



Journal of Nursing

Revista de Enfermagem

UFPE On Line

ISSN: 1981-8963

ORIGINAL ARTICLE

EVALUATION OF GROWTH OF CHILDREN FROM ZERO TO 24 MONTHS OLD ACCOMPANIED BY FOLLOW-UP PROGRAM

AVALIAÇÃO DO CRESCIMENTO DE CRIANÇAS DE ZERO A 24 MESES ACOMPANHADAS NO PROGRAMA FOLLOW-UP

EVALUACIÓN DEL CRECIMIENTO DE LOS NIÑOS DE CERO A 24 MESES ACOMPAÑADOS EN EL PROGRAMA FOLLOW-UP

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ABSTRACT

Objective: to evaluate the growth of children in the first two years old of life followed at *Follow-up*. **Method:** a documental and retrospective study developed in a maternity hospital of reference Fortaleza/Ceará/Northeast of Brazil. The data were collected from 89 medical records of infants enrolled in the Program *Follow-up*, and then were examined by considering, in the first stage, the descriptive statistics. Then analytical statistics was performed by the Mann-Whitney Test using a significance level of 5%. The research project was approved by the Research Ethics Committee, protocol nº 66/10. **Results:** when comparing children who were born preterm with those born at term, there was a significant difference in weight at six months old of life. The preterm children had a beginning of recovery of its length around 24 months old. **Conclusion:** there was realized the need to foster discussions about the importance of child growth assessment of children who have risk factors that may lead to future complications and losses. **Descriptors:** Nursing; Child Care; Child Health; Growth and Development.

RESUMO

Objetivo: avaliar o crescimento das crianças nos dois primeiros anos de vida acompanhadas no *Follow-up*. **Método:** estudo documental e retrospectivo, desenvolvido em uma maternidade-escola de referência em Fortaleza/CE/Nordeste do Brasil. Os dados foram coletados em 89 prontuários dos recém-nascidos cadastrados no Programa *Follow-up*; em seguida, foram examinados considerando-se, na primeira etapa, a estatística descritiva. Em seguida foi realizada estatística analítica por meio do Teste Mann-Whitney, utilizando um nível de significância de 5%. O projeto de pesquisa foi aprovado pelo Comitê de Ética e Pesquisa, protocolo nº 66/10. **Resultados:** ao comparar as crianças que nasceram pré-termo com as que nasceram a termo, houve diferença significativa do peso até os seis meses de vida. As crianças pré-termo tiveram início da recuperação do seu comprimento em torno dos 24 meses de vida. **Conclusão:** percebeu-se a necessidade de fomentar discussões sobre a importância da avaliação do crescimento infantil das crianças que apresentam fatores de risco que venham futuramente culminar em complicações e prejuízos. **Descritores:** Enfermagem; Cuidado da Criança; Saúde da Criança; Crescimento e Desenvolvimento.

RESUMEN

Objetivo: evaluar el crecimiento de los niños en los primeros dos años de vida seguidos en el *Follow-up*. **Método:** estudio documental y retrospectivo desarrollado en un hospital de maternidad de referencia en Fortaleza/Ceará/Nordeste de Brasil. Los datos se obtuvieron de los 89 registros médicos de niños recién nacidos inscritos en el Programa *Follow-up*, y luego fueron examinados teniendo en cuenta, en la primera etapa, las estadísticas descriptivas. Luego se realizó la estadística analítica mediante el Teste de Mann-Whitney con un nivel de significación de 5%. Este proyecto de investigación fue aprobado por el Comité de Ética e Investigación, el protocolo nº 66/10. **Resultados:** la comparación de los niños que nacieron prematuros con aquellos nacidos a término, hubo diferencia significativa en el peso hasta los seis meses de vida. Los niños prematuros tenían una pronta recuperación de su longitud de alrededor de 24 meses. **Conclusión:** se realizó la necesidad de fomentar la discusión sobre la importancia de la evaluación del crecimiento infantil de los niños con factores de riesgo que pueden dar lugar a complicaciones y pérdidas futuras. **Descriptores:** Enfermería; Cuidado de Niños; Salud Infantil; Crecimiento y Desarrollo.

