Advisory Committee on Infant Mortality

PROMOTING THE HEALTH OF NEWBORNS AND MOTHERS THROUGH POSTPARTUM SERVICES:

Mandated by the Newborns' and Mothers' Health Protection Act of 1996
(PUBLIC LAW 104-204, SECTION 606)

Final Report to
Secretary of the U.S. Department of Health and Human Services
and Congress

December, 2001

The views expressed in this document are solely those of the Advisory Committee on Infant Mortality and do not necessarily represent the views of the Health Resources and Services Administration nor the United States Government.

ACIM

Advisory Committee on Infant Mortality

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December 2001

Dear Colleague:

The Federal law, the Newborns' and Mothers' Health Protection Act of 1996 [Public Law 104-204, Section 606] specified that the Secretary of Health and Human Services should conduct studies of the factors affecting outcomes following childbirth, including length of hospital stay, other services, and financial incentives. The Advisory Committee on Infant Mortality (ACIM) has served as the advisory panel responsible for fulfilling the Act's requirements.

We are pleased to present the final report of ACIM entitled, "Promoting the Health of Newborns and Mothers Through Postpartum Services." As required by the Act, this document is being submitted 5 years after the law's enactment. A preliminary report and an interim report were previously submitted 18 months and 3 years ago, respectively.

ACIM'S Subcommittee on Early Postpartum Discharge includes representatives with expertise in maternal and child health, health care practitioners, as well as representatives from health plans, hospitals, employers and States as specified by the Act.

We emphasize the following recommendations, which are discussed in more detail in the report:

1. Broaden the focus from early postpartum discharge to include appropriate services such as prenatal care, the content and quality of hospital care, and care of the mother and the newborn in the first 60 days after delivery;

2. Recognize that the outcomes of good prenatal and postpartum care are the optimal physical and psychosocial health of the mother, newborn, and family;

3. Closely monitor the accessibility and quality of postpartum preventive services via population-based studies and national quality assurance measures;

4. Support further Federal funding of research on the benefits and costs of different practices for the birth hospitalization and postpartum period; and

5. Ensure that the public and private sectors make patients and providers aware of the best services available.

Nearly 4 million mothers give birth in the United States each year, making childbirth one of the most common reasons for hospitalization. We feel strongly that the recommendations in this final report will enhance efforts to identify gaps in the delivery of postpartum preventive services and serve as guidance for future research and policymaking.

Sincerely,

Antoinette Parisi Eaton

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ADVISORY COMMITTEE ON INFANT MORTALITY (2001)

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EXECUTIVE SUMMARY

Abstract

Nearly 4 million mothers give birth in the United States each year, making childbirth one of the most common reasons for hospitalization. During the 1980s and early 1990s, early postpartum discharge with hospital stays of 1 night or less became increasingly common, in part due to cost containment pressures. In the early 1990s, reports raised concerns that short postpartum stays endangered the well-being of mothers and infants. Federal and state laws enacted between 1995 and 1998 mandated that insurers cover at least 48 hours of hospital stay after vaginal delivery and 96 hours after cesarean delivery.

The legislation and the public attention focused on this issue were associated with an increase in the average length of postpartum hospital stay from 2.1 to 2.4 days. The proportion of vaginal deliveries with stays of 1 day or less declined from 47% to 23% between 1995 and 1998. Maternal satisfaction with length of postpartum hospital stay seems to have improved since the laws' passage. Evidence on the safety or harms of early postpartum discharge remains mixed. Studies of how the legislation affected selected populations are underway.

Future research and policymaking should address how to increase the consistency of follow-up services during the first week after newborn discharge, and how to identify mothers and newborns at risk of adverse outcomes so that services can be better targeted to their needs. Support is also warranted for ongoing monitoring of postpartum preventive services, translating research into practice to promote breastfeeding, and research into effective strategies to reduce maternal depressive symptoms.

In follow-up of the Newborns' and Mothers' Health Protection Act of 1996, the Secretary's Advisory Committee on Infant Mortality makes the following recommendations, which are discussed in more detail below:

1. Broaden the focus on appropriate services to include prenatal care, the content and quality of hospital care, and the first 60 days after delivery.

2. Recognize that the outcomes of good prenatal and postpartum care are the optimal physical and psychosocial health of the mother, newborn, and family.

3. Closely monitor the accessibility and quality of postpartum preventive services via population-based studies and national quality assurance measures.

4. Support further federal funding of research on the benefits and costs of different practices for the birth hospitalization and postpartum period.

5. Ensure that the public and private sectors make patients and providers aware of the best services available.

The Context of the Legislation

1. What issues did the legislation address?

Early postpartum discharge is defined as hospital length of stay less than 48 hours after vaginal delivery and 96 hours after cesarean delivery. Trends toward early postpartum discharge accelerated in the United States during the 1980s and early 1990s,[1] largely in response to cost-containment pressures. By 1995, 47% of women with vaginal childbirth had postpartum hospital stays of 1 day or less.[2]

Reports of complications, including brain damage due to severe jaundice and dehydration from breastfeeding failure, drew attention to the potential safety problems of early postpartum discharge. Despite recommendations by the American Academy of Pediatrics (AAP) and the American College of Obstetricians and Gynecologists (ACOG) to let the attending physician determine when the mother and newborn should be discharged, some insurers refused to cover lengths of stay of more than 24 or 36 hours after uncomplicated delivery.[3] In 1995, the issue of early postpartum discharge and its potential harms expanded rapidly on the agenda of state and Federal policymakers. The topic symbolized the potential harms of cost containment pressures from managed care, and the media and the public could easily understand the need for a mother to rest and recover after childbirth.

2. What services did the Federal and state laws specify?

In 1995, six states passed length of stay laws for mothers and newborns following birth. Five of the six states mandated that insurers cover postpartum hospital stays of at least 48 hours for normal vaginal deliveries and 96 hours for cesarean deliveries. By 1998, 42 states and the District of Columbia mandated coverage for postpartum hospital stays of the standard duration recommended by the AAP and ACOG.[4] Approximately one-third of states also require follow-up visits, with some specifying that these be home visits.

Federal legislation was called for because the state laws often did not apply to Medicaid beneficiaries and did not cover the more than 50 million Americans enrolled in self-funded employee benefit plans covered by the Employee Retirement Income Security Act of 1974 (ERISA).[5] In 1996, the federal government passed the Newborns' and Mothers' Health Protection Act, which mandated that insurers cover postpartum hospital stays of at least 48 hours for uncomplicated vaginal deliveries and 96 hours for cesarean deliveries. The Federal law does not require follow-up visits. The Federal law and some state laws allow the attending physician, in consultation with the mother, to discharge the mother and/or newborn before the recommended length of stay.

3. What evidence exists about early postpartum discharge and other postpartum services?

Evidence from research on the medical safety or harms of early postpartum discharge is mixed. Several studies have concluded that short postpartum hospital stays are safe when combined with good outpatient follow-up services. However, reports in the early 1990s suggested that increases in early postpartum discharge might have caused an increase in newborn hospital readmissions due to breastfeeding failure and dehydration, as well as severe cases of jaundice leading to brain damage. Other studies have found that short lengths of postpartum stay were associated with increases in newborn hospital readmission.

The Effects of the Legislation

Information was systematically collected to describe the effects of the legislation and to help the Secretary's Advisory Committee on Infant Mortality develop policy recommendations. An evidence review was conducted that included all relevant articles published in medical journals and a review of unpublished data and ongoing studies including a telephone survey of all 50 states.

1. How did the Federal and state laws affect the length of hospital stay and other services after childbirth?

Length of Hospital Stay

National and state-based data show that legislation was associated with increased length of hospital stay after childbirth. The National Hospital Discharge Survey showed that the mean length of postpartum hospital stay decreased from 3.8 days in 1980 to 2.1 days in 1995, then increased to 2.4 days in 1997.[2] This increase resulted mainly because a lower proportion of mothers with vaginal deliveries had stays of 1 day or less. This proportion decreased from 47% in 1995 to 23% in 1998. In 1998, 58% of mothers with vaginal deliveries stayed 2 days and 15% stayed 3 days.

