Objective: A follow-up study, to compare the short-term outcome of preterms, in two hospitals in Al Qassim region, Saudi Arabia.

Methods: Preterms admitted in two hospitals, 47 in hospital A and 36 in hospital B, were followed from admission until one month after discharge. Preterms were compared on gestational age, birth weight, birth head circumference and length of stay. Outcome measures were weight gain per day, feeding patterns on discharge and feeding patterns one month after discharge compared with the feeding of normal infants (200 infants) at the age of 6 weeks.

Results: No difference was found between the two hospitals on admission in gestational age, mean birth weight, birth head circumference and length of stay. Mean weight gain per day was significantly higher in hospital A, 9.56 (± 19.7) gm, compared to 1.22 (± 29.47) gm in hospital B. (P = 0.049). But the proportion of exclusive breast fed infants, one month after discharge was higher in hospital B, 37.5% compared to 13.2% in hospital A. (p = 0.0224).

Correspondence to:
Dr. Mohamed Khalil, Head of Research Unit, Medical Education and Research Center, King Fahad Specialist Hospital, P.O. Box 2290, Buraidah, Al-Qassim, Saudi Arabia

Short-term Outcome of Preterms 25
Conclusion: Our study showed that there is a clear hospital level difference in the same region, in the short-term outcome. This emphasizes that outcome should be continuously followed and that differences should be evaluated in perinatal audit procedure.

Key Words: Preterm, breastfeeding, weight, Saudi

INTRODUCTION
Neonatal Intensive Care has experienced tremendous growth in the past 30 years. This expansion in capacity grew out of neonatology’s proven effectiveness in improving birth weight specific outcome coupled with efforts to regionalize care through a system of unit classification and maternal and newborn transport.1-3 But availability of service is not the only problem, as the quality of service varies from one center to another. Variation in practice and outcome in Neonatal Intensive Care Unit (NICU), is well known even in developed countries.4 In Canada, there was a significant variation in the risk-adjusted mortality rates among 17 NICUs included in an evaluation.5 This variation in practices and outcome was observed despite Canada’s universal health insurance system.6 This has also been noticed in other countries.7 The aim of this study is to document variation in the short-term outcome of the preterm in two hospitals in the city of Buraidah, Qassim, Saudi Arabia.

METHODS
This follow-up study included preterms born in two neonatology units in the two hospitals (Hospital A & Hospital B) in the city of Buraidah, Qassim. Criteria for inclusion (a) Infants born at the study hospital (b) gestational age < 37 weeks. Infants with congenital anomalies were excluded. The following variables were used in the study; gestational age, birth weight, head circumference, and weight at the start of study, discharge weight, discharge feeding pattern, length of stay and feeding pattern one month after discharge. To obtain representative data, the feeding pattern was not altered during the study. For comparison, the following clinical data were used: weight gain per day during hospitalization (using digital electronics scales), length of stay, discharge feeding pattern and feeding pattern, one month later. The feeding pattern after one month was also compared with a reference sample of normal children. This reference sample (200 infants) was of normal infants attending the first immunization visit in Primary Health Care (PHC) at the age of 6 weeks, recruited from 10 PHC selected at random from Buraidah.

Statistical analysis: SPSSPC V10 was used for analysis using t-test to compare quantitative data and Chi-square test to compare qualitative data.

RESULTS
Of the 94 preterms included, 83 completed the study, 47 from Hospital A and 36 from hospital B. Table 1 shows that the two groups of infants were comparable regarding; gestational age, birth weight, birth head circumference, weight at the start of study, discharged age and length of stay.

Weight gain per day was significantly higher in hospital A (9.564 gm/day) compared to hospital B (-1.22 gm/day). (P=0.049).

Although, no significant difference was found between the two groups regarding the feeding pattern on discharge, the proportion.
Table 1: Comparison between Hospital A and B in Buraidah city