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INTRODUCTION

Childhood is a period of life in which many modifications in the physical, psychological and engines, featuring, in general, the growth and development of children.¹ These changes need to be regularly monitored by a multidisciplinary team of health care, since growth and development indicate the health of the child, directing the creation and implementation of strategies to promote and maintain health, according to the real needs of children.

Growth and development are good indicators for assessing the health of the child, as they were considered the guiding principle of child health care, with an emphasis on monitoring of factors that can interfere with this process. Thus, monitoring the growth and development of children is configured as one of the most important actions for achieving better quality of life.^{1,2}

The monitoring of children by health professionals to detect early changes in child growth and development, allowing intervene and prevent complications, and to identify risk factors involved in child development, improve health services for perinatal care, identify physical problems, emotional and psychological stress on the child and family; educate parents about the possible difficulties they face in caring for children, among others.³

The term growth is related to increased body size and therefore it ceases with the end of the increase in height (linear growth). However, more broadly, we can say that the growth of the human being is a dynamic and continuous process that occurs from conception to the end of life, considering the phenomena of substitution and regeneration of tissues and organs.⁴ Thus, to monitor the growth of children has been the follow-up, which is a program of multi and interdisciplinary care that aims to detect and act on changes in weight and height growth and psychomotor development of children with prophylactic intervention and / therapy or early.⁵

By knowing the purpose of the follow-up, were highlighted in this study aspects that guide children's growth in the early years of life, considering: weight, length, head circumference (HC) and heart girth (PT). Since the early years of a child's life are characterized by both the accelerated growth that is higher at this stage than at any other stage of life, and because it is a period of life in which one perceives more factors that influence the growth and to be a time of

increased vulnerability to multiple nutritional, infectious and environmental.⁶

Given these considerations, this study aims to evaluate the growth of children in the first two years of life followed at Follow-up.

METHOD

A documental, retrospective study, of quantitative nature, developed in a maternity hospital of reference located in the city of Fortaleza/Ceará/Brazil. This location has been chosen to carry out the study, due to the institution offer the outpatient service for monitoring children's growth and development, following the principles of the Program *Follow-up*.

The collection was in 89 medical records of infants enrolled in the Program Follow-up since 1987, the year of its implementation by the year 2010, that meet the following criteria: be registered in the program's follow-up between the years 2004 and 2008, as the child should have at least two years during the period of data collection, have been followed in the program for at least the first two years of life, be classified according to gestational age in preterm or term.

Data collection took place in October and November 2010, using a form containing information relating to the personal data of the mothers, characteristics of the newborn (NB) at birth (gestational age, mode of delivery, Apgar) and data infant growth, which were raised at birth, and in the following months: 1,2,4,6,9,12,18 and 24, which correspond to the dates of appointments of time-bound follow-up, following the recommendations of the Ministry of Health.⁴

Data were examined by considering, in the first stage, the descriptive statistics of the data collected. Then analytical statistics was performed by the Mann -Whitney test using a significance level of 5%.

The study followed 196/96 of the National Health. Therefore, it was submitted to the Ethics and Research Assis Chateaubriand Maternity School - CEP/MEAC/UFC which gave its assent to its development under Protocol nº 66/10.

RESULTS

Initially, the description of the sociodemographic variables of mothers whose maternal age ranged from 15 to 40 years old, with an average of 26,6 and standard deviation of 7,6. The predominant age of the mothers was 20-29 years old (48,4%), followed by mothers aged > 30 (35,9%).

As for conducting pre-natal, met 75 (84,3%) mothers who delivered an average of 5,1 visits and 1,8 standard deviation. However, it is noteworthy that 4 (4,5%) mothers had no prenatal care, and is considered a risk factor for possible complications during labor and the birth of a newborn risk, preventing early detection of changes in child health. In addition, 10 (11,2%) records contained no data related to the performance or not the prenatal.

As regards the type of delivery, 66 (74,2%) were caesarean and 23 (25,8%) vaginal. Among vaginal deliveries, 22 newborns had cephalic presentation and a pelvic. And in relation to caesarean section, various reasons have been identified such as hypertensive disorder unique to pregnancy, twin pregnancy, fetal distress, prior detachment of the placenta, pre-eclampsia, ruptured membranes, eclampsia, HIV positive, work premature labor, cephalopelvic disproportion -breech, previous placenta, among others.