Although the Federal legislation was enacted in 1996 and was not formally in effect until 1998, changes in insurance policy in anticipation of the law may have caused the longer stays. The nationally observed trends are confirmed by data from states including Delaware, Maine, Massachusetts, New Jersey, and Ohio documenting an increase in the average length of stay and a reduction in stays of 1 day or less after vaginal delivery.[6,7]

Other postpartum services

When early postpartum discharge programs were developed during the 1980s and early 1990s, many tried to counterbalance the reduction in hospital stay by increasing prenatal and/or post-discharge follow-up services. One concern about length-of-stay legislation was that the Federal law and most state laws did not specify post-discharge services. Thus, the laws might have the unintended effect of increasing postpartum hospital stays while decreasing other services such as post-discharge home visits. The AAP and ACOG recommendations specify that newborns with hospital stays of less than 48 hours should be evaluated by a health care provider within 48 hours after hospital discharge.[8]

Ongoing studies supported by the Maternal and Child Health Bureau and other Federal agencies are evaluating how the Federal and state legislation affected post-discharge follow-up services. Findings from several studies[9-11] suggest that many infants with early discharge are not receiving early preventive visits. However, it appears possible to achieve better rates of early follow-up visits after short hospital stays via concerted efforts to educate physicians on the importance of such visits.[12]

2. What were the costs of the legislation?

The first day of a hospitalization typically costs more than the second or subsequent days. By the second postpartum day, the marginal costs of additional hours in the hospital are lower than the costs of earlier hours. The current literature review found only one study of the actual effects of postpartum length of stay legislation on hospital charges. In Maryland, the first state to enact a law, the mean length of stay for

vaginal deliveries increased by 38%, from 1.45 days before the law to 1.99 days after the law.[13] However, the increase in charges was only 10%. For cesarean deliveries, the mean length of stay increased by 17% while charges increased by 6%. The additional cost borne by Maryland health care payers was estimated at $250 per vaginal birth and $225 per cesarean birth.

Other studies that evaluated postpartum length of stay and hospital charges before Federal and state laws took effect also suggest that the marginal cost of an additional day in the hospital is relatively low, certainly lower than the per diem rate of $1,000 to $2,000. A study of Medicaid managed care in Indiana from 1993 to 1995 found that hospital length of stay decreased by 21% but costs decreased by only 12%, or $280.[14] A study of Illinois deliveries projected that the state's legislation would have a net effect, after subtracting hypothetical savings from avoiding some hospital readmissions, ranging from a savings of 0.1% to a cost of 20%.

Several studies have given national projections of the costs of the postpartum length of stay legislation. Depending on the methods used, these estimates have ranged from $220 million per year to a high of $2.2 billion per year.[15,16] Most estimates have fallen in the range of $900 million to $2 billion per year. This range does not take into account possible savings from hospital readmissions that might be averted, nor changes in the costs of other postdischarge events such as follow-up visits or costs to families.

3. How did the legislation affect patient health and maternal satisfaction?

The law appears to have increased maternal satisfaction. Surveys conducted before the legislation found that relatively high proportions of mothers, especially those who were discharged at less than 24 hours, felt their hospital stays had been too short.[17-19] In contrast, studies after the legislation have found that most mothers believe their length of stay was about right.[20] Preliminary findings from the nationwide Life Around Newborn Discharge (LAND) Study, led by Henry Bernstein et al with the collaboration of the AAP's Pediatric Research in Office Settings network and supported by MCHB, suggest that almost 9 of 10 mothers currently believe their length of hospital stay was about right.

At least two studies in progress are evaluating the effects of state laws on health outcomes. The Maternity Length of Stay (MLOS) study, supported by the Agency for Healthcare Research and Quality with contributions from MCHB and the Harvard Pilgrim Health Care Foundation, is analyzing a large Massachusetts health maintenance organization population. The MLOS investigators have found no changes in newborn hospital readmission rates associated with changes in length of stay that resulted from either the HMO's early postpartum discharge policy or the state's subsequent length of stay legislation. This study also evaluated breastfeeding initiation and duration based on the HMO's fully-computerized medical record and found no changes associated with changes in length of postpartum hospital stay. The MCHB-supported Ohio Medicaid study is beginning analyses of Medicaid data from 1991 to 1998 to evaluate the potential effects of Ohio state's legislation on hospital readmissions and primary care use.

4. What services are newborns and mothers now receiving during the 60 days after delivery?

The American Academy of Pediatrics recommends that newborns who are discharged from the hospital at 48 hours

or less receive a follow-up visit within 48 hours after discharge. For the newborn, the report "Bright Futures," sponsored by the Maternal and Child Health throughout infancy and childhood. The American College of Obstetricians and Gynecologists recommends a postpartum visit for the mother approximately 6 weeks after delivery.

There is cause for concern that the AAP recommendation for early follow-up visits is often not followed. Several studies suggest that most newborns who are discharged early do not receive home visits.[11] Further, most pediatricians say they do not always recommend postdischarge follow-up visits within 48 hours for newborns discharged early.[10,21]

Two ongoing studies will contribute population-based information about the services received by newborns and mothers. The MCHB-supported Life Around Newborn Discharge Study is collecting information about length of postpartum hospital stay and early preventive outpatient visits by newborns, as described above. This study is also collecting information on a variety of services, such as breastfeeding support services, and other factors which may affect the safe recovery and physical and psychosocial health of mothers and newborns.

The second ongoing study is the Pregnancy Risk Assessment Monitoring System (PRAMS), a population-based survey conducted collaboratively by the Centers for Disease Control and Prevention and 16 states. In the version of the PRAMS survey that was fielded in 2000, two questions were added so that the proportion of newborns receiving home visits and office- or hospital-based postnatal follow-up visits can be estimated. As PRAMS data become available in summer 2001, analyses to be led by investigators at the University of California, San Francisco with the Health Resources and Services Administration, also suggests visits at 1 month and 2 months of age, with further preventive visits support of the Maternal and Child Health Bureau will evaluate what services are being delivered to mothers and newborns. The results will be stratified by race/ethnicity, insurance coverage, maternal education, and states with and without legislation mandating postdischarge follow-up after short hospital stays.

5. What services need to be further strengthened to improve the health of newborns and mothers?

The focus of efforts on behalf of newborns and mothers needs to be expanded to include a broad range of services in the prenatal, in-hospital, and postpartum periods. In the postpartum period, consistent outpatient follow-up visits within the first 48 hours after hospital discharge appear to lead to reductions in urgent care.[22-24] Adherence to the AAP recommendation for these visits should be monitored and promoted.

Two specific problems during the postnatal period deserve more attention: breastfeeding discontinuation and maternal depressive symptoms. Although breastfeeding initiation rates have increased in the United States, most mothers do not continue breastfeeding their infants through 6 months as recommended.[25] Counseling to support breastfeeding is effective,[26,27] and efforts should be made to ensure the accessibility of these programs. Maternal depressive symptoms are relatively common in the early postpartum period. Increasing attention to maternal mental health and identifying effective interventions to optimize mothers' adjustment during the postnatal period seems a promising area for future work.

Recommendations of the Secretary's Advisory Committee on Infant Mortality

1. Broaden the focus on appropriate services to include prenatal care, the content and quality of hospital care, and the first 60 days after delivery.

The NMHPA was a milestone that focused attention on postpartum care. However, to optimize maternal and infant health, concern should focus on both (1) the full range of preconceptual, prenatal, postnatal, and postpartum services needed for optimal health of newborns and mothers, and (2) how such practices can be implemented in the evolving health care environment in which clinical effectiveness and patient satisfaction as well as costs, reimbursement and financial incentives are important considerations.

For example, postnatal visits within 48 hours for infants who have had short hospital stays appear to reduce subsequent urgent care use and are recommended by national professional organizations, but newborns often do not receive these visits. For families at high socioeconomic risk, intensive programs using home visits have been found to improve long-term psychosocial outcomes. Public policymakers and health care administrators should collaborate on strategies to increase the delivery of such effective services as deemed appropriate for both publicly- and privately-insured families.

2. Recognize that the outcomes of good prenatal and postpartum care are the optimal physical and psychosocial health of the mother, newborn, and family.

The goal of postnatal and postpartum services should be to achieve optimal newborn, maternal, and family physical and psychosocial health, not only to prevent rare occurrences such as hospital readmission or catastrophic events leading to permanent disability or death. Interventions and studies must focus on outcomes reflecting important measures of health and well-being for newborns, mothers, and families, both in the short- and long-term.