| Variables                  | Hospital A (N=47) | Hospital B (N=36) | Total (N=83) | p-value |
|----------------------------|-------------------|-------------------|--------------|---------|
| Gestational age (weeks)   | 33.8 (± 1.9)      | 33.9 (± 2.7)      | 33.8 (±2.3)  | 0.727   |
| Birth weight (gm)         | 1856.4 (±374.0)   | 1888.9 (±455.5)   | 1879 (±408.0)| 0.722   |
| Birth head circum (cm)    | 30.9 (±2.5)       | 30.1 (±2.5)       | 30.5 (±2.5)  | 0.154   |
| Weight at start (gm)      | 1854 (±370.3)     | 1973 (±459.0)     | 1862 (±408.6)| 0.837   |
| Discharge age (days)      | 17.1 (±17.4)      | 16.2 (±16.5)      | 16.7 (±16.9) | 0.805   |
| Length of stay (days)     | 13.3 (±15.1)      | 14.8 (±16.0)      | 14.0 (±15.4) | 0.663   |
| Weight gain (gm/day)      | 9.564 (19.7)      | -1.226 (29.5)     | 4.827 (24.9) | 0.049   |
| Discharge feeding:        |                   |                   |              |         |
| Mixed (formula and breast)| 9.3% (4/43)       | 19.4% (7/36)      | 13.9% (11/79)| 0.214   |
| Exclusive formula         | 90.7% (39/43)     | 80.6% (29/36)     | 86.1% (68/79)|         |
| Exclusive breast          | 13.2%             | 37.5%             | 20.4%        | 0.024   |

Table 2: Feeding pattern at the age of six weeks

| Feeding pattern               | Hospital A (N=47) | Hospital B (N=36) | Normal group (N=191) | Hospital A vs normal infants | Hospital B vs normal infants |
|-------------------------------|-------------------|-------------------|----------------------|------------------------------|------------------------------|
| Mixed                         | 26.3%             | 6.3%              | 39.8                 | 0.121                        | 0.0002                       |
| Exclusive formula             | 60.5%             | 56.3%             | 19.9                 | 0.00001                      | 0.00001                      |
| Exclusive breast              | 13.2%             | 37.5%             | 40.3                 | 0.0009                       | 0.89                         |

of exclusive breast feeding was higher in hospital B, one month after discharge, (Table 1) p=0.024

Compared to a group of normal infants (191 infants) at the age of 6 weeks, preterm infants were more likely to be on exclusive formula feeding (59.3%) than normal infants (19.9%), p=0.0001. The feeding pattern of preterm infants one month after discharge, compared to normal infants, is shown in Table 2.

DISCUSSION

Daily evaluation of body weight is standard practice in the care of preterm infants. Weight changes in the first week of life primarily reflect fluctuation of total body fluid, whereas changes beyond the second week of life seem to reflect growth in response to nutrition support. Knowing that the mean length of stay in our study is two weeks after birth, weight gain in our study reflects not only growth but fluid balance. The mean weight at the start of the study was > 1800 gm for both hospitals and the discharge feeding pattern was the same, but weight gain per day and the proportion of exclusive breast fed infants after one month, were different. This may reflect a difference in the outcome due to different practices, workload, resources, efficiency or other factors, during hospitalization.

A higher proportion of exclusive breastfeeding one month after discharge cannot explain the lower daily weight gain in Hospital B, because no difference was found between the feeding patterns on discharge in the two hospitals (Table 1).

Although it is possible eventually to achieve an intrauterine weight gain 14-16 gm/kg/day in a hospitalized preterm, catch-up growth does not occur before the time of
discharge.\textsuperscript{9,10} Published data from similar studies, showed that mean weight gain/day during the first two weeks of hospitalization, is in the range of 15-16 gm/day.\textsuperscript{11,12}

In Hospital B, there was a program for Baby Friendly Hospital Initiative (BFHI) to support breast-feeding. This was reflected in the rate for exclusive breastfeeding one month after discharge, which was significantly higher than in Hospital A (p=0.024), but comparable to normal Saudi infants at the same age (Table 2). The effect of BFHI was also demonstrated in other studies.\textsuperscript{13,14}

Investigators who studied the breastfeeding patterns of low birth weight infants, (1500-2500gm) on the day of hospital discharge and 4 weeks later, found that 38\% of the infants were exclusively breast fed on the day of hospital discharge and 40\% of the infants were exclusively breast fed at 4 weeks.\textsuperscript{15} Exclusive breastfeeding in normal children at 6-8 weeks, which was 40\% in our study, is comparable to published data from other Saudi studies. In Riyadh city, studies showed that 32.4\% and 22.1\% of Saudi infants were exclusively breast-fed at 3 and 6 months respectively. The same study showed that 18.2\%, 48.4\% and 65\% were exclusively bottle fed at 3, 6 and 12 months respectively.\textsuperscript{16} Other data showed that over half of the children had been bottle-fed with infant formula at some stage.\textsuperscript{17}

Our study supports evidence from other studies that there is a strong and a consistent effect of LBW on infant feeding pattern.\textsuperscript{18} Mothers of premature infants need support and advice to successfully initiate and sustain breastfeeding in the NICU setting, by expressing milk until the infant is well enough to put to breast.\textsuperscript{19} This can be done by providing education and support, through a lactation specialist, who can facilitate breastfeeding in the NICU setting.