Regarding the characteristics of newborns, who were seen at *Follow-up* program were raised: gender, gestational age, birth weight, Apgar scores at 1 and 5 minutes of life.

With regard to gender, it was found that there were similar at birth, 45 (50,6%) children were male and 44 (49,4%) females.

Regarding the presence of gestational age was 76 (85,4%) infants classified as preterm (PN), or gestational age less than 37 weeks gestation, and 13 (14,6%) newly term newborns (FTN), with gestational age between 37 and 40 weeks.

Regarding the classification of the RN as birth weight, it was found that 11 (12,3%) were classified as extremely low birth weight (<1000g), 33 (37%) with very low birth weight (between 1000g and 1449g), 33 (37%) underweight (between 1500g and 2500g) and 12 (13,4%) with normal weight (> 2500g).

By analyzing the appropriateness of birth weight, 43,8% of newborns were appropriate for gestational age (AGA) and 34,4% were classified as small for gestational age (SGA).

As for the Apgar score at 1 minute of life of the newborn (NB), as a relevant factor to assess the vitality of the newborn at birth, there was an average of 5,74, with a standard deviation of 2,14, and 20 (22,47%) newborns had Apgar scores > 8, indicating that the infants showed no choking. However, 47 (52,80%) newborns had mild asphyxia with Apgar scores ranging between 5 and 7, indicating that their health status at birth is

regular, 12 (13,48%) had a ratio of 3 and 4, featuring moderate asphyxia and 10 (11,23%) were recorded severe asphyxia.

In the fifth minute of life, there was an improvement in Apgar score of newborns, whose average was 7,64 and standard deviation of 1,87. It was found that 65 (73,03%) of the newborns had no frame of asphyxia and 20 (22,47%) were classified as mild choking. But still it was announced that an RN showed moderate asphyxia and other severe asphyxia. And two records did not record this data. It is noteworthy also that none of the children followed in *Follow-up* study participants had Apgar maximum (10) in the assessments during the 1st and 5th minute of life, and may indicate that these newborns had complications that require monitoring and periodic assessment of its growth and development for early detection and/or prevention of health problems these children.

By comparing the indices Delete on 1st and 5th minute of life among neonates with preterm at term, it was found that the averages are lower than the parameters established by the Ministry of Health Since the 1st minute of life, the newborn preterm present average of 5,99 and newborns at term 4,41. And in the 5th minute of life, it was noticed an improvement in mean Apgar score, due to newborn preterm submit an average of 8,08. However, infants born at term still continued with a value lower than the Apgar parameters considered satisfactory, with an average of 6,31.

In comparing the measures of central tendency, using the Mann-Whitney, Apgar at 5 minutes of life showed a statistically significant difference between the groups of children who were born pre-term infants ($p < 0,05$). The variables related to maternal age, with the consultation of prenatal and Apgar score in the 1st minute of life did not differ significantly between groups.

Tables 1, 2, 3 and 4 show the variables related to childhood growth of children born pre-term infants followed in the program follow-up. Distributed values are the mean and standard deviation of weight, length, PC and PT at different points over 24 months.

Table 1. Distribution of children born preterm and term according to birth weight, over 24 months to live. Fortaleza-CE, 2010.

Child	Preterm infant		Child to term	
	AVERAGE	DP	AVERAGE	DP
Weight				
At birth	1428,8	431	2980,0	849
1 st month	2593,0	664	3683,0	783
2 nd	2904,0	727	4679,0	664
4 th	4759,0	1180	6132,0	1251
6 th	6001,0	1006	7798,0	1025
9 th	7975,0	1264	9060,0	1939
12 th	8586,0	1326	10040,0	2390
24 th month	11865,0	1739	13913,0	3034

It is seen in Table 1, the infants born preterm with a mean weight of 1428,8g at birth were classified as newborns with low birth weight, according to the parameters established by the Ministry of Health.⁴ While the newborns born at term with an average weight of 2980g, is considered satisfactory according to the classification parameters appropriate weight Ministry of Health.⁴

When comparing children who were born preterm with those born at term, significant difference at six months of life, ie the term

infants are larger than pre-term. And at nine months of age, yet there is a perceived difference in mean weight among children born preterm (7975,0g) and term infants (9060,0g), however no significant difference ($p > 0,05$), which can characterize the age in the preterm infant can present an ideal weight consistent with age.

It is noteworthy that the average weight of preterm birth (142,8g) no triples at 12 months, but increases on average five times the birth weight (8585,9g).

Table 2. Distribution of children born preterm and term according to the length at birth over 24 months old. Fortaleza-CE, 2010.

Child	Preterm infant		Child to term	
	AVERAGE	DP	AVERAGE	DP
Length				
At birth	39,8	3,6	48,6	4,4
1 st month	45,6	3,2	52,2	4,0
2 nd	47,7	3,6	55,2	3,7
4 th	54,1	4,5	62,3	3,5
6 th	59,3	4,0	66,2	1,8
9 th	66,7	3,3	69,8	3,2
12 th	70,0	3,6	75,2	2,8
24 th month	84,1	4,8	86,8	5,2

Table 2 depicts data related to the length of children. It was noticed that the newborn preterm birth with an average of 39,8cm, while the newborns born at term with 48,6cm. Therefore, there is a difference of 8,8cm between the two groups of newborns; there is a significant difference ($p < 0,05$).

By analyzing this variable to twelve months, children born prematurely have an average length of 70.0 cm while the children are with the term 75,2cm. Thus decreasing the difference in mean length between the

groups to 5,2cm, yet still remains a significant difference ($p < 0,05$). At 24 months of age this difference decreases, there being no significant difference between groups ($p > 0,05$).

However, one cannot say that this adjustment will only happen at 24 months old, since the period of 13 to 23 months old was not compared, because these records do not exist in their records and the records had only 18 months of single full-term newborns, invalidating the comparison between children.

Table 3. Distribution of children born preterm and term according to cephalic perimeter at birth over 24 months old. Fortaleza-CE, 2010.

Child	Preterm infant		Child to term	
	AVERAGE	DP	AVERAGE	DP
Cephalic perimeter				
At birth	28,8	2,6	34,1	1,5
1 st month	35	1,8	37	2,1
2 nd	35,9	2,2	38,3	1,4
4 th	39,7	2,2	40,5	2,0
6 th	41,3	1,7	43,2	1,3
9 th	44,8	1,6	44,5	2,4
12 th	45,7	1,8	45,3	2,8
24 th month	49,1	2,2	48,2	3,2

When it checks the head circumference at birth, the average in newborn preterm infants is 28,8 cm, while the newly-term infants exhibit 34,1 cm, with a significant difference

($p < 0,05$). At 12 months, the average is 45,7 cm for preterm and 45,3 cm for children to term, ie, with no significant difference between groups ($p > 0,05$).

Table 4. Distribution of children born preterm and term according to the thoracic perimeter at birth over 24 months old. Fortaleza-CE, 2010.

Child	Preterm infant		Child to term	
Thoracic perimeter	AVERAGE	DP	AVERAGE	DP
At birth	24,7	2, 8	31,8	3, 4
1 st month	30,0	2,3	34,1	2,7
2 nd	31,9	2,9	37,7	2,2
4 th	37,8	3,2	41,6	2,8
6 th	40,5	2,5	45,7	1,6
9 th	45,4	3,0	47,0	3,0
12 th	46,0	3,3	50,0	5,2
24 th	51,3	3,2	52,8	4,6

Regarding the heart girth at birth, it is clear that the PN has an average of 24,7 cm as the RNT was 31,8 cm. Thus, there is a difference of 7,1cm between groups, noting that there is a significant difference between groups ($p > 0,05$).

At 12 months old, still a significant difference ($p > 0,05$) 10cm PT between groups. Thus, up to 12 months of life there is a divergence of the mean heart girth between preterm and term infants.

Due to the lack of records in the period of 13 to 23 months was not possible to compare children in these age groups, but the review after 24 months, it was found that this measure becomes equivalent between preterm and full-term have no significant difference ($p < 0,05$).

DISCUSSION

Data regarding sociodemographic mothers showed a mean age of 26,6 years old, being consistent with a study in Rio de Janeiro that analyzed 579 births, finding a mean maternal age of 27.7 years old.⁷

Although the average age was in the age group of lower maternal risk, it was found that 12 (13,5%) mothers were teenagers, according to the classification of the World Health Organization, which classifies adolescents aged between 10 and 19 years old.⁸

Teenage pregnancy is a factor of greater concentration of health problems maternal and perinatal complications such as low maternal weight gain, cephalopelvic disproportion, pre-eclampsia, preterm birth, low birth weight and low Apgar score at 5 minutes of life.^{9,10}

At the realization of prenatal care, the majority (84,3%) performed the prenatal period, but the amount of consultation was lower than recommended by the health ministry, which calls for at least six medical consultations.¹¹ This may be due the non-attendance of mothers or children due to prematurity that prevented maternal and fetal monitoring during the nine months of pregnancy.

The most common type of delivery was cesarean, whose high percentage (74,2%) may be due to the fact of premature births have their risks by itself, and also for the reason that newborn term infants had a risk factor for possible complications. This is confirmed by some authors to argue that a devaluation of normal delivery and practice of unnecessary surgical interventions in increasing number and frequency.^{12,13}

According to gestational age, we found a prevalence of newborn preterm (85,4%). This finding was expected, since one of the criteria for inclusion of children in the program *Follow-up* is being born prematurely. However, several studies have shown that despite the improvement of quality of care, the incidence of prematurity has remained constant, ie, around 7 % in the last two decades, and has even risen in some places, even in developed countries. In Brazil, the incidence of preterm birth has varied from 5 to 15% .¹³

As for the Apgar score, highlights that the term infants with adequate weight and usually have good Apgar scores, while those with low birth weight and very preterm are more likely to have a low Apgar score, thus requiring aid to survive.¹⁴ However, this study goes against what was perceived in the data analysis of this research, because it appears that the Apgar scores at 1 and 5 minutes of life of newborns at term had mean of 4,31 and 6,31, respectively.

The newborn preterm predominated the extremely low birth weight (37,1%) and low birth weight (37.1 %), being a risk factor for possible future changes in the growth process of these children.

The study assessed 528 children, also in northeastern Brazil, specifically in the Zona da Mata of Southern Pernambuco; found that low birth weight is an important determinant of malnutrition because it reflects the nutritional status of both the newborn and the pregnant woman influences the child's growth and long-term repercussions on the health of the adult.¹⁵

Newborns who are born preterm have a higher susceptibility to the difficulties of adaptation to extra-uterine life, demonstrating that the growth deficit is a risk factor, and therefore requires greater vigilance.^{16,17} Therefore, the birth weight is an important risk factor that can influence child survival.

The weight gain in preterm infants is due to the characteristic phenomenon in this group of infants characterized by differential growth and accelerated the phenomenon known as catch-up, which aims to tailor their anthropometric measurements to the ideal standard for its age.^{16,18}

Therefore, to have happened before the birth of normal pregnancy, which is between 37 to 40 weeks old, the baby does not gain weight corresponding to the last trimester of pregnancy. Thus, due to the lack of intra-uterine life in the third trimester of pregnancy, a period where there is greater fat deposition, the newborn is born with low energy reserves, ie, below the expected weight at birth.⁴

As for the length, it was found that both the PN as the RNT had a mean birth lower than that recommended by the child's health booklet from the Ministry of Health.⁴ And at 12 months of age, children born preterm had a mean length less for their age as well as compared with term infants who were an average of 75,2 cm within the normal range.

Regarding the head circumference, the newborns were born preterm with an average of 28,8 cm while the newborns at term with 34,12cm. When analyzing the head circumference at birth, it was noticed that the head circumference of newborns preterm falls short (below the 10th percentile) levels by the Ministry of Health when the acceptable parameters must be between 50 and 90 percentile, or between 33 to 36cm.⁴

Studies with populations of preterm children show that they maintain weight and shorter than children born at term during early childhood, but can match the perimeter cephalic.¹⁹ Corroborating this study, which identified that children born underweight and gestational age less than 37 weeks gestation have achieved around 12 months old head circumference and chest girth similar to those of the term infants.

As for girth, the newborns were born preterm with an average of 24,74 cm while the newborns were born at term with 31,83 cm. This variable growth alone or be used in association with the head circumference, as

can also be seen as an indicator of the fat reserves of the newborn.¹⁹

Therefore, it is noticed that the chest girth in a term newborn is on average 1 to 2cm less than the head circumference, equating the values of PC and PT at six months and twelve months of life the PT is larger than the PC.⁴

However, it is not clear that proportionality relation between head circumference and chest girth in newborn preterm, because there is a difference of more than 2cm between these variables, since the difference is about 4cm, not configuring what is recommended in the literature.⁴ Proving thus the asymmetry characteristic of newborn preterm presenting the cephalic pole disproportionate to body size.²⁰

In contrast, in term newborn can visualize the relationship of 2,2cm between head circumference and chest circumference at birth. From 12 months of life, no longer aware of the difference in proportionality when relating the variables comparing children born preterm and at term, with no statistically significant difference ($p > 0,05$).

Therefore, the restoration of growth of this group of newborns is clear and satisfactory, although the standard speed is not well defined, since the performance of newborn babies preterm relative to its growth beyond the genetic potential is depending on the quality of care provided to the newborn and after discharge, the socioeconomic conditions of the family. In satisfactory condition, these newborns can recover its growth over time, reaching a growth curve of newborns appropriate for gestational age.²⁰

It was found that children who were born preterm showed the phenomenon catch-up before six months of life for growth variables related to weight, head circumference and chest girth. However, the length of your recovery started around 24 months of age, since this age the difference between preterm and full-term (84,1cm) with the term (86,8cm) was only 2,7 cm. Already the head circumference and chest between preterm and term infants were similar at around 12 months of age.

Given the analysis of indicators of child growth stands that the phenomenon of catch-up is evident in the first 6 months old of preterm infants, in which it realizes a gain greater than expected in relation to newly born at term and satisfactory for weight, length, head circumference and chest girth. Thus confirming that this phenomenon helps to ensure a balance and that the newborn

preterm channel reaches its optimal growth for their age.²⁰

Therefore, one realizes a gain greater than expected compared to newborns at term for weight, length, and head circumference and chest girth. Thus confirming that this phenomenon helps to ensure a balance and that the newborn preterm channel reaches its optimal growth for their age.²⁰

CONCLUSION

The study made it possible to monitor the growth of children who are part of the program *Follow-up* that serves children who need specialized care, such as children who are born premature or with complications during and after childbirth.

When comparing children who were born preterm with those born at term, there was significant difference in weight at six months of life. And at nine months of age, yet there is a perceived difference in mean weight, but no significant difference ($p > 0,05$), we can characterize the nine months to preterm infant can present an ideal weight compatible with age.

As for the length, it was found that children who were born preterm had early recovery of its length around 24 months, since at this age the difference between preterm and full-term (84,1 cm) with the term (86,8 cm) was only 2,7 cm. And as for head circumference and chest between preterm and term infants were similar at around 12 months of age.

These findings show that infants born preterm are part of a group of children who need a more specialized monitoring as well as infants who were born at term, but with some kind of change or complication. Therefore, infants who are born underweight or risk factors that may possibly affect the growth process in the early years of life, such as prematurity, should be identified early and placed in programs like *Follow-up* for close monitoring in order to identify early changes and possible complications of the growth of these children, as well as provide guidance and care about children's health.

Monitoring child growth has been quite incorporated by health professional, who recognize it as routine and as a criterion for evaluating appropriate conditions of child health. For effective monitoring of child growth is necessary that the measures of weight, length, and head circumference and chest girth constitute the first action to be practiced in a query childcare. But this is no simple task, because an effective and

accurate monitoring of growth requires a precise and accurate anthropometry performed by trained professionals to evaluate deviations and detect possible changes.

It was found that the nurse is not present in the program follow-up, which makes it incomplete as to the professional staff needed to make the program of follow-up, according to the manual *Follow-up*. It is believed that the roles of the nurse within the program *Follow-up* would help to maximize the effectiveness of the program and offered assistance to children and families.

Thus, we see the need to introduce and foster discussions about the importance of child growth assessment of children who have risk factors that may lead to future complications and losses, in order to emphasize and enhance the vital role of nursing in context, raising awareness of the importance of professional involvement in the monitoring of child growth. As well as to their presence in a specific program so committed to the health of the child as the program is *Follow-up*.

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Submission: 2012/07/03

Accepted: 2013/10/08

Publishing: 2013/11/15

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J Nurs UFPE on line., Recife, 7(spe):6601-9, Nov., 2013