ASSESSING THE COST BENEFIT OF WIN INTERVENTIONS IN RUSSIA

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1. ACKNOWLEDGEMENTS

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2. EXECUTIVE SUMMARY

Objective of Cost Study

The main objective of the study was to quantify the financial impact of the WIN interventions in the pilot maternity hospitals.

Methodology

The setting for the study was 2 of the pilot maternity hospitals in Perm Oblast (City Maternity #21 and Berezniki). A Before and After analysis of hospital and patient related care costs was based on a review of patient records of women who delivered in the WIN hospitals during a six-month period prior to and then following the implementation of WIN interventions. A total of 632 cases were reviewed in the 2 pilot hospitals that participated in the study: a total of 307 cases in Perm #21, and 325 cases in Berezniki. The analysis also collected information on hospitalization (length-of-stay or LOS) for an estimate of more general hospital expenditures.

Maternal Care

- An overall reduction in the cost care was observed for women delivering in both study sites, but the degree and source of the cost reduction differed between hospitals.
- The **total cost of care decreased by 28%** (from 321,507 to 230,167 Rub) **in Perm #21** and **by 13%** (from 913,755 to 795,893 Rub) **in Berezniki**. **In Perm #21** these reductions were associated with significant changes in **average cost per patient**: **cost of test and drugs decreased by 52%** and **cost of hospitalization** lowered **by 26%**. **In Berezniki** cost of hospitalization reduced **by 11%.**

Practice of Using Analgesics and Anesthesia during Labor

- Analgesics showed a decrease in both hospitals (more significant in Perm #21) in terms of average cost per patient: costs were reduced by 95% in Perm21 and by 11% in Berezniki.
- **In Perm #21**, the cost reduction was associated with **decreasing the number of patients receiving analgesics from 62% to 5%**.
- There was **decrease in polypharmacy** (from use of **18 different types of drugs before** the intervention to **7 after** in Perm #21).

Cost Impact of Changes in Breast-Feeding Practices

- **Cost savings** over the six-month after period range were from about **81,000 to 222,000 rubles in Berezniki and Perm #21** respectively.

Other Practices related to Births: Enemas and Perineal Shaves

- Estimates for deliveries performed in each hospital **over a 6 month** period January to June 2002 suggest **savings** in the order of **5,040 and 3,538 rubles in Perm#21 and Berezniki** hospital, respectively.

Practice of Drug Therapy and Use of Tests

- The **number of different types of drugs and tests** was **reduced by half from 52 to 24** types being used in for the sample of patients with normal delivery **in Perm #21**. The **average number of interventions** (tests and drugs) per patient was also dramatically **reduced (from 10 to 3 per patient**). Both of these factors contributed to the significant reduction **(-57%) in unit costs**.

Change in Cost of Care to Newborns

- In **Perm#21** changes in practices for prevention and treating different conditions including infections in babies have resulted in significant **decreasing in the cost of care (-76%).**
- Changes in the **cost of cord care** were observed in both hospitals **(-75% in Perm#21 and –57% in Berezniki**).

Changes in Hospital Length of Stay (LOS)

- Significant **reduction in LOS** per patient was measured **in Perm #21**, **from 9 days** per patient per delivery **to 7 days**. **In Berezniki**, LOS per patient was also a day shorter in the After group relative to the Before group (**9 versus 10 days**).

Conclusions

The WIN interventions had significant financial impact on the pilot sites. The observed changes in costs can be attributed to the implementation of WIN interventions and the changes have mostly been beneficial, especially in Perm #21.

3. BACKGROUND AND OBJECTIVES OF COST STUDY

Between June 1999 and June 2002, funded by the United States Agency for International Development (USAID)/Russia under the Technical Assistance Service Contract/ Indefinite Quantity Contract (TASC/IQC), John Snow, Inc. (JSI) implemented the Women and Infant Health (WIN) project in 3 pilot cities in Russia. The project aimed to improve the quality of care provided to women during pregnancy, labor, delivery and the postpartum period; support breastfeeding; and provide family planning counseling after births and abortions. The pilot cities included Perm and Berezniki in Perm Oblast, and Novgorod City in Veliky Novgorod Oblast.

During its fourth year extension, the WIN project was asked by USAID/Russia to conduct a more careful analysis of the financial costs and benefits of implementing the WIN interventions. This research proposal responds to that request. The paper describes the specific objectives of the operational research and provides a description of the research methodology to analyze data on cost and benefits.

The main objective of the study was to better understand and quantify the financial impact of the WIN interventions in the pilot maternity hospitals. Anecdotal reports from maternal and child health leaders in pilot sites already indicated that significant savings had been made by hospitals due to fewer supplies and medicines being used for maternity services. Savings accrued from the reduced use of sterilization materials, analgesics and anesthetic drugs, bottles and feeding formulas, antibiotics and intravenous solutions.

Based on these findings, this study specifically addressed the following questions:

1. How has the cost of caring for delivering women changed as a result of implementing the WIN interventions? What major costs or resources has a hospital incurred or saved as a result of implementing the WIN interventions?
2. What are the major drivers of the change in costs (hospital and patient related)?

The broader objective of the study was to provide health facilities involved in the scale-up phase of the project with information and guidance for managing the financial impact of the interventions. It was hoped that, based on the experience of sites being studied here, newly recruited facilities can anticipate, plan for and maximize the financial aspects of implementing the interventions; the study would provide a basis for understanding the major factors to be managed in this regard.

In an effort to keep the study relatively simple and realizable in the available time frame, the study was conducted under two parameters. One, the analysis focused primarily on quantifying the costs – i.e., inputs/resources spent or saved – associated with the WIN interventions. Reports of the interventions' positive impact on the quality of care for women and newborns suggested that the financial impact of the interventions extended to outcomes of the interventions (e.g., improved client perceptions of quality of care

may improve hospital reputation and ultimately utilization of services). Potential financial benefits may also have accrued to the patients and their families (e.g., from shorter stays in the delivery ward), or ultimately the hospital. However, all these aspects of the intervention are considered outside the scope of this study.

Another parameter of the study was that the analysis would focus on costs associated with the maternity hospitals. The primary rationale for this was that the major interventions focusing on improving quality of care were introduced in the hospital settings. Maternity hospitals have also been the major centers of activity and change.[1]

The setting for the study was 2 of the pilot maternity hospitals in Perm Oblast (City Maternity #21 and Berezniki). These include two urban hospitals. Both were deemed appropriate as they had successfully implemented the WIN interventions during the pilot project phase, and had complete and accessible information required for this study.

4. METHODOLOGY

The major strategy used to investigate the key questions in this study was a **Before and After** analysis of hospital and patient related care costs based on a review of patient records of women who delivered in the WIN hospitals; the analysis would include unit cost information from hospital economists, to understand the changes in the cost of care.

The aim of this approach was to use a bottom-up approach to understand any cost changes attributable to the use of WIN interventions. The analysis focused on patient-related interventions and collected information on hospitalization (length-of-stay or LOS) for an estimate of more general hospital expenditures. The design for this approach was essentially a before-and-after study of the cost of care provided to delivering women in the pilot maternity hospitals.

This component of the study involved a review of medical records of pregnant women who had delivered in the hospital during a six-month period prior to and then following the implementation of WIN interventions. The records of pregnant women were identified using patient registries. Medical records in these hospitals were considered to be accessible, though they required that relevant information be abstracted manually. The sample size of medical records to be reviewed in the hospital sites was determined based on information on the number of deliveries recorded in each site over the relevant time periods.

A data collection form was developed to abstract data from medical records **(Appendix 1)**. The tool was reviewed and finalized with providers involved in the WIN project prior to beginning data collection. Their feedback informed the completeness of the data being collected (i.e., all data relevant to assessing the financial impact of the WIN interventions), and the feasibility of collecting the data from medical records. An accompanying set of guidelines was developed to ensure consistency in the type of information that was collected and how it was obtained. The guidelines were used to train the person abstracting the medical records in each hospital **(Appendix 2)**. The guidelines also include cost estimation forms to collect information on the cost of drugs, test, and a hospital-stay (hospital-bed-day). The cost data was obtained with the assistance of hospital economists or other sources such as health insurance organizations affiliated with the hospitals.

[1] Other sites that have involved in the WIN project include antenatal and women's consultation clinics, family planning clinics, abortion units and NGOs.

The same types of data were collected from records both before and after the WIN intervention period, including information on procedures performed and treatment given. The costs of these procedures and treatment were determined based on the information from these forms. As mentioned above, the study primarily focused on information on care that is likely to be affected by the implementation of WIN interventions, and that would require the expenditure of hospital resources. The kinds of care inputs to investigated was guided by literature on the WIN interventions in the pilot sites and other costing exercises that have been done around WIN-like or Family-Centered Maternity Care interventions elsewhere.[2] The following describes the information collected in more detail:

- **Drug Costs:** These were calculated based on information on the actual treatment administered to a patient (the type of the drug, quantities of each based on the dosage and duration of the treatment). Information on therapies and treatments was abstracted from medical records. The cost of each drug was obtained from the hospital or hospital pharmacy's purchase records, including data on the purchase price for 1999 and 2002. Since purchase prices are typically quoted for a packaged form of a drug (e.g., a packet of 10 tables), prices were adjusted to obtain the cost per unit of drug administered to patients (e.g., unit cost of 1 tablet based on the price of a packet of 10 tablets). In this analysis, 2002 drug costs were applied for both Before and After data: this was deemed the simplest and most rapid approach to control for the effect of price changes (or inflation) on the changes observed between Before and After groups over the time period of the study. More sophisticated methods may be considered in future analyses (e.g., price index adjusted prices to convert one year's prices to the monetary equivalent another year).

  Where information on the price of a given drug could not be obtained, assumptions made about the equivalent or estimated price used were noted in the spreadsheet analysis. Notations were also made where data was not available (however instances where this was the case were very few and are not expected to affect major findings or conclusions). Data on anesthetic and analgesics was collected separately as these were expected to change as a direct result of WIN activities and interventions.

- **Lab tests and procedures costs:** Similar to the approach used for drugs, information on the type and number of tests (e.g., procedures) performed was abstracted from medical records. Information on the cost of these tests was obtained from estimates calculated by the hospital administrators, based primarily on the cost of inputs required to produce the tests. 1999 and 2002 cost data was collected though as with drug costs, 2002 costs were applied to both Before and After groups to control for the effect of broader economic and price changes.

- **Hospitalization and hospital-stay:** Hospitalization data provided a way of measuring hospital related costs, whereas previous costs (above) were primarily patient-related. Data on duration of stay (time between date of admission for delivery and date of discharge from hospital) was collected to see if WIN interventions have any impact on the length-of-stay (LOS). LOS is typically one of the major cost categories to be managed for efficiency and cost reduction in a hospital. A unit cost of a hospital bed-day was calculated using the following worksheet and multiplied by the LOS data (in days) to estimate the cost of hospitalization for each patient. **Appendix 3** shows a data estimation sheet developed by each hospital to calculate the cost of one day's stay in a hospital in 2002.

[2] See for example: Else, B. (2000). Cost Impact of Family-Centered Maternity Care in Ukraine: Positive Clinical Indicators & Cost Efficiency - The Patient Wins. MotherCare Matters, 9, (1), 15-18.

Worksheet To Calculate the Cost of a Hospital Bed-Day

Year: _____				
1. Salary Costs				
	Number of staff A	Average Salary/ month B	Benefit mark-up, % C	Total per month A x (Bx (1+C))
Medical Staff				
Paramedical				
Auxiliary/ other				
Total, D				
2. Social Tax paid by employer				
Percentage of salary, E	____%			
Total Tax paid, F = (D x E)				
3. Food Costs				
Total monthly cost of Food, G				
4. Utilities and General Supplies				
Total monthly cost of utilities, supplies, H				
5. Total Monthly Costs				
Total, I = F + G + H				
6. Bed days				
Total number of beds days per month, J[3]				
Average monthly % utilization rate of beds, K				
Total bed days used, L = J * K				
7. Total Unit Cost per Bed-Day, I / L				

- **Other variables:** To facilitate the interpretation of findings, additional data was collected on factors that may influence the patterns of care and hence cost. For example, information on the pregnancy risk and complication profile of patients, and other expected effects of the interventions (e.g., breastfeeding and bottle-feeding practices) were measured. Some data on newborn and infant related care was also collected.

Assumptions

Some assumptions were made during the analysis of findings. Most assumptions that related to specific data were noted in the analysis spreadsheets or in summary reports under the Findings section; the major assumptions are mentioned below:

- At the time of the study, investigators were not aware of any other major interventions that were being introduced in the studies sites and that would have an effect on the variables being investigated in this study (e.g., medication, lab test, or hospitalization). This increases the investigator's confidence in attributing any significant changes that might be observed between Before and After groups to the effects of the WIN interventions. This assumption can be further discussed for specific findings.
- The use of a uniform data collection tool for abstracting data medical records from two time periods is expected to increase the consistency of data collection and hence the reliability of data comparison between 2 periods. No tests were conducted to assess the quality of medical records. To increase the quality collected from medical records, providers from pilot sites were asked to abstract relevant data.
- The sample of cases reviewed in this study is deemed to be representative of the profile of patients that presented at each hospital. A random selection process was used identify records for review.

[3] Number of beds per month x average number of working days in month

5. SUMMARY PROFILE OF STUDY GROUPS

Table 15: Summary Profile of Before and After Study Groups

	Perm #21		Berezniki	
	Before	**After**	**Before**	**After**
Total Number of Cases	153	154	165	160
Percent of Births Delivered by C-section	12%	13%	8%	10%
Risk Level of Pregnancy	n=97*	n=96*	n=161*	n=155*
Low	14%	22%	8%	7%
Medium	64%	70%	39%	43%
High	22%	8%	52%	49%

Note: * Remaining cases have no data in patient records on patient risk level.

- A total of 632 cases were reviewed in total in the 2 pilot hospitals that participated in the study: a total of 307 cases in Perm #, and 325 cases in Berezniki **(Table 1).**

- The profile of complications was similar in the Before and After groups in both hospitals. Most cases (over 85% for the most part) did not have any complications during the delivery or the pregnancy

- However, the initial level of risk of the pregnancies differed slightly between hospitals.[4] Relative to Perm #21, Berezniki hospital managed relatively more high-risk pregnancies (about 50% of the patient load) compared to 8% to 22% of the patients in Perm #21.

  These differences may have an effect in the treatment administered to an 'average' patient in each hospital. The existence of more high-risk cases to manage in Berezniki may also make it more difficult to attribute any observed changes (or lack thereof) between the Before and After groups to the WIN interventions.

- Findings from the 2 hospital sites are analyzed separately in this report. This approach helps to identify patterns that could be associated with the WIN interventions. The approach also filters the effect of internal characteristics of each site (e.g., provider practices, hospital specific treatment protocols) on the outcomes being measured.

- The profile of cases was not expected to be a driver of changes observed between Before and After groups. Interestingly, C-sections accounted for similar shares of deliveries between groups, in both hospitals, both before and after WIN interventions.

[4] The level of risk of a pregnancy was rated high, medium and low, and determined in the medical records by the attending physician. Standard criteria existed in each hospital for assigning patients to each category.

6. CHANGES IN TOTAL COST OF MATERNAL CARE

Table 16: Summary of Findings on Cost of Care to Mother Between Before and After Groups

	Perm			Berezniki		
	Before	**After**	**% Change**	**Before**	**After**	**% Change**
Total Cost of Care (Rubles)						
Delivery-related						
Anesthesia	3,903	2,596	-33%	668	722	8%
Analgesics	1,695	82	-95%	2,554	2,202	-14%
Tests and Drugs[1]	6,908	4,921	-29%	10,886	10,489	-4%
Post-Delivery						
Tests and Drugs[1]	25,338	12,231	-52%	24,891	26,025	5%
Hospitalization	283,663	210,338	-26%	874,755	756,455	-14%
Total Cost	**321,507**	**230,167**	**-28%**	**913,755**	**795,893**	**-13%**
N	153	154		165	160	
Average	2,101	1,495	-29%	5,538	4,974	-10%
Average Cost per Patient (Rubles)						
Delivery-related						
Anesthesia	26	17	-34%	4	5	11%
Analgesics	11	1	-95%	15	14	-11%
Tests and Drugs[1]	45	32	-29%	66	66	-1%
Post-Delivery						
Tests and Drugs[1]	166	79	-52%	151	163	8%
Hospitalization	1,854	1,366	-26%	5,302	4,728	-11%

1. In Berezniki hospital, all tests were reported as part of the "Tests & Drugs" category under Post Delivery interventions.

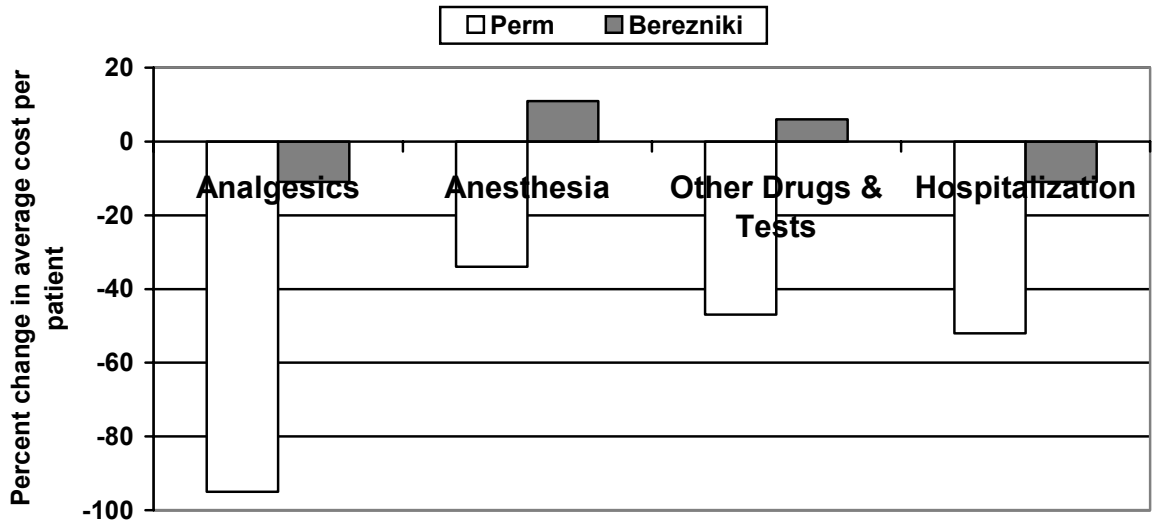
- An overall reduction in the cost care was observed for women delivering in both study sites, but the degree and source of the cost reduction differed between hospitals **(Table 2)**.

- Cost reductions were observed in Perm #21 hospital more so than in Berezniki hospital, particularly related to the cost of tests and drugs and hospitalization.

- Changes in the cost of hospitalization account for the largest proportion of the change in total costs. This is because of the relatively high cost of hospitalization or a hospital-bed day. In Perm #21, the decrease in hospitalization costs accounted for 80% of the total change in costs, followed by 16% accounted for by the change in cost of other drugs (not including anesthesia and analgesics) and tests. In Berezniki, the high costs of hospitalization accounted for 98% of the changes in total costs.

7. PRACTICE OF USING ANALGESICS AND ANESTHESIA DURING LABOR

Figure 1: Percent Change in the Average Cost of Care for Major Care Inputs, All Patients, by Hospital



- Analgesics do not represent a major share of the cost of care for delivering mothers but showed a decrease in both hospitals (more significant in Perm #21) in terms of average cost per patient **(Figure 1)**.

Table 17: Percent of Patients Receiving Analgesic During Labor

	Perm		Berezniki	
	Before (n=153)	**After** (n=154)	**Before** (n=165)	**After** (n=160)
Received	62%	5%	41%	42%
Didn't receive	38%	95%	59%	58%

- In Perm #21, the reduction in the *number* of patients receiving analgesics by each patient resulted in significant savings in the cost of analgesics between the Before and After group **(Table 3)**.

Table 18: Analgesics Use in Study Sites – Number of Patients Receiving a Given Drug

	Perm		Berezniki	
	Before	After	Before	After
Number of different drug types	18	7	8	9
Average number of drugs per patient	2	2	2	2
Maximum number of drugs per patient	6	4	5	5

- In addition to fewer *patients* receiving analgesics, the number and type of drugs being used to provide pain relief to women was also reduced in the Before vs. After group, particularly in Perm #21 **(Table 4)**. There was decrease in polypharmacy (from use of 18 different types of drugs before the intervention to 7 after), while the average number of drugs given to a patient is about the same. This factors reduces the variation in costs (and ultimately the average cost per patient) that results from using different types of drugs.

Pattern of Analgesics Use in Study Sites is presented in **Appendices 4,5**.

Table 19: Unit Cost of Analgesics Care per Patient Receiving Analgesics, with C-section or With Normal Delivery (Rubles)

		Perm #21		Berezniki	
		Before	**After**	**Before**	**After**
C-Section		(n)	(n)	(n)	(n)
	No	17.7	13.5	37.1	31.5
		(85)	(6)	(67)	(60)
	Yes	19.9	1.1	68.6	38.9
		(10)	(1)	(1)	(8)

- The trends of cost decreasing exist for both hospitals in terms of unit cost of care for analgesics **(Table 5**).

Table 20: Unit Cost of Anesthesia Care per Patient Receiving Anesthetics, with C-section or With Normal Delivery (Rubles)

		Perm #21		Berezniki	
		Before	**After**	**Before**	**After**
C-Section		(n)	(n)	(n)	(n)
	No	22.5	7.2	13.9	12.7
		(70)	(46)	(9)	(4)
	Yes	129.5	113.3	41.8	41.9
		(18)	(20)	(13)	(16)

- The most significant change in unit cost of care for anesthetics was among patients in Perm #21 **(Table 6)**.

8. COST IMPACT OF CHANGES IN BREAST-FEEDING PRACTICES

Table 21: Changes in Baby-feeding Practices

		Perm #21		Berezniki	
Percent of Patients whose Newborn Received…					
		Before	**After**	**Before**	**After**
…Bottle Feeding		n=153	n=154	n=165	n=160
	Yes	42%	3%	53%	2%
	No	58%	97%	47%	98%
…Water feeding		n=131	n=154	n=165	n=160
	Yes	23%	0%	95%	1%
	No	77%	100%	5%	99%

- Significant changes in baby-feeding practices were quantified in both Perm #21 and Berezniki hospital, particularly the decrease in bottle-feeding practices, as well as significant reductions in giving water to the newborn **(Table 7)**. This pattern of bottle-feeding was congruent with the changes that were expected as a result of implementing WIN interventions, and corroborated by results from reports by the WIN project.

- Where about half of the mothers who delivered in both hospital bottle-fed their newborns in the Before group, less than 3 % of them were doing so in the After group. In relation to water-feeding practices, the most dramatic change was observed in Berezniki, where 95% of women were water-feeding their babies in the Before group and only 1% were in the After group.

Table 22: Estimated Change in Cost of Bottle-feeding, for a six month period Jan.-June 2002

	Perm	**Berezniki**	
# of Births, Jan. to June 2002	1400	996	
Cost of Bottles			
Number bottle-fed expected	588	528	
Number bottle-fed After	42	20	
Change in number bottle-fed	546	508	
Change in Cost of Bottle (Rubles)	**38**	**36**	Assume 1 bottle per baby/delivery – 0.07 rubles per bottle and dummy
Cost of Formula			
Number of feedings expected	39,622	18,955	Based on feeding level in Before group
Number of feedings After	2,562	5,405	Based on feeding level in After group
Change in number of feedings	37,060	13,550	Assume average feeding is 10ml, and total volume given to bottle-fed babies converted to # of feedings.
Change in Cost of formula (Rubles)	**222,361**	**81,301**	Assume 1 feeding equivalent of 6 rubles of formula
Total change in cost (Rubles)	**222,399**	**81,336**	

- Findings also suggest that not only were fewer newborns being bottle-fed, but of those who were, the frequency of feedings changed.

- Quantified in financial terms using general assumptions, estimates of costs saved over the six-month After period range from about 81,000 to 222,000 rubles in Berezniki and Perm #21 respectively **(Table 8)**.

Table 23: Indicators of Rooming-In

		Perm #21		Berezniki	
		Before n=153	After n=154	Before n=165	After n=160
Rooming-in					
	Yes	23%	97%	18%	96%
	No	77%	3%	82%	4%

- In addition, other changes confirmed that WIN interventions were being implemented, and hence the changes in practices are most likely due to the WIN, in particular, the increase in rooming-in of mother and baby to foster breast-feeding **(Table 9)**.

9. OTHER PPRACTICES RELATED TO BIRTHS: ENEMAS AND PERINEAL SHAVES

Table 24: Percent of Patients Receiving Enemas or Perineal Shaves in the Before vs. After Groups

		Perm #21		Berezniki	
		Before n=153	After n=154	Before n=165	After n=160
Enema					
	Yes	100%	0%	95%	3%
	No	0%	100%	5%	97%
Perineal Shave					
	Yes	100%	0%	100%	0%
	No	0%	100%	0%	100%

- Stark decreases of the practice of enemas and perineal shaves in preparation for delivery were quantified between the Before and After groups in both hospitals **(Table 10)**.

- These practices most likely resulted in financial savings, resulting from a decrease in expenditures for materials and supplies required to carry out enemas and shaves. 0.6 and 3. For instance, estimates for deliveries performed in each hospital over a 6 month period January to June 2002 (see **Table 8**) suggest savings in the order of *5,040 and 3538* rubles in Perm#21 and Berezniki hospital, respectively.[5]

[5] Calculations were based on estimates from Perm #21 of the cost of performing one enema (0.6 rubles per patient) and a perineal shave per patient (3 rubles per patient for a razor and shaving cream).

10. PRACTICE OF DRUG THERAPY AND USE OF TESTS

Table 25: Unit Cost of All Drugs and Tests per Patient During Hospital Stay, Not Including Analgesics and Anesthesia, Before vs. After Group (Rubles)

		Perm #21			Berezniki		
		Before (n)	After (n)		Before (n)	After (n)	
C-Section							
	No	160.7 (135)	68.6 (134)	*-57%*	146.0 (151)	163.4 (116)	*12%*
	Yes	479.0 (18)	400.4 (20)	*-16%*	648.1 (14)	789.5 (6)	*22%*

- A significant changed was observed in the cost of tests and drugs other than analgesics and anesthetics for both hospitals **(Table 11)**.
- One immediate observation was the difference between hospitals in the drugs and tests used during and after delivery. This in large part can be explained by the differences in the patient profiles in each hospital, the different risk-levels of pregnancies requiring different treatment guidelines. Also, hospital-specific treatment protocols as well as the level of resources available for procurement affected the range and pattern of use.

Table 26: Use of Drugs and Tests for Women with Normal Deliveries

	Perm #21		Berezniki	
	Before (n=135)	After (n=134)	Before (n=151)	After (n=116)
Number of different types of drugs and tests	52	24	27	31
Average number of tests and drugs per patient	10	3	5	4

- In general, a significant reduction was observed in the type and number of drugs used in Perm #21 **(Table 12)**. The number of different types of drugs and tests was reduced by half from 52 to 24 different types being used in for the sample of patients. The average number of interventions (tests and drugs) per patient was also dramatically reduced (from 10 to 3 per patient). Both of these factors, i.e., the mix of drugs and tests as well as the average number of drugs and tests per patient, contributed to the significant reduction in unit costs.

- Unlike Perm #21, the average number of test or drugs per patient did not change so significantly in Berezniki (an average of 5 per patient in the Before group to 4 in the After group). However, there was an observed increase in the mix and number of different types of tests and drugs used.

11. CHANGE IN COST OF CARE TO NEWBORNS: CORD CARE AND CARE FOR DIFFERENT CONDITIONS (including INFECTIONS)

Table 27: Unit cost of care for different conditions (including infections) and cord care (Rubles)

	Perm #21			Berezniki		
	Before (n=153)	After (n=154)		Before (n=165)	After (n=160)	
Different conditions care (including Infections)	267.3	63.8	-76%	141.3	134.2	-5%
Cord Care	0.7	0.2	-75%	3.1	1.3	-57%

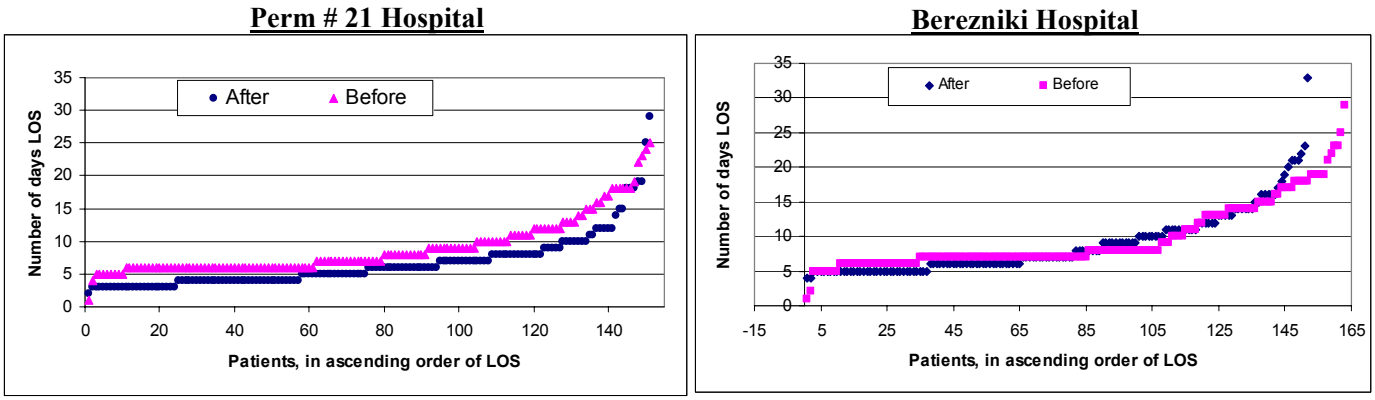
- Significant changes in practices for prevention and treating different conditions including infections in babies have resulted in significant changes in the cost of infection care for babies, even though the relative cost of this care for newborns is less than the unit cost of drug therapies for mothers reported earlier **(Table 13)**.