The outcomes of good prenatal and postpartum care include: initiation and continuation of breastfeeding; timely use of preventive services for the infant; the prevention and timely treatment of postpartum depression; the parents' physical comfort, overall functioning, and sense of competence in parenting; longer-term measures of child and family welfare; and the adoption of healthy lifestyles (eg, a healthy diet and elimination of substance abuse). Funding for studies must be adequate for prospective data collection on these outcomes, since many computerized databases do not routinely collect information on breastfeeding or other health measures beyond rehospitalization or death.

3. Closely monitor the accessibility and quality of postpartum preventive services via population-based studies and national quality assurance measures.

Current knowledge of physiologic events in the initial period after childbirth indicates that, regardless of length of stay, all newborns should receive clinical evaluation and health promotion services on the third or fourth day after delivery. At that time point, mothers should also receive culturally appropriate health promotion and education services, and should have ready access to clinical care if needed. The physical needs of the newborn and mother, as well as the psychosocial needs of the mother and family, should be addressed at this time using AAP and ACOG recommendations.

Services should be tailored to the individual family's socioeconomic, psychosocial, and environmental circumstances as well as biomedical risk factors, and should be culturally appropriate. Very young or inexperienced mothers with limited family support warrant special consideration. Public and private payors should include home visits, breastfeeding education, and other postpartum services on their menu of benefits. The choice of location and provider for postpartum follow-up services ideally should be tailored to the specific population being served. Current evidence suggests that postnatal follow-up via home visits results in higher maternal satisfaction and may achieve better outcomes for families at high risk, while office visits are less costly and may result in equivalent clinical outcomes for low-risk populations with good access to primary care. Public health agencies should direct support for home visits toward those families at highest risk.

4. Support further federal funding of research on the benefits and costs of different practices for the birth hospitalization and postpartum period.

This evidence review suggested that ongoing research will address some, but not all, of the important needs for information to improve the health of newborns and mothers. Given that early postpartum follow-up visits are not consistently being provided, close monitoring and better evidence on the effectiveness of such visits and the potential approaches to improving their delivery is needed. Future research should target areas of concern, for example, improving breastfeeding rates and reducing the incidence and severity of maternal depressive symptoms. Efforts in these areas seem likely to have greater health impact than studies that continue to focus on length of postpartum hospital stay.

In addition, the unmet needs of newborns and mothers who are insured by Medicaid or are uninsured deserve closer study. Because the risk of adverse health outcomes tends to vary with demographic, socioeconomic, and psychosocial characteristics, it may be possible to develop practical risk assessment instruments to identify newborns, mothers and families who need more intensive postpartum services than those recommended for the general population.

5. Ensure that the public and private sectors make patients and providers aware of the best services available.

Mothers are often made aware of their right to a minimum length of postpartum stay, and the follow-up services available, by health care providers during the postpartum hospitalization. The delivery and quality of prenatal and postpartum services deserves close monitoring via population-based surveillance systems such as the Pregnancy Risk Assessment Monitoring System, as well as the National Commission on Quality Assurance and other organizations that may influence purchasers' choice of health care delivery systems. It is important to establish mechanisms to proactively give mothers and providers information about the highest-quality services appropriate for their level of risk. State and local public health departments may be able to join with local health providers to ensure that such information reaches mothers during the early prenatal period.

REVIEW OF EVIDENCE

BACKGROUND

Overview

Nearly four million women give birth in the United States each year, making childbirth one of the most common reasons for hospitalization. Childbirth in hospital settings became standard several decades ago, and the immediate needs of the mother and newborn were routinely addressed during the postpartum hospitalization. The average length of postpartum hospital stay after vaginal delivery decreased by half between 1970 and 1993, from 3.9 days to 2.0 days. Pressure from insurers to further decrease the length of postpartum hospitalization, coupled with reports of adverse events due to jaundice and dehydration in normal full-term infants, raised concerns that mothers and newborns might not be receiving adequate care.

To counterbalance the pressure toward early postpartum discharge and to protect mothers and newborns, Congress and the majority of states enacted legislation between 1995 and 1998 mandating that insurers cover at least 48 hours of hospital stay after vaginal delivery and 96 hours after Cesarean delivery. The Federal law, the Newborns' and Mothers' Health Protection Act of 1996, specified that the Secretary of Health and Human Services should conduct studies of the factors affecting outcomes following childbirth, including length of hospital stay, other services, and financial incentives. Details of the Act's requirements are given in Table 1 below.

The Secretary's Advisory Committee on Infant Mortality (SACIM) has served as the advisory panel responsible for fulfilling the Act's requirements. SACIM's Subcommittee on Early Postpartum Discharge includes representatives from within the Department of Health and Human Services with expertise in maternal and child health, as well as health care practitioners, health plans, hospitals, employers, and states, as specified by the Act. The current document is the final report submitted 5 years after the enactment of the Act; an initial report was submitted 18 months and an interim report was submitted 3 years after its enactment. This report was drafted by SACIM committee members with assistance from staff and consultants as shown in Appendix A.

History of Early Postpartum Discharge

Before 1900, delivery at home rather than in the hospital was standard in the United States.[28] With advances in obstetrical techniques and anethesia, increasing numbers of mothers began delivering in hospital settings. By 1960, almost all births occurred in hospitals.[29] Typical hospital stays after delivery were 4 days or more until the 1980s.

Ironically, the trend toward early postpartum discharge began in this country in the 1970s as a new philosophy to empower mothers and reduce medical intervention after childbirth.[28,29] This paradigm emphasized that delivering a baby is a normal, healthy process. Advocates of early postpartum discharge believed that mothers should have the option of minimizing their time in the hospital, given the risks of nosocomial infections and potential hindrances to mother-

Table 1. Specific Requirements of the Federal Newborns' and Mothers' Health Protection Act of 1996, Sec.606 (Reports to Congress Concerning Childbirth) Completed by the Secretary of Health and Human Services and the Secretary's Advisory Committee on Infant Mortality

Sec 606 (c) Studies --
The Secretary shall conduct a study of --

(A) the factors affecting the continuum of maternal and child health care, including outcomes following childbirth;
(B) the factors determining the length of hospital stay following childbirth;
(C) the diversity of negative or positive outcomes affecting mothers, infants, and families;
(D) the manner in which postnatal care has changed over time and the manner in which that care has adapted or related to changes in the length of hospital stay, taking into account --
  (i) the types of postnatal care available and the extent to which such care is accessed; and
  (ii) the challenges associated with providing postnatal care to all populations, including vulnerable populations, and solutions for overcoming these challenges; and
(E) the financial incentives that may --
  (i) impact the health of newborns and mothers; and
  (ii) influence the clinical decision making of health care providers.

Sec 606 (d) Reports --
The Secretary shall prepare and submit to the Committee on Labor and Human Resources of the Senate and the Committee on Commerce of the House of Representatives a report that contains --

(A) a summary of the study conducted under subsection (c);
(B) a summary of the best practices used in the public and private sectors for the care of newborns and mothers,
(C) recommendations for improvements in prenatal care, postnatal care, delivery and follow-up care, and whether the implementation of such improvements should be accomplished by the private health care sector, Federal or State governments, or any combination thereof; and
(D) limitations of the databases in existence on the date of the enactment of the Act.

Sec 606 (b) Advisory Panel --
Not later than 90 days after the date of enactment of this Act, the Secretary of Health and Human Service shall establish an advisory panel --

(A) to guide and review methods, procedures, and data collection for the studies above;
(B) to develop consensus among the members of the advisory panel regarding the appropriateness of the specific requirements of the title; and
(C) to prepare and submit to the Secretary a report summarizing the consensus, if any, developed under part (b) or the reasons for not achieving such a consensus.

infant bonding in an institutional setting. In other industrialized countries, including England, Canada, Australia, and Scandinavia, the practice of early postpartum discharge also increased between 1970 and 1990.[30]

During the 1980s and early 1990s, the length of postpartum hospital stay continued to decrease, but cost containment by health insurers rather than consumer advocacy became the most prominent driving factor in this trend. Between 1970 and 1992, the average length of stay for all deliveries decreased from 4.1 days to 2.6 days.[31] This trend was seen in both vaginal deliveries, whose length fell from 3.9 to 2.1 days, and caesarean deliveries, whose length fell from 7.8 to 4 days. Postpartum hospital stays in the United States are now among the shortest in the industrialized world.[29,32]

Medical and Social Context of the Legislation

In this report, early postpartum discharge is defined as a length of stay less than 48 hours after vaginal delivery or less than 72 hours after cesarean delivery. Several initial studies of early postpartum discharge had suggested this practice could be safe in carefully selected groups of mothers, provided the mothers and newborns received enhanced outpatient and educational services in the prenatal and/or postnatal periods to compensate for the short length of hospital stay.[33-36]

The American Academy of Pediatrics and the American College of Obstetricians and Gynecologists published guidelines recommending that the length of postpartum hospital stay be determined by the physician in consultation with the mother, and that postpartum discharge at less than 48 hours occur only when the mother and newborn met a series of medical and social criteria. Despite this, some insurers refused to cover lengths of stay of more than 24 or 36 hours after uncomplicated delivery. The targets for length of hospital stay continued to be shortened, sometimes to as little as 12 to 24 hours after delivery.[3]

As cost-containment pressures increased, health insurers and providers began to apply early postpartum discharge less discriminately to mothers and newborns at higher social and medical risk than those in the original studies.[37] In addition, early postpartum discharge was sometimes implemented without the enhanced outpatient services provided in the original, controlled studies of this practice. By 1995, the average length of stay for all deliveries was 2.1 days, and the proportion of vaginal deliveries with stays of 1 day or less was 47%.[2]

In 1995, the issue of early postpartum discharge expanded rapidly on the agenda of state and Federal policy makers. The speed of this process has been attributed to the growing recognition of potential problems from early postpartum discharge, the formation and refinement of policy proposals on the topic, and the political mood of the times.[32] The issue was easy to understand and affected a vulnerable group. Because it also symbolized the problems that could arise from managed care's drive to contain medical costs, it attracted wide media attention.[38]

Medical researchers also began to draw attention to problems believed associated with early postpartum discharge, including jaundice and dehydration.[39] Between 1960 and 1980, there were virtually no published reports of brain damage due to extreme jaundice (also known as kernicterus) in normal, full-term newborns. However,

during the early 1990s, several case reports appeared documenting an increase in cases of kernicterus from 1984 to 1995.[40-45] These reports cited increased rates of breastfeeding (a risk factor for jaundice), decreased vigilance among providers, shorter post-partum stays (especially for near-term infants), and failure to schedule early follow-up visits after early postpartum discharge as potential causes for this phenomenon.

In addition, breastfeeding failure and subsequent dehydration following early newborn discharge were reported in one published study and in several anecdotal cases.[15,46] Reviews of existing medical research found no conclusive evidence that early postpartum discharge was safe in the general, unselected population of mothers and newborns.[30,47,48] Finally, editorials in prominent journals drew attention to the issue.[28,49]

Provisions of the Federal and State Legislation

Within 18 months of the issue appearing on the policy agenda, 29 states had mandated insurance coverage for minimum hospital stays.[32] The state statutes typically required insurers either to pay for 48 hours after vaginal delivery and 96 hours after cesarean delivery, or to provide hospitalization coverage for the amount of time specified by the AAP and ACOG or to defer to the judgment of the physician

By 1998, 43 states had mandated coverage for postnatal hospital stays of the standard duration recommended by the AAP and ACOG; 41 states enacted legislation, while New Mexico and Vermont adopted provisions through administrative rule. The state statutes, summarized in Appendix B, typically required insurers either to pay for hospital stays of 48 hours after vaginal delivery and 96 hours after cesarean delivery, or to provide hospitalization coverage for the amount of time specified by the AAP and ACOG or to accept the judgment of the attending physician. Some states authorized discharge in less than the specified time as long as there was post-discharge follow-up. However, Maryland, which passed such a law in 1995, found that the provision gave insurers a way to circumvent the mandate for extended postpartum stays, and amended its statute to remove the provision in 1996.[15]

Federal legislation was called for because the state laws had important loopholes. For example, in many states, the legislation either specifically excluded Medicaid beneficiaries or did not specify whether the law applied to them.[5] In addition, because of the Employee Retirement Income Security Act of 1974 (ERISA), state laws did not affect the more than 50 million Americans enrolled in self-funded employee benefit plans.

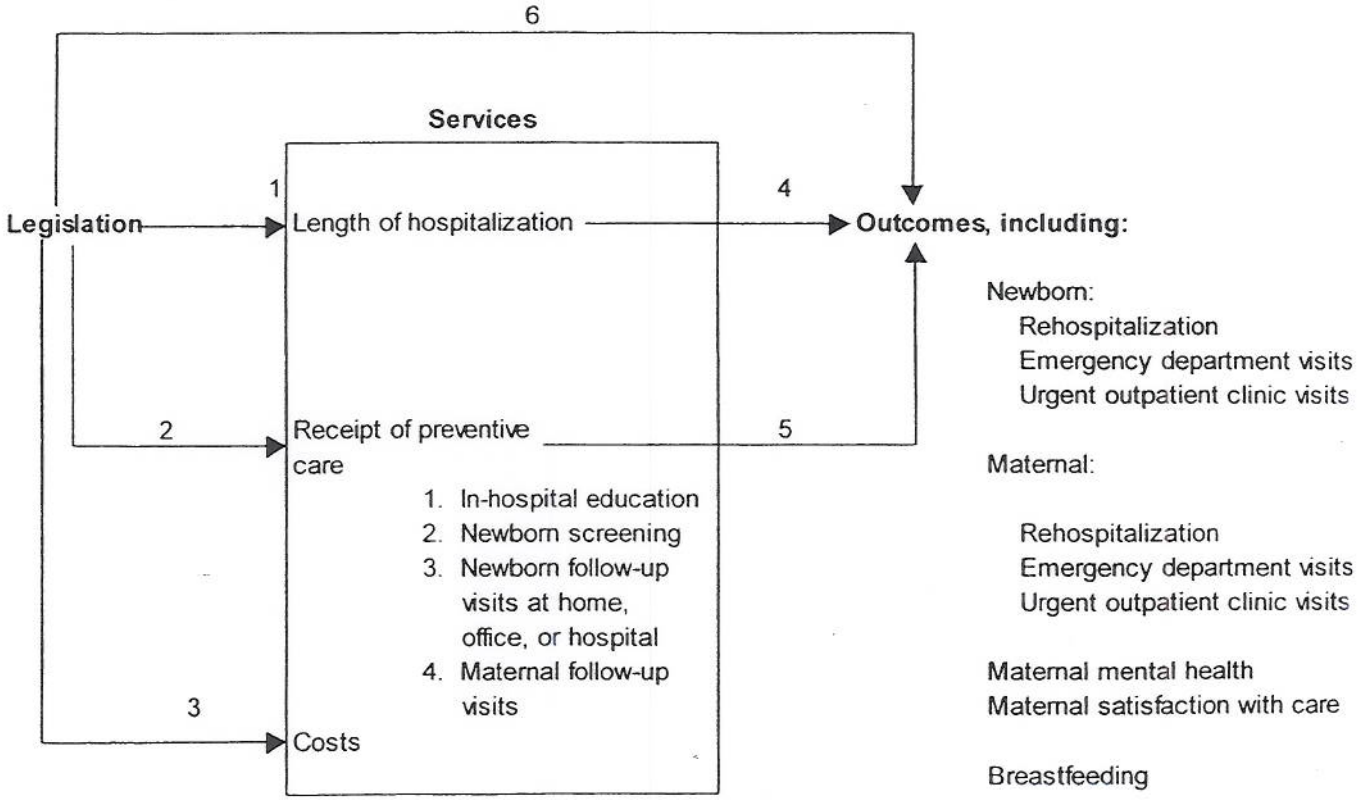
Although several bills addressing early postpartum discharge were introduced in Congress in 1995, Senate Bill 969 became the ultimate bill considered.[15] Signed by President Clinton on September 26, 1996, and effective January 1, 1998, the Newborns' and Mothers' Health Protection Act (NMHPA) requires coverage of hospitalization for at least 48 hours after vaginal and 96 hours after cesarean delivery. Earlier discharge may occur if the physician, in consultation with the mother, decides it is appropriate. The Act bars offering mothers monetary or other incentives to encourage them to leave the hospital early, and prohibits giving physicians financial incentives to discharge mothers and newborns early.

Questions Addressed in This Report

To address the questions posed in Section 606(c) of the NMHPA (Table 1), the Department of Health and Human Services commissioned this report by the Secretary's Advisory Committee on Infant Mortality. The process followed was a streamlined but broader version of a systematic evidence review.[50,51] A comprehensive search of the published evidence was conducted, following replicable strategies. In addition, this review was expanded beyond the requirements of a traditional systematic evidence review, to include unpublished data and information from key informants as well.

To illustrate how postpartum services may affect key outcomes for newborns and mothers, the SACIM Subcommittee on Early Postpartum Discharge developed the conceptual framework shown in Fig 1 below. Postpartum services may have direct effects on key outcomes, whether or not they are delivered as a result of legislation. Legislation may have direct effects on these services and may thus affect key outcomes.

Figure 1. Analytic Framework for Systematic Evidence Review
Early Postpartum Discharge Legislation



The Key Questions addressed in this report correspond to the numbered arrows in the analytic framework. These are listed in Table 2 below.

Table 2. Key Questions for Evidence Review on Early Postpartum Discharge

Key Question #	
1	How have the Federal and state laws affected length of postpartum hospitalization? What is the current length of stay?
2	How have the laws affected receipt of preventive care, including in-hospital education, newborn screening, newborn follow-up visits, and maternal follow-up visits? What services are newborns and mothers now receiving during the first 60 days after delivery?
3	How did the legislation affect the costs of postpartum care?
4	How does the length of postpartum hospitalization affect the following outcomes? a. Rehospitalization of the infant b. Emergency department visits by the infant c. Urgent outpatient clinic visits by the infant d. Other infant morbidity and mortality e. Rehospitalization of the mother f. Emergency department visits by the mother g. Urgent outpatient clinic visits by the mother h. Maternal mental health, including postpartum depression i. Maternal satisfaction j. Breastfeeding k. Infant preventive care, including newborn screening tests
5	How do other preventive care services, eg newborn follow-up visits, affect the above outcomes (a-j)?
6	How have the laws affected the above outcomes (a-j)?

METHODS

This report includes evidence from two general types of sources: published literature, and unpublished or ongoing studies. This section describes the methods for collecting and appraising information from each type of source.

Published Literature Search Strategy

Preliminary review of the literature was guided by the key questions. Investigators leading the preliminary search strategy (1) reviewed current recommendations of the AAP and ACOG; (2) reviewed findings of SACIM's initial and interim reports to Congress on early postpartum discharge; (3) identified the most recent relevant reviews in the medical literature; and (4) consulted with key informants who were experts in early postpartum discharge.

Literature Search Specifications

Medline and PubMed were searched for relevant articles using keyword searches. Overall inclusion and exclusion criteria were established a priori (Appendix C). For the initial search strategies, the keywords used and the results are documented in Appendix D. Additional relevant articles were sought in the reference lists of reviews and key papers. Articles were also sought in the existing files of the researcher leading this review.

Several comprehensive reviews of the evidence on the effects of early postpartum discharge were conducted during the mid-1990s.[30,47,52] Thus, searches for new literature focused on relevant articles published in 1990 or later from the United States and Canada. Some well-designed studies were excluded because they were conducted in countries or during decades where the health care system and social support structure after childbirth would differ greatly from the United States.[34,53-55] Articles published in earlier years or in other countries were included when there was a paucity of more recent evidence or evidence from North American countries for the key question being addressed.

For each key question, Appendix E shows the number of articles initially identified, excluded after review of title, excluded after review of abstract, included for review of full article, and included in the summary evidence tables. References were electronically enumerated in RefMan reference management software used for storing, managing, and retrieving bibliographic citations.

Process for Review of Published Studies

In total, 189 full articles were reviewed. Of these, 93 were included in the evidence tables that summarize the design and results of studies with primary data to address one or more key questions (Appendix F). The evidence tables include 7 articles for Key Question 1; 10 articles for Key Question 2; 4 articles for Key Question 3; 69 articles for Key Question 4; 30 articles for Key Question 5; and no articles for Key Question 6.

The reviews were conducted by two pediatrician researchers who divided the set of articles and used the predetermined criteria described below to identify the strengths and limitations of each study. The reviewers consulted with each other regularly to resolve questions or potential differences in interpretation of studies. Articles that were not included in the evidence tables

were summarized briefly in a separate table (Appendix G).

Criteria for Appraising the Quality of Evidence

The design of a study affects the strength of the conclusions that can be drawn from it. In most medical literature, studies where an intervention is conducted proactively and systematically are considered stronger designs than studies that are purely observational.[56] The randomized controlled trial, where patients are assigned to either intervention or usual care by chance alone, is usually considered to give stronger evidence about the effects of an intervention compared with non-randomized trials or observational studies. The US Preventive Services Task Force has developed criteria for grading the quality of individual studies that were followed, with modifications, in the current reviews (Appendix H).

In addition to rating the quality of each study in this review, the lead researchers also rated the quality of evidence for each key question. The rating for quality of evidence is only partly based on the validity of the available studies for the specific interventions and populations they include (termed internal validity). The quality of evidence for each key question also depends on two other factors: the generalizability of the studies (termed external validity) and the consistency of the studies.

For example, consider the randomized controlled trials of early postpartum discharge. Most of these studies enrolled only carefully selected mothers with strong social support who consented to randomization and by inference, were likely interested in receiving early postpartum discharge. These trials might have good or fair internal validity, but might have poor external validity because they are not generalizable to mothers who do not meet these stringent criteria. Randomized controlled trials of early postpartum discharge are prone to this limitation on external validity. Thus, this review also included evidence from non-randomized trials (especially pre- and post-intervention designs), as well as interrupted time-series, time-series, cohort, and case-control studies. These designs tend to have better generalizability, although they provide weaker evidence for causality than randomized trials.

Search Strategies for Unpublished Data and Ongoing Studies

To identify ongoing, Federally-funded studies of postpartum services, two data sources were used: the CRISP database supported by the National Institutes of Health, and the National Center for Education on Maternal and Child Health database supported by the Maternal and Child Health Bureau. The strategy used the keywords "infant," "newborn," "postpartum," and "postnatal" to search each of these databases, reviewed lists of study titles, and selected those studies that looked potentially relevant for review of abstracts. For each study that was judged relevant based on the review of its abstract, a telephone interview with the principal investigator was conducted to gather additional information about the study's aims, design, current status, and anticipated completion date. To identify state-supported evaluations of the effects of early postpartum discharge legislation, one representative from each state was contacted using the roster of the Association of Maternal and Child Health Programs to identify contacts. At least one person from each state was contacted in 1998, and follow-

up was attempted with all states again in 2001. Appendix I shows the results of this survey

In the course of data collection, information was also gathered from selected key informants who could provide current, unpublished information about work in progress and national processes that affect services for mothers and infants. These included researchers leading recent or ongoing studies such as the Pregnancy Risk Assessment Monitoring System, as well as representatives of quality monitoring organizations, including the National Committee on Quality Assurance and the Foundation for Accountability.

RESULTS

At the time of this evidence review, the most recent year for which data are available for many measures was 1998, the same year the Federal legislation took effect. Thus, most of the available evidence on the effects of legislation reflects the effects of state laws that took effect in earlier years. Current and future research will be able to address the effects of the Federal legislation, as data for health outcomes becomes available beyond 1998.

Summary of Findings by Key Question

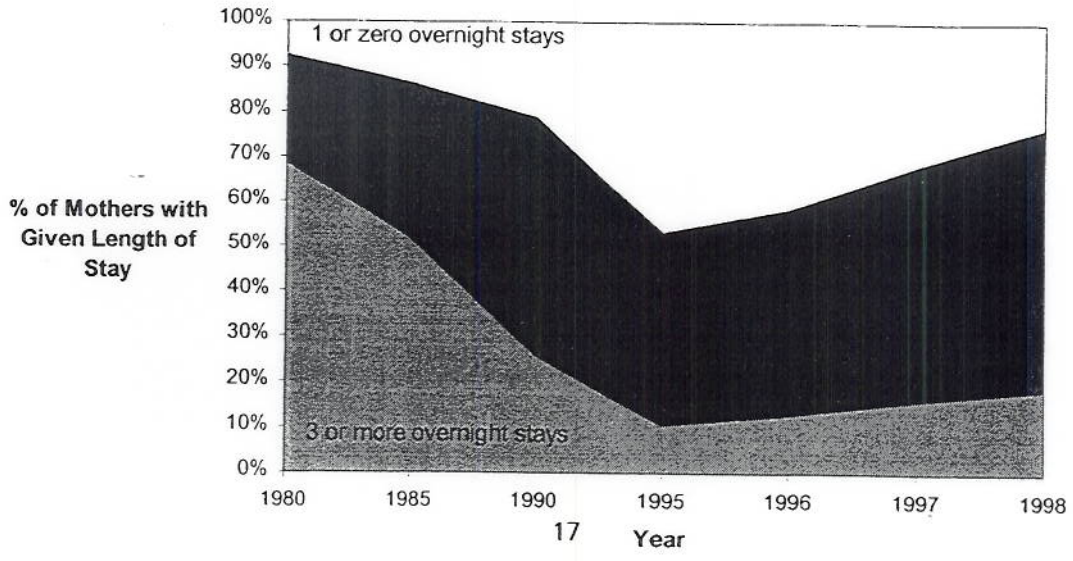
Key Question 1: *How have the Federal and state laws affected length of postpartum hospitalization? What is the current length of stay?*

Nationally, the length of hospitalization for childbirth increased from a mean of 2.1 days in 1995 to 2.5 days in 1998, the most recent year for which statistics are available from the National Hospital Discharge Survey.[2] The proportion of mothers hospitalized for one day or less for childbirth decreased from 37% in 1995 to 18% in 1998 (Fig 2). Between 1995 and 1998, mothers with vaginal deliveries accounted for almost the entire decrease in 1-day stays, which dropped from 47% to 23% in this group. Mothers with cesarean deliveries had an increase in the proportion with 4-day stays, from 20% to 27%.

Source: Popovic, National Hospital Discharge Survey, 2000

Although the Federal legislation did not become effective until January 1, 1998, state laws and changes in anticipation of the Federal law may have led to the longer stays beginning in 1996.[57] Information from state and local sources, including Maryland,[13] Massachusetts,[20] Ohio (Uma Kotagal, MD, MPH, personal communication, October 2000), and Harvard Pilgrim Health Care (Jeanne Madden, personal communication, October 2000) all confirm the trend toward increasing length of hospital stay for childbirth seen

Figure 2. Changes in Length of Stay after Vaginal Delivery over Time



in national statistics. Although the trend toward increasing hospital stay nationally has not been adjusted for confounding variables that may have changed over time, the increase seen in Fig 1 is sudden and pronounced, suggesting that the legislation was associated with this change.

It is less clear whether the increases in length of stay were consistent across the U.S. population. In Ohio, the effects of the law on length of postpartum hospital stay have varied in the different regions of the state (Uma Kotagal, MD, MPH, personal communication, October 2000). California conducted a postpartum mail/telephone survey of a population-based sample of California mothers in 1999, the Maternal and Infant Health Assessment (MIHA). Preliminary results of this survey found that 44% of mothers with vaginal delivery had a stay of 1 night or less, and 71% of mothers with cesarean delivery had a stay of 3 nights or less.[11] Thus, the proportion of mothers with short hospital stays in California in the 1999 MIHA survey was higher than in 1988 national statistics. However, since comparable data are not available from the pre-legislation period, it is not known how much length of stay for childbirth in California actually changed due to the legislation. Previous studies have suggested that early postpartum discharge is more common in the West compared with other geographic regions and in health maintenance organizations compared with point-of-service and indemnity plans.[58]

Medicaid covers approximately 39% of births nationwide. It is important to evaluate vulnerable subgroups because early postpartum discharge was actually more common among mothers with risk factors, which include receipt of Medicaid, an educational level of less than high school, and inadequate prenatal care.[37] Two studies in progress, both supported by the Maternal and Child Health Bureau, are specifically evaluating mothers and newborns insured by Medicaid. The first study, led by health economist Ellen Meara at Harvard Medical School in collaboration with Tracy Lieu, Uma Kotagal, and Harry Atherton, is evaluating changes in length of stay, postpartum follow-up services, and related outcomes in the Ohio Medicaid population during the years 1991-1998. This is a population with more than 1 million mothers and newborns, and the study should have adequate statistical power to evaluate the effects of the Ohio state law, which was enacted in 1995.

The second Medicaid study supported by MCHB is a multi-state analysis led by Paula Braveman of the University of California, San Francisco, in collaboration with Susan Egerter and others. This study was made possible by an intra-agency agreement between the Office of Strategic Planning within the Health Care Financing Administration (HCFA) and MCHB/Health Resources and Services Administration (HRSA). Data from the 1995 State Medicaid Research Files (SMRF) are being analyzed for the 27 states included, with a population of 1.2 million mothers and newborns. The study's objective is to produce information on inpatient stays and early outpatient services for newborns and mothers covered by fee-for-service Medicaid, who are not covered by the Federal early postpartum discharge legislation or by most of the state early discharge laws. (In contrast, mothers and newborns enrolled in Medicaid managed care programs are subject to the federal law; they account for a minority of deliveries to Medicaid-insured women.) The analyses will provide important evidence about the extent to which the Medicaid newborn and maternity population is receiving the care recommended by the AAP and ACOG and guaranteed to other insured groups under existing state and federal legislation.

Key Question 2: ***How have the laws affected receipt of preventive care, including in-hospital education, newborn screening, newborn follow-up visits, and maternal follow-up visits? What services are newborns and mothers now receiving during the first 60 days after delivery?***

Under ideal circumstances, if early postpartum discharge occurs, it should be associated with no reduction in the content or quality of in-hospital care, including education and newborn screening. According to AAP and ACOG practice recommendations, all newborns with short hospital stays (< 48 hours) should be seen by a clinician for a preventive visit within 48 hours of hospital discharge.[8] By increasing the length of postpartum hospital stay, the Federal and state legislation might have improved the delivery of in-hospital services or reduced the proportion of newborns receiving early outpatient follow-up visits.

The sections below look at whether hospitals and health plans reacted to the legislation by making any changes in hospital services or in postpartum follow-up visits. They also review the related question of whether changes in hospital length of stay affect preventive care services, whether or not these changes are prompted by legislation.

Newborn Screening

Recent reports in the medical literature suggest that increasing attention is being paid to newborn screening for phenylketonuria, jaundice, and other disorders. However, this review did not find any studies that looked directly at whether the state or Federal laws on early postpartum discharge affected the use of such screening. The evidence discussed below addresses the question of what screening services newborn infants are currently receiving.

Early postpartum discharge may hinder the delivery of preventive services, especially newborn screening for phenylketonuria (PKU) and other metabolic disorders.[59] The problem arises from the fact that newborn screening for metabolic disorders such as PKU is relatively insensitive if performed before 24 hours of life, compared with screening later. The AAP recommends repeating the PKU screen for infants discharged within the first 24 hours of life.

A national survey that included 133 term nurseries and 131 pediatricians in 1993 found lapses in adherence to the AAP recommendation on repeat PKU screening.[60] The study found that most states do not mandate rescreening and that most hospitals screen all infants for PKU before discharge regardless of age. More importantly, the survey suggested that a significant number of infants with early discharge do not receive repeated screening and are at risk for delayed or missed diagnosis of PKU. It also found that almost half of pediatricians were not aware of the need to perform repeated PKU screens on infants discharged by 24 hours.

The opposite problem may exist for thyroid screening. Thyroid tests obtained between 12 and 24 hours instead of later would not increase false-negative results, in which abnormal infants would go undetected, but may increase false-positive results, in which normal infants are incorrectly targeted for retesting.[61]

Screening for jaundice has traditionally been done via visual inspection of the newborn's skin color by an experienced clinician. Those infants who appear jaundiced are then selected for serum

bilirubin testing. However, bilirubin does not peak until 72 to 96 hours after delivery, and it is often difficult to predict which infants will have significant hyperbilirubinemia (jaundice) by visual inspection on the first or even second day of life. It is unclear whether increasing the average hospital length of stay to 48 hours will increase the proportion of jaundiced infants who are identified during the initial hospitalization.

In recent years, experts have advocated more systematic approaches to jaundice screening. A study conducted in 1995 suggested that many nurseries lacked parent education on jaundice, neonatal jaundice protocols, and neonatal jaundice tracking systems.[21] Largely in response to the consumer advocacy group Parents of Infants and Children with Kernicterus (PICK), the Joint Commission on Accreditation of Healthcare Organizations recently published a Sentinel Event Alert to call attention to the problem of hyperbilirubinemia and kernicterus.[62] Attempts to develop screening tests that identify newborns at risk of developing significant hyperbilirubinemia are ongoing. Using retrospective data on more than 51,000 newborns in the California Kaiser Permanente system, Newman and colleagues developed a simple risk index that incorporates several biological predictors of significant hyperbilirubinemia.[63] The index is better at identifying newborns at low risk than at high risk, and it has not been tested prospectively in a large population of newborns. Neonatologists at Pennsylvania Hospital in Philadelphia have developed predictive nomograms that utilize hour-specific serum or transcutaneous bilirubin measurement to risk stratify and guide follow-up care of their newborns.[64,65]

Newborn Follow-Up Services

Many early postpartum discharge programs provided early newborn follow-up visits as compensatory services. Evidence about how the legislation on early postpartum discharge affected newborn follow-up services is limited, but concern exists that health plans could have reacted to the increases in length of hospital stay by reducing follow-up services. Preliminary data from the Maternity Length of Stay study at Harvard Pilgrim Health Care (supported by the Agency for Healthcare Quality and Research with joint funding from MCHB and the Harvard Pilgrim Health Care Foundation) suggest that increases in the length of postpartum hospital stay during the late 1990s were associated with reductions in the proportion of newborns who received early outpatient follow-up visits either in office settings or at home. The Ohio Medicaid study, supported by MCHB, will also evaluate this question.

Several recent and ongoing studies are evaluating what services newborns and mothers are currently receiving during the first 60 postpartum days. In addition, preliminary analyses from the Ohio Medicaid study and the California Maternal Infant Health Assessment suggest that as recently as 1998 and 1999, fewer than half of the newborns with short hospital stays in these states were receiving early outpatient follow-up visits (Ellen Meara, PhD, personal communication, March 2001).[11]

Findings from physician surveys confirm this problem. Among a national sample of pediatricians surveyed via the AAP Periodic Survey in 2000, fewer than half reported scheduling the first office visit within 7 days after discharge (Henry Bernstein, personal communication, April 2001).[10] The proportion who said they would schedule a visit at less than

7 days was lower for non-breastfed than for breastfed infants. A national survey of nursery head nurses and pediatricians in 1995 identified similar problems.[21] Newborns discharged before 48 hours of age were often not scheduled to be seen by a health care provider within 2 to 3 days after discharge.

Work at one community hospital in Michigan suggests that physician education may improve adherence to AAP recommendations for early follow-up visits after early discharge. The investigators in this setting found that between 1994 and 1996 with various educational interventions including chart review, feedback, and letters, pediatricians became more likely to appropriately schedule follow-up for short-stay newborns.[9] However, in 1996, a substantial minority (38%) of short-stay infants were scheduled to be seen 4 or more days after discharge, and more than 80% of this group were scheduled 14 days after discharge. New data from this group suggest that under the right circumstances, adherence to the recommendation to schedule early follow-up visits after early postpartum discharge can be improved to more than 90% through multifaceted education and feedback.[12]

In Massachusetts, the state law specified that all mothers and newborns who were discharged at less than 48 hours after delivery should be offered a home visit. A statewide survey found that of 389 mothers who were discharged early, 33% were not asked whether they wanted a home visit. Of those who were asked, 59% wanted a visit and 40% did not. Overall, 41% of mothers with early discharge received home visits.

Maternal Follow-Up Services

During the 6 weeks after delivery, the mother experiences a number of predictable changes in the anatomy and physiology of reproduction. For the mother, the Guidelines for Perinatal Care published by ACOG and AAP recommend a postpartum review and physical examination 4 to 6 weeks after delivery.[8] Healthy People 2010 has a developmental objective to increase the proportion of women who receive a postpartum visit 4 to 6 weeks after delivery.[25]

This review did not find studies that looked specifically at the effects of the early postpartum discharge laws on maternal follow-up visits, but there is some information about how consistently mothers are currently receiving follow-up services. Continuous monitoring of the proportion of mothers receiving postpartum follow-up visits has been carried out by the National Committee on Quality Assurance, which accredits managed care organizations. NCQA's "Check-Up After Delivery" measure, implemented in 1997, is defined as the percentage of women who had live births and who had a postpartum visit between 21 days and 56 days after delivery. NCQA data show a substantial performance gap on this measure between publicly-reporting health plans (74.8%) and non-publicly reporting ones (63.5%). Similarly, accredited health plans scored 75.5% compared with non-accredited health plans, which scored 67.7%. It is important to note that these data include only mothers who have health insurance; the proportions among uninsured mothers in the general population are likely to be lower.

The Pregnancy Risk Assessment Monitoring System

Ongoing studies that describe what services newborns and mothers are currently receiving during the postpartum period include the Pregnancy Risk Assessment Monitoring System (PRAMS), supported by the

Centers for Disease Control and Prevention (CDC) and participating states; and the Life Around Newborn Discharge (LAND) study, supported by MCHB. The PRAMS survey is a cooperative project between CDC and 32 states that continuously collects data from a stratified random sample of mothers identified using birth certificate data. Much of the PRAMS questionnaire focuses on prenatal risk.

At SACIM's request to include new questions on the delivery of postpartum services, PRAMS recently added the two core questions and three state-standard questions shown in Table 3. These questions were used for the first time for births in the year 2000. The MCHB grant for collaborative research in early postpartum discharge will support analyses of these data, which researchers at the University of California, San Francisco plan when the year 2000 PRAMS data become available in fall 2001.

The Life Around Newborn Discharge (LAND) Study

Another population-based evaluation of services during and after delivery is the LAND study started in 1999 by Henry Bernstein, DO, and collaborators including the AAP Pediatric Research in Office Settings (PROS) network, with funding from the MCH Research Program. It is a prospective, observational cohort study in which mother-infant pairs who deliver at term (37 weeks or more) are being followed for the first 4 weeks after hospital discharge. The LAND study addresses these research questions:

- How often do mothers, pediatricians, and obstetricians agree on readiness for postpartum discharge?
- What influences these perceptions of readiness?
- How do these perceptions impact health-care utilization, health outcomes, and health-related behaviors during the first four weeks after discharge?
- How do these perceptions change over time?

Each participating practice enrolls an average of 30 mother-infant pairs; the goal is to have 200 pediatric practices participate for a total sample of 6,000 mother-infant pairs. Data collection includes practice demographics, questionnaires on the day of discharge (by the mother, pediatrician, and obstetrician) and 4 weeks after discharge (by the mother and pediatrician), a daily diary kept by the mother for the first 2 weeks after discharge, and a brief encounter form completed by the pediatrician at each office visit during the first four weeks after hospital discharge.

At SACIM's and MCHB's request to evaluate what services are now being provided to mothers and newborns for this report, the LAND investigators conducted a preliminary analysis of data from the first 600 mother-infant pairs enrolled in the study. For these newborns, the pediatricians reported discussing the plan for follow-up visits in more than 99% of cases (Appendix J, p. 4). More than 99% recommended an office visit. However, this first preventive visit was recommended an average of 10 days after discharge. This suggests that for many newborns, pediatricians are not scheduling follow-up visits within 48 hours after hospital discharge, despite AAP recommendations to do so. Pediatricians said they recommended a home visit for only 13% of newborns; these were planned a mean of 3 days after hospital discharge.

When assessments were made on the day of discharge, most pediatricians

(96%) felt that the newborn had been discharged on the right day (Appendix J, p. 5). However, in retrospect, when asked 4 weeks after discharge, only 88% of mothers felt that their newborn had been discharged on the right day (Appendix J, p. 6). Of the 38 mothers (10% of respondents) who thought their baby should have stayed longer, 14 said they were not yet comfortable with breastfeeding, 14 said they were too tired to care for either the newborn or themselves, and 12 said they needed more education about baby care or feeding (total sums to more than 38 because multiple responses were permitted).

Table 3. Questions on Postpartum Follow-Up Services Added to the Pregnancy Risk Assessment Monitoring System Questionnaires at the Request of the Secretary's Advisory Committee on Infant Mortality

Core Questions (asked by all states)

51. Was your baby seen by a doctor, nurse or other health care provider in the first week after he or she left the hospital?
    [ ] No --> Go to Question 53
    [ ] Yes

52. Was your baby seen at home or at a health care facility?
    [ ] At home
    [ ] At a doctor's office, clinic or other health care facility

Standard Questions (states can choose to use these questions)

L8. Since your new baby was born, have you had a postpartum checkup for yourself? (A postpartum checkup is the regular checkup a woman has after she gives birth.)
    [ ] No --> Go to Question ##
    [ ] Yes

L9. At that visit, did a doctor, nurse, or other health care worker discuss family planning or birth control with you?
    [ ] No
    [ ] Yes

X3. Did your baby have any well baby shots or vaccinations before he or she was 3 months old? (Don't count shots or vaccinations given in the hospital right after birth.) Check one answer
    [ ] No
    [ ] Yes
    [ ] My child has not had any well baby shots but he or she is not 3 months old yet

When asked if any interventions would have helped them feel more confident caring for their baby during the first four weeks of life, 53% of mothers responded that one or more services would have helped. Of this cohort who desired one or more services, more than half would have wanted more help from anyone at home (the baby's father or others). In fact, as Table 4 shows, a varied array of services could make postpartum mothers feel more confident. With respect to reported health care utilization during the first 4 weeks postpartum, almost all mothers (97%) noted that their baby had at least one medical visit of any type (Appendix J, p. 7). Among breastfeeding mothers, more than one-fifth (21%) of them reported having had visits specifically with "breastfeeding/lactation consultant" during the first 4 weeks postpartum.

More detailed findings from the LAND preliminary analysis are in Appendix J. The LAND study has produced several abstracts and papers.[10,66-68] The investigators continue to enroll mother-infant pairs and their physicians, and are collecting data on many aspects of the quality and quantity of services as well as physician and maternal perceptions during the postpartum period. Final analyses are scheduled to begin in 2003.

Table 4. Responses of mothers in the Life Around Newborn Discharge study to the question, "Would the following have helped you feel more confident in caring for your baby over the past four weeks?"

Service	N (%)
Any service listed below	199 (53)*
More prenatal classes	41 (21)†
More time in the hospital for recovery from labor	59 (30)†
More patient education while in the hospital	67 (34)†
More visits to the pediatrician with my baby after discharge	64 (32)†
Some or more home visits	67 (34)†
More help from anyone at home (baby's father and/or others)	103 (52)†

* 199 (53%) of the 377 mothers responding named any service.

† % is calculated based on the 199 mothers who named one or more services.

Key Question 3: *How did the legislation affect the costs of postpartum care?*

As early postpartum discharge became widely adopted in the United States, it was assumed that the practice saved money. However, little evidence supports this assumption. A study of Wisconsin newborns from 1989 through 1994 found that although the average length of stay decreased for both full-term and premature infants, average hospital charges rose for both groups during the same time period.[69] The authors of this study also observed that double the proportion of newborns were classified as sick in 1994 (43%) compared with 1989 (19%). They concluded that managed care efforts to control neonatal care costs through early discharge policies may have had limited impact, and that physicians or hospital may have been compensating for these policies by classifying more newborns as sick to enable longer hospital stays to be reimbursed. A Canadian study also suggested that there would not necessarily be strong cost savings from early discharge; the effects would depend on whether empty beds were filled and whether staff were sent home when the hospital census was low.[70]

The true costs of early discharge programs have not been rigorously analyzed.[16] The few studies that have examined the costs of early discharge programs typically estimated them based on charges rather than true costs, which would include development costs, preventive care costs including home visit, education, and outpatient visit costs, and liability costs.[71] A study in Australia suggested that the net costs of an early postpartum discharge program would depend on how many home visits were provided to compensate for the reduced time in the hospital.

The increase in average length of hospital stay associated with the Federal and state laws likely did increase costs, although not by as much as might be predicted on the basis of hospital per diem rates alone. The first day of hospitalization for childbirth typically costs more than the second or subsequent days.[14] By the second postpartum day, the marginal costs of additional hours in the hospital are lower than the costs of the earlier hours in the hospitalization.

This literature review found only one published before-and-after study of the actual effects of the postpartum length of stay legislation on hospital charges, conducted in Maryland. In that state, the mean length of stay for vaginal deliveries increased by 38%, from 1.45 days before to 1.99 days after the law.[13] However, the increase in hospital charges was only 10%. For cesarean deliveries, the mean length of stay increased by 17% while charges increased by 6%. The additional cost born by Maryland health care payers was estimated at $250 per vaginal birth and $225 per cesarean birth. If these costs are extrapolated to the United States birth cohort of approximately 3.8 million, the national costs of the legislation would be approximately $900 million.

Other studies that evaluated postpartum length of stay and hospital charges before the Federal and state legislation also suggest that the marginal cost of an additional day in the hospital is relatively low, certainly lower than the per diem rate of $1,000 to $2,000. A study of Medicaid managed care in Indiana from 1993 to 1995 found that hospital length of stay for deliveries decreased by 21%

but costs decreased by only 12%, or $280.[72]

A Congressional Budget Office report prior to the Federal law's passage estimated the cost of the Federal legislation at $220 million per year.[15] However, the CBO excluded costs for uninsured mothers and the 20% of mothers who at the time were already covered by state laws. Most estimates of the costs of increased length of stay alone have ranged from $900 million to approximately $2 billion per year.[15,16] However, these estimates do not take into account possible savings from hospital readmissions that might be averted, nor changes in the costs of other postdischarge events such as follow-up visits or costs to families.

One study, conducted in Illinois over a 12-month period predating the implementation of the law in that state, made projections of the net costs of the law after subtracting hypothetical savings from avoiding some hospital readmissions.[14] The net costs would depend on both the percentage of short-stay mothers and newborns who opted to stay for the new minimum as well as the percentage of readmissions avoided due to the longer stays. Other evidence suggests it is unlikely that longer stays would prevent 100% or even 50% of the readmissions of newborns or mothers. The cost estimates were much more sensitive to the proportion of short staying mothers who opted to stay the new minimum. If 25% of the short staying mothers opted to stay the new minimum and 25% of readmissions were avoided, the law was projected to increase birth-related hospital costs by 4.6%. If 50% of the short staying mothers opted to stay the new minimum and 25% of readmissions were avoided, then the law would increase birth-related hospital costs by 9.7%. In the most extreme but unlikely scenarios, the law might increase costs by up to 20% (if 100% of short stayers stayed the new minimum and 10% of readmissions were avoided) or result in savings of 0.1% (if 10% of short stayers stayed the new minimum and 100% of readmissions were avoided).

Key Question 4: *How does the length of postpartum hospitalization affect newborn and maternal outcomes?*

Postpartum services may affect multiple outcomes for the newborn and mother. Each outcome is discussed separately below. Infant outcomes include: rehospitalization, including jaundice, dehydration, and infection; emergency department visits; urgent outpatient visits; and other infant morbidity and mortality; and preventive care, including newborn screening tests. Maternal outcomes include: rehospitalization; emergency department visits; urgent outpatient visits; mental health, including postpartum blues and depression; and maternal satisfaction. Breastfeeding is an important outcome for both the infant and mother.

The studies that evaluated length of stay and follow-up services had varying designs. As observed in the Methods section above, the design of a study affects the strength of the conclusions that it produces. Appendix K shows the relevant studies and the outcomes they assessed, grouped by study design.

The current literature review found that studies of early discharge programs almost always combined reduced length of hospitalization with enhanced preventive services, such as prenatal education and/or postpartum home visits, that were intended to compensate for the short stay. It is important to keep in mind that in actual practice, early postpartum discharge often has been conducted without offering such compensatory services and has been applied to a much broader range of mothers and newborns than those who participated in the programs in the research literature. Thus, the outcomes reported from early postpartum discharge programs described in published studies represent the most optimistic possible effects.

Rehospitalization of the infant (including jaundice, dehydration, and infection)

Rehospitalization of the newborn is difficult to study because it is an uncommon event. Based on the largest cross-sectional studies available, only about 1 in 50 full-term newborns will be rehospitalized during the month after delivery. To have adequate statistical power to identify an increase in the rehospitalization rate from 2% to 2.5%, the minimum number required in a randomized controlled trial would be more than 14,000 in both the intervention and control groups. Wide consensus exists among scientific researchers in this field that attaining such sample sizes in a randomized study of early postpartum discