ]
Try vacuum	[ ]
Put up a drip	[ ]
Do not know/unsure	[ ]

6. A para 1 has been in labour for 10 hours. She is now 6 cm dilated and has been so for 3 hours. The contractions are very painful. Would you:

Transfer to hospital	[ ]
Put up a drip	[ ]
Encourage her to walk around	[ ]
Put her into a hot tub	[ ]
Do not know/unsure	[ ]