- Changes in the cost of cord care were observed in both hospitals.

Pattern of Use of Drugs and Tests for Newborn Care is presented in **Appendix 7**.
Appendix 8 shows change in Practices for Cord Care.

12. CHANGES IN HOSPITAL LENGTH OF STAY

Figure 2: Hospitalization Length-of-Stay (LOS) in each Hospital, Before and After



- A more obvious and significant reduction in LOS per patient was measured in Perm #21, from 9 days per patient per delivery to 7 days **(Figure 2)**. In Berezniki, LOS per patient was also a day shorter in the After group relative to the Before group (9 versus 10 days), but the reduction was less consistent.

- The pattern of hospitalization accounted for the significant reduction in the cost of hospitalization in Perm #21, compared to the change in cost observed in Berezniki which was not so significant.

13. CONCLUSIONS AND CONSIDERATIONS FOR FURTHER INVESTIGATION

- Based on the differences between Before and After groups reported in this study, the WIN interventions can be said to have had significant financial impact on the pilot sites. The study looked at areas that were expected to be directly affected by the interventions as well as areas that are could be considered to benefit from side effects of the interventions.

- The observed changes in costs can be attributed to the implementation of WIN interventions and the changes have mostly been beneficial, especially in Perm #21.

- It is important to consider that not all hospitals that will implement WIN interventions are likely to financially be affected similarly by the changes brought about by the interventions, as illustrated in the differences in the findings between Berezniki and Perm #21 hospitals.

- It is possible that hospitals like Berezniki that carry a case load of higher risk pregnancies may be slower in capitalizing the financial benefits of WIN interventions, compared to Perm #21 for instance.

- Still, the differences in financial results (as measured in this study) underscore the value of integrating a careful cost analysis component in each site where the intervention is planned for scale up. This type of analysis may be repeated with each site intervention or a cost analysis component may be instituted, both as part of the monitoring and evaluation strategy that would be part of a scale up program.

- The benefit of such an integrated strategy would partly be: 1) to increase knowledge about cost savings in a given hospital (enabling the hospital to put mechanisms in place to capture those savings, if there are any), and also 2) to continuously analyze the financial impact of interventions and spread useful cost management ideas to the new sites. This type of analysis could also be customized.

- On a specific note, while the costs of analgesics were expected to be directly affected by WIN interventions, these cost represent a small proportion of the costs of care that go into providing maternity services. Findings hence highlight the importance of keeping in mind other costs and looking for opportunities such as WIN, where practices are being changed, to increase overall hospital efficiency (while assuring and achieving the positive outcomes of the intervention).

- Finally, opportunity still exists to expand and widen the analysis reported in this paper, as this is the tip of the iceberg of what can be analyzed based on available data, including a deeper analysis of protocols of care at each hospital. An increase in cost of care (as observed in some elements of care in Berezniki) does not necessary reflect better or poorer quality of care, and this can be further explored. A more comprehensive picture of changes in costs (combining changes in practices affecting both mother and newborn) is also possible.

APPENDIX 1:

Medical Records Data Collection Tool

Assigned Patient ID #: _____[6]

General

a. Extract from Patient Record # _____
b. Hospital (use code) _____ 1 = Maternity MSU #9, 2 = Maternity # 21, 3 = Berezniki Maternity
c. Attending Physician _____
d. Name of Individual Abstracting Record _____

General Characterization:

e. Patient Date of Birth (day/ month /year): _____
f. Date of delivery (Day/month/year): _____
g. Parity of Pregnancy (Day/month/year): _____
h. Pregnancy Risk Level (3 = high, 2 = medium, 3 = low/no risk): _____

Hospitalizations:

i. Date of Admission for Last Hospitalization (Day/month/year): _____
j. Date of Discharge (Day/month/year): _____

Birth and Third Stage of Labor:

1. Did patient receive enema? 1 = ___ yes, 0 = ___ no

2. Did patient receive perineal shave? 1 = ___ yes, 0 = ___ no

3. Did patient undergo fetal monitoring? 1 = ___ yes, 0 = ___ no
If no, why (e.g., is a fetal monitor available): _____

4. Did the patient receive any analgesic during labor? 1 = ___ yes, 0 = ___ no
If yes: indicate the following about the type and quantity of analgesic received:

Name	**Dosage**	**# of Units Used** (e.g., number of units x time period)

5. Did the patient receive any anesthesia for labor and delivery? 1 = ___ yes, 0 = ___ no
If yes: indicate the following about the type and quantity of anesthesia received:

Name	**Dosage**	**# of Units Used** (e.g., number of units x time period)

[6] To be completed by individual responsible for data entry.

6. **Did patient receive any other drugs, fluids or tests?** 1 = ___ yes, 0 = ___ no

If yes: indicate the following about the type and quantity of each received:

Name (drug, fluid or test)	**Dosage** (for drugs and fluids only)	**# of Units Used** (e.g., number of units x time period, number of each type of test)

7. **Was labor induced for patient?** 1 = ___ yes, 0 = ___ no

8. **Did the patient receive an episiotomy?** 1 = ___ yes, 0 = ___ no

9. **Did patient deliver by cesarean section?** 1 = ___ yes, 0 = ___ no

10. **What method of 3rd stage management was used (indicate):**
    1) active
    2) physiologic

11. **Were there any complications observed?** 1 = ___ yes, 0 = ___ no
    If yes, note type of complications: _____
    _____

12. **What medications were used in case of active management in the 3d stage of labor**
    1. **Oxyticin** 1 = ___ yes, 0 = ___ no
    2. **Methylergometrin** 1 = ___ yes, 0 = ___ no
    3. **other (indicate)----------**

Post-Birth:

13. **Was baby (immediately) breastfed?** 1 = ___ yes, 0 = ___ no

14. **Did baby receive any bottle-feeding?** 1 = ___ yes, 0 = ___ no
    If yes, frequency during hospitalization or total number of feedings? _____

15. **Did baby room-in with mother?** 1 = ___ yes, 0 = ___ no

16. **Did mother acquire any infection during hospitalization?** 1 = ___ yes, 0 = ___ no
    If yes, what was the course of treatment (preferably actual course, if not prescribed course)? Also, indicate any additional medication (drugs, fluids) or tests received after date of delivery.

Name (drug, fluid, test)	**Dosage** (for drug and fluids only)	**# of Units Used** (e.g., number of units x time period, number of each type of test)

17. Did baby acquire any infection during hospitalization? 1 = ___ yes, 0 = ___ no

If yes, what was the course of treatment (preferably actual course, if not prescribed course)?

Name	**Dosage**	**# of Units Used** (e.g., number of units x time period, number of each type of test)

NEWBORN CARE:

18. What type of drugs did the baby received for eye care?

Name ***(drug, treatment, etc.)***	**Dosage**	**# of Units Used** (e.g., number of units x time period)

19. What type of drugs did the baby receive for Cord Care?

Name	**Dosage**	**# of Units Used** (e.g., number of units x time period)

20. Did baby receive newborn resuscitation? 1 = ___ yes, 0 = ___ no

If yes, indicate what procedures were performed

- **Aspiration** 1 = ___ yes, 0 = ___ no
- ***Bag and mask*** 1 = ___ yes, 0 = ___ no
- ***Intermittent positive pressure ventilation (IPPV)*** 1 = ___ yes, 0 = ___ no
- ***Endotracheal intubation*** 1 = ___ yes, 0 = ___ no
- ***Cardiac massage*** 1 = ___ yes, 0 = ___ no
- ***Drugs in current use*** 1 = ___ yes, 0 = ___ no**,**

APPENDIX 2:

Medical Records Data Collection Guidelines

Introduction

This document is intended as a general guide for applying the data collection tool developed in this study to abstract medical records data. The information obtained from medical records will be used in conjunction with unit cost information regarding individual elements of care (**Attachments A and B**) to estimate the cost of care for deliveries. Cost of care information will be compared in pre- and post-WIN intervention groups, to evaluate the cost impact, if any, of the WIN interventions.

The guide will systematically review and provide instructions for each question of the data collection tool.

Identifying Medical Records to Sample

Given the large volume of deliveries that occur in each of the study hospitals, it is not reasonable to collect information on all deliveries, hence a sample is required. Two factors however need to be weighed: a) the limited availability of time and resources to conducted a large data collection exercise, and b) the need to have a representative sample of delivery episodes to ensure validity of the data that is collected. A rule of thumb approach was used to calculate the sample size needed to compare differences in two means (average cost of care pre- and post-WIN interventions).

A sample of **150 cases** will be obtained in both pre- and post- groups, in each study hospital.

The **Before-group** includes deliveries that occurred between January 1st to June 30th 1999.
The **After-group** includes deliveries that occurred between January 1st to June 30th 2002.

To identify which medical record to include in the proposed sample: Using registry of medical records (the one used for identify number of delivery cases), note the patient record number that falls on the following interval for each of the study hospitals, starting on January 1st of the study period, until 150 records are identified:

- For MSU # 9 Perm every 8th record in 1999 (1,212 deliveries Jan. to June)
  every 10th record in 2002 (1,536 deliveries Jan. to June)

- For City Hospital Perm every 5th record in 1999 (805 deliveries Jan. to June)
  every 9th record in 2002 (1,400 deliveries Jan. to June)

- For Berezniki Maternity every 5th record in 1999 (853 deliveries Jan. to June)
  every 6th record in 2002 (996 deliveries Jan. to June)

To begin data collection, identify and pull out medical records corresponding to the patient record numbers identified through the above exercise.

Guidelines for Completing each Section

Data collection should be completed to the fullest extent possible. Where data is not available for a specific question, the individual abstracting the record should indicate "n/a" for that specific

question. **Also, please the data collector should feel free to make any comments regarding the data using brackets ("["and "]") to enclose comments.**

Questions in italics are not critical to the analysis of study findings.

Questions a – j:

These questions are relatively self-explanatory.

a. Enter patient record number not name. If available, medical record number of baby should be noted here also.
b. Name of hospital where record is being pulled from.
c. Name of attending physician at the time of study (e.g., in 1999 for pre-group records, and in 2002 for post-group)
d. Name of individual collecting data, preferably medical officer attending to maternity ward, or deliveries
e. Patient date of birth
f. Date of delivery
g. Whether delivery that occurred at the time of study is 1st ever delivery for the mother, or whether its 2nd, 3rd, etc.
h. Use appropriate classification of risk: no risk, 'pathologic' based on WIN definitions, high risk (3 = high, 2 = medium, 1 = low or no risk)
i. Date of admission for delivery
j. Date of discharge from delivery

Questions 1 – 12:

Questions 1 to 12 apply to the period during delivery date.

1. Note if patient record indicates that **enema** was performed.
2. Note if patient record indicates that **perineal shave** was done.
3. Note if patient record indicates that **fetal monitoring** was performed. Note if any reasons are provided in the record for why monitoring was not performed. If individual abstracting form was aware of reason at the time, note reason here.
4. Make note of **any and each pain relief medication** that was administered to the patient during the time period of the delivery. Analgesic medication associated with labor or other condition should be noted here. Indicate dosage and number of units of that dosage indicated in medical record. Number of units is determined by the number of units administered each time the drug is given x the number of times it is administered (for the length of time it is administered). For example, enter "2 tablets x 3 times a day x 3 days".
5. Make note of **any anesthesia** that was administered to the patient during labor. Indicate dosage and number of units of that dosage indicated in medical record. Number of units is determined by the number of units administered each time the drug is given x the number of times it is administered (for the length of time it is administered).
6. Same as #4 for **any other drug or fluid medication** (including vitamins, etc.) **and tests (and other paraclinical interventions)** that the record show the patient having received. Tests include but are not limited to, for example, blood and urine tests, x-rays, etc.. Any treatments (e.g., for skin care) should also be included.
7. Indicate with yes or no if record show that labor was **induced**.
8. Indicate with yes or no if record show that **episiotomy** was performed.
9. Indicate with yes or no if record show that **cesarean section** was performed.
10. Indicate what method of management was used in the third stage of labor (1 = active, 2 = physiologic)
11. Indicate with yes or no if record show that **complications** were observed. Write down briefly the type of complications (e.g., hypertension, excessive bleeding, etc.).

12. If answer to #10 was 1=active, indicate with yes or no whether the drugs oxytocin and methylgometrin were used. Indicate other drugs used also.

Questions 13 – 20:

The following have to do with post delivery interventions. It is possible that the information required to complete this section is contained within the medical record of the baby. If this is the case, identify the record of the child (e.g., based on information completed in Question 'a' above). The questions preceded with an '*' indicate the question which may require data collector to refer to baby's medical record.

13. *Indicate with yes or no if record show that **baby was breastfed**.
14. *Indicate with yes or no if record show that **baby was bottle-fed.** If yes, indicate, if possible, the number of times the baby was bottle-fed during the period of the delivery hospitalization.
15. Indicate with yes or no if record show that **rooming-in** was allowed for baby with mother.
16. Indicate with yes or no if record show that **mother acquired infection**. Indicate the dosage and number of units of medication (drug or fluids) and tests that the patient received during the hospitalization, ***after*** the date of the delivery. See Questions 4 and 6 above for guidelines for how to complete table.
17. *Indicate with yes or no if record show that **baby acquired infection**. Indicate the dosage and number of units of medication (drug or fluids) that the baby received specifically to fight infection. See Questions 4 and 6 above for guidelines for how to completed table.
18. *Indicate what type of drugs the newborn baby received for **eye care**. Complete tables indicating the type drugs or treatments used for eye and/or cord care. Complete table using guideline in Question 4 above.
19. *Indicate what type of drugs the newborn baby received for **cord care**. Complete tables indicating the type drugs or treatments used for eye and/or cord care. Complete table using guideline in Question 4 above.
20. *Indicate with yes or no if the listed procedures were performed for **resuscitation** of the newborn. Complete information on any drugs or procedures used on newborn, indicating yes or no whether the drugs or procedure was used.

Attachment A - Information on Medications:

Once data on medication is completed in questions 4, 5, 6, 14, 15, and 17 above, enter the name and dosage of the different medications recorded in the first and second columns of the following table. Remove any double entries. (Electronic version of form is available to facilitate this process.)

Hospital Name: ___________________

Columns 4 and 5 on the Cost per unit of purchase should then be completed by personnel knowledgeable about the purchase price of medications, e.g., hospital accountant or hospital pharmacists

Name of medication (Drugs or Fluids)	**Dosage**	**Unit of purchase** (e.g., 1 x 500ml bottle, 100 tablets)	**Cost per unit of purchase**	
			1999	**2002**

Attachment B – Information on Tests and Paraclinical Care

Once data on tests performed is completed in questions 6 and 14above, enter the name of the different types of tests in the first column of the following table. Remove any double entries. (Electronic version of form is available to facilitate this process.)

Hospital Name: _____

Column 2 on the Cost per test should then completed by personnel knowledgeable about the cost of the tests, e.g., hospital accountant. The cost of the test is typically available in records of the hospital budget. If budget estimates or information is not available, please indicate the fee (or price) that would have been charged for the test in 1999 and 2002. In the last column, indicate with BC or FC which figure was being reported in the table for either or both years.

Name of test	**Cost per test**		**Budget cost (BC) or fee (or price) charged for test (FC)?**
	1999	**2002**	

APPENDIX 3:

Cost Estimations on Hospital-Bed-Day

Hospital Name: Berezniki maternity

Year: 2002					
1. Salary Costs					
		Number of staff A	Average Salary/ month B	Benefit mark-up, % C	Total per month Ax(Bx(1+C))
	Medical Staff	125	3340	-	417500
	Paramedical	16	3360	-	53760
	Auxiliary/ other	13	2130	-	27690
	Total, D				498950
2. Social Tax paid by employer					
	Percentage of salary, E	35.8%			
	Total Tax paid, F = (D x E)				178624
3. Food Costs					
	Total monthly cost of Food, G				39990
4. Utilities and General Supplies					
	Total monthly cost of utilities, supplies, H				318810*
5. Total Monthly Costs					
	Total, I = F + G + H **+ D**				1036374**
6. Bed days					
	Total number of beds days per month, J[7]	1794			
	Average monthly % utilization rate of beds, K	104			
	Total bed days used, L = J * K	1866			
7. Total Unit Cost per Bed-Day, I / L					**555.4**

* - include medical expenses
** - include D

[7] Number of beds per month x average number of working days in month

Hospital Name: **Maternity #21, Perm**

Year: 2002					
1. Salary Costs					
		Number of staff A	Average Salary/ month B	Benefit mark-up, % C	Total per month Ax(Bx(1+C))
	Medical Staff	131	3290	-	430990
	Paramedical	56	2850		159600
	Auxiliary/ other	20	3420		68400
	Total, D				658990
2. Social Tax paid by employer					
	Percentage of salary, E	35.8 %			
	Total Tax paid, F = (D x E)				235918
3. Food Costs					
	Total monthly cost of Food, G				65990
4. Utilities and General Supplies					
	Total monthly cost of utilities, supplies, H				160500
5. Total Monthly Costs					
	Total, I = F + G + H				462408
6. Bed days					
	Total number of beds days per month, J[8]	2116			
	Average monthly % utilization rate of beds, K	104.3			
	Total bed days used, L = J * K	2207			
7. Total Unit Cost per Bed-Day, I / L					**209.52**

[8] Number of beds per month x average number of working days in month

APPENDIX 4:

Table: Pattern of Analgesics Use in Study Sites - Number of Patients Receiving a Given Drug

	Perm			Berezniki	
	Before	After		Before	After
Analgin	2		Analgin	2	1
Atropin	3	3	Baralgin	12	13
Baralgin	32		Galidor	6	10
Clophelin	1	1	No-spa	32	26
Dimedrol	14		Oxybutirat	33	27
Galidor	2		Papaverin	3	2
Maxigan	1		Promedol	39	40
No-spa	72	2	Relanium	28	
Novocain	11		Sibazon		37
Nozepam	2		Dimedrol		3
Omnopone	2				
Oxybutirat	13	2			
Papaverin	6	1			
Phentanyl	1				
Promedol	35	3			
Sibazon	1	1			
Spasgan	2				
Spasmalgon	1				
Number of different drug types	18	7		8	9
Average number of drugs per patient	2	2		2	2
Maximum number of drugs per patient	6	4		5	5

APPENDIX 5:

Table: Pattern of Use of Drugs and Tests for Women with Normal Deliveries, Perm #21

Name	Number of Patients Receiving Drug or Test		% Change (weighted for n in Before Group)	Unit Cost per Patient Receiving Drug or Test (rubles)	
	Before (n=135)	**After** (n=134)		**Before** (n=135)	**After** (n=134)
Ampicillin		1	---		144.4
Ampiox 1gr		3	---		83.2
Analgin	4		-3%	5.2	
Aspirin	4		-3%	-	
ATF			---		
Baralgin	1		-1%	60.5	
Bicillin-5	17		-13%	6.7	
Blood analysis biochemical		4	---		62.0
Blood analysis clinical	135	75	-44%	35.3	33.7
Blood bacteriological analysis	7		-5%	8.2	
Blood HIV		3	---		-
Blood RW	122	114	-6%	16.0	16.0
Blood serum	1	2	1%	-	-
CaCl	2	1	-1%	8.5	3.4
Cefamizin	1		-1%	-	
Cefazolin		1	---		82.5
Clophelin_tabs	2		-1%	0.2	
Cocarboxylase	1		-1%	5.8	
Dibazol	2		-1%	20.8	
Dimedrol	2		-1%	1.7	
Ensoprost	2	7	4%	66.1	44.1
Erytrocites infusion	2		-1%	-	
Euphylline	2	1	-1%	2.2	2.2
Furadonin	1		-1%	-	
Gentamicin	18	3	-11%	20.8	16.6
Glucose 40%	112		-83%	2.2	
Glucose 5% - 400	6	1	-4%	46.7	20.0
Hemodez			---		
Kalipsol		1	---		8.8
KCl	4		-3%	0.1	
Klaforan			---		
Methylergometrin	1	1	0%	50.9	50.9
Methyluracil	2		-1%	7.3	
Metragil			---		
Metronodazolum		1	---		5.8
NaCl 20 ml	97		-72%	2.0	
NaCl 200 ml	4		-3%	15.6	
NaCl 400 ml	54	26	-21%	27.8	29.8
No-spa	3		-2%	14.3	
Novocain	6	5	-1%	6.2	12.2
Omnopone			---		
Oxacillin		2	---		95.0
Oxytocin	150[1]	138	-9%	2.5	3.3
Papaverin	1		-1%	8.9	

Name	Number of Patients Receiving Drug or Test		% Change (weighted for n in Before Group)	Unit Cost per Patient Receiving Drug or Test (rubles)	
	Before (n=135)	**After** (n=134)		**Before** (n=135)	**After** (n=134)
Partusisten	1		-1%	-	
Penicillin	7		-5%	0.4	
Permanganat K 5%	155[1]		-115%	1.2	
Physiotherapy	30	22	-6%	58.6	53.8
Polyvitamins	1		-1%	-	
Prednisolon	1		-1%	13.3	
Promedol	4		-3%	48.5	
Proserinum	1		-1%	4.1	
Reomacrodex			---		
Smear	132	1	-97%	35.0	35.0
Stabizol			---		
Sulfat Mg	14		-10%	12.7	
Tazepam	1		-1%	-	
Timogen	3		-2%	16.9	
Trichopol	4	1	-2%	58.7	44.7
Urina bacteriological analysis	1		-1%	-	
Urine analysis Nechiporenko	2		-1%	-	
Urine analysis routine	133	36	-72%	26.1	25.7
Vitamin B1	5		-4%	2.5	
Vitamin B12	12		-9%	0.7	
Vitamin B12 -200	1		-1%	5.0	
Vitamin B6	1		-1%	4.6	
Vitamin C -1ml	96		-71%	6.1	
Number of different types	**52**	**24**			

Note: 1. indicates multiple information entries on the same drug for the same patient

APPENDIX 6:

Table: Pattern of Use of Drugs and Tests for Women with Normal Deliveries, Berezniki

Name	Number of Patients Receiving Drug or Test		% Change (weighted for n in Before Group)	Unit Cost per Patient Receiving Drug or Test (rubles)	
	Before (n=151)	**After** (n=116)		**Before** (n=151)	**After** (n=116)
Ampicillin	4	2	-1%	110.4	196.3
Ampiox	1	2	1%	58.8	88.2
Atropin	34	22	-8%	1.3	1.3
Bifidumbacterinum	1		-1%	53.7	
Blood analysis biochemical	4	3	-1%	56.0	56.0
Blood analysis clinical	3	4	1%	88.7	85.5
Blood analysis short	12	8	-3%	65.0	67.5
Blood group and Rh	10	2	-5%	78.0	78.0
Ca Gluconat	2		-1%	2.8	
CaCl	2	1	-1%	1.8	1.8
Cefazolin			---		
Dibazol	2	5	2%	1.3	3.7
Dicinon			---		
Dimedrol	36	24	-8%	0.7	0.7
Droperidol			---		
Ensoprost	14	34	13%	106.5	106.5
Euphylline	2		-1%	85.6	
Fortum			---		
Ginepral		5	---		0.0
Glucose 10%			---		
Glucose 40%	134	92	-28%	2.3	3.9
Glucose 5% - 20		1	---		2.0
Glucose 5% - 200		2	---		20.5
Glucose 5% - 400	2	3	1%	129.2	109.6
Hemodez		3	---		111.9
Kalipsol		3	---		69.6
Kefzol			---		
Klaforan			---		
Lactobacterin		15	---		52.5
Methylergometrin	257[1]	173	-56%	51.7	50.9
NaCl 200 ml	9	11	1%	27.3	31.8
NaCl 400 ml	59	38	-14%	24.5	28.4
Oxacillin	1	1	0%	235.2	78.4
Oxytocin	68	19	-32%	4.0	3.8
Papaverin		1	---		4.9
Penicillin	22	17	-3%	46.9	44.0
Pipolphen	1	1	0%	8.2	8.2
Polyglucin	1		-1%	92.9	
Prednisolon	2	1	-1%	52.5	35.0
Promedol			---		
Reopolyglucin			---		
Sibazon		1	---		3.6
Sinestrol	7		-5%	3.8	
Sulfat Mg		1	---		8.6

Name	Number of Patients Receiving Drug or Test		% Change (weighted for n in Before Group)	Unit Cost per Patient Receiving Drug or Test (rubles)	
	Before (n=151)	**After** (n=116)		**Before** (n=151)	**After** (n=116)
Ampicillin	4	2	-1%	110.4	196.3
Urine analysis routine	7	5	-1%	54.9	48.0
Zefamizin			---		
Number of different types	**27**	**31**			

Note: 1. indicates multiple information entries on the same drug for the same patient

APPENDIX 7:

Table: Number of Patients Whose Newborns Received Given Drug or Tests for Care

	Perm #21		% Change (weighted for n in Before Group)		Berezniki		% Change (weighted for n in Before Group)
	Before	After			Before	After	
Active carbon	25		-16%	Active carbon	95		-58%
Amikozid	4		-3%	Allochol	5		-3%
Ampicillin	1		-1%	Ampicillin	14	15	1%
Ampiox 1gr	1	1	0%	Analgin	22	1	-13%
Analgin	11	2	-6%	Bifidumbacterinum	45	23	-13%
Bacteriological analysis (eye)	2	5	2%	Blood analysis biochemical	4	7	2%
Bifidumbacterinum	104	10	-61%	Blood analysis clinical	161	160	-1%
Blood analysis biochemical	3	2	-1%	Blood bilirubin	108	90	-11%
Blood analysis clinical	149	144	-3%	Blood glucose	36	57	13%
Blood bacteriological analysis	7	10	2%	Blood group and Rh	2	23	13%
Blood bilirubin	23	43	13%	Blood HbsAG	2	12	6%
Blood glucose	1	1	0%	Blood Hepatit C		11	---
Blood RW	4	6	1%	Blood RW	10	12	1%
Ca Gluconat 10ml	37	8	-19%	Ca Gluconat	6		-4%
Dibazol tab	75	17	-38%	CaCl	3	3	0%
Dicinon	27	4	-15%	Cefazolin	1	1	0%
Dimedrol	14	4	-7%	Cerucal	1	1	0%
Dimedrol tab.	15	6	-6%	Dicinon	7		-4%
Gentamicin	3	1	-1%	Dimedrol	3	1	-1%
Glucose 10%	47	12	-23%	Dophaminum_0.5%	3	5	1%
Interferon	8		-5%	Etamsylat		1	---
KCl	6	3	-2%	Gentamicin	4	5	1%
Lactobacterin	7	7	0%	Glucose 10%	13	18	3%
Lactobacterin 3	1		-1%	Glucose 5% - 200	22	12	-6%
Levomicetin drops	17	6	-7%	Heparin	1		-1%
Oil sterile 10 ml	22	1	-14%	KCl	1	2	1%
Phenobarbital	67	1	-43%	Lactobacterin	2		-1%
Phototherapy 12 hours	22	17	-3%	Lasix	2	1	-1%
Piracetam	3	3	0%	NaCl 200 ml	18		-11%
Piracetam amp	19	4	-10%	No-shpa	3	1	-1%
Prednisolon	6	1	-3%	Oxybutirat	3	4	1%
Sedative mixture	33		-22%	Pancreatin	1		-1%
Sulfat Mg	6	2	-3%	Penicillin_500	21	5	-10%
Vicasol	153	151	-1%	Phenobarbital	1		-1%
Vitamin E	11		-7%	Relanium	2	1	-1%
Different types	**35**	**28**		Sibazon		3	---
				Urine analysis routine	3	5	1%
				Vicasol	70	4	-40%
				Zefotaxim		1	---
				Different types	**35**	**30**	

APPENDIX 8:

Table: Change in Practices for Cord Care, Perm #21

	Number of Newborns Receiving…		% Change (weighted for n in Before Group)	**UNIT COST OF CORD CARE PER NEWBORN (RUBLES)**	
Name	**Before** (n=153)	**After** (n=154)		**Before** (n=153)	**After** (n=154)
Chlorgexidin spiritus 70%_10	153	150	-2%	0.391	0.093
H Peroxide 3% _10	149	128	-14%	0.004	0.002
K Iodid 5%	152		-99%	0.132	
Permanganat K _30	153	154	1%	0.142	0.074

Table: Change in Practices for Cord Care, Berezniki

	Number of Newborns Receiving…		% Change (weighted for n in Before Group)	**UNIT COST OF CORD CARE PER NEWBORN (RUBLES)**	
	Before (n=160)	**After** (n=102)		**Before** (n=160)	**After** (n=102)
Ethyl alcohol 70%		161	---		0.7
Ethyl alcohol 96%	103		-62%	0.6	
Permanganat K	102	70	-19%	2.5	1.5