Improving the effectiveness and efficiency of medical care for newborn infants can be done through a coordinated program of research, education, and quality-improvement.\textsuperscript{20} Our study showed that there is a clear hospital level difference in the same region, in the short-term outcome. This emphasizes that outcome should be continuously followed and that differences should be evaluated in a perinatal audit procedure. Further studies are needed to evaluate the effect of different factors such as type of practice, work load and others on the outcome of preterm. Our study supports evidence from other studies that BFHI has a positive impact on breast feeding. At the end of study, arrangements were made to combine the two units in a centralized service.

ACKNOWLEDGMENT
This study was supported in part by Wyeth Nutritional Company.

REFERENCES
1. Goodmann DC, Fisher ES, Little GA, Stuckel TA, Chang CH. Are neonatal intensive care resources located according to the need? Regional variation in neonatologist, beds, and low birth weight. Pediatrics 2001;108(2):426-31
2. Little G, Merenstein G. Towards improving the outcomes of pregnancy. 1993: perinatal regionalization revisited. Pediatrics 1993;92: 611-2
3. Hack M, Klein N, Taylor H. Long-term developmental outcomes of low birth weight infants. Future Child 1995;5:176-96
4. Horbar JD. The Vermont Oxford Network: evidence-based quality improvement for neonatology. Pediatrics 1999;103(1):350-9.
5. Sankaran K, Chein LY, Walker R, Seshia M, Ohlsson A. Canadian Neonatal Network. Variation in mortality rates among Canadian neonatal intensive care units. CMAJ 2002;166(2):173-8.
6. Lee SK, McMillan DD, Ohlsson A, et al. Variations in practice and outcomes in the Canadian NICU network: 1996-1997. Pediatrics 2000;106(5):1070-9
7. Tommiska V, Heinonen K, Ikonen S, et al. A national short-term follow-up study of extremely
low birth weight infants born in Finland in 1996-1997. Pediatrics 2001;107(1):E2.
8. Bauer K, Bovermann G, Roithmaier A, et al. Body composition, nutrition, and fluid balance during the first two weeks of life in preterm neonates weighing less than 1500 grams. J Pediatr 1991;118:615-20.
9. Greer FR. Feeding the preterm infants after hospital discharge. Pediatric Annals 2001;30(11):658.
10. Alexander GR, Himes JH, Kaufman RB More L, Kogan MA. A United States national reference for fetal growth. Obstet Gynecol 1996;87:163-8.
11. Barton AJ, Danek G, Owen B. Clinical and economic outcomes of infants receiving milk in the NICU. Journal of the Society of Pediatric Nurses 2001;6(1):5-9.
12. Kennedy KA, Tyson JE C hamnanvanikij S. Early versus delayed initiation of progressive enteral feedings for parenerally fed low birth weight or preterm infants. (Cochrane Review). In: The Cochrane Library, Issue 2, 2002.
13. Cattaneo A, Buzzetti R. Effect on rates of breast feeding of training for Baby Friendly Hospital Initiative. BMJ 2001;323:1258-62.
14. Fairbank L, O’Meara S, Renfrow MJ, Woolridge M, Sowden AJ, Lister-Sharp D. A systemic review to evaluate the effectiveness of intervention to promote the initiation of breast feeding. Health Technol Assess 2000;4(25):1-171.
15. Hill PD, Ledbetter, RJ, Kavannaugh. KL. Breastfeeding patterns of low-birth weight infants after hospital discharge. Journal of Obstetric Gynecologic and Neonatal Nursing 1997;26:189-97.
16. Al-Ayed JH, Qureshi MI. Breast feeding practices in Urban Riyadh. J Trop Pediatr 1998;44(2):113-7.
17. Wyen AH, Spencer AJ, Szuster FS. Infant and child feeding practices: a preliminary investigation. Aust Dent J 1997;42(1):54-8.
18. Adair LS, Popkin BM. Low birth weight reduces the likelihood of breast-feeding among Filipino infants. The Journal of Nutrition 1996.126(1):103.
19. Barton AJ, Danek G, Owens B. Clinical and economic outcomes of infants receiving breast milk in the NICU. Journal of Society of Pediatrics Nurses Mar 2001;6(1):5-10.
20. Horbar JD, Rogowski J, Phek P, et al. Collaborative quality improvement for neonatal intensive care. Pediatrics 2001;107(1):14-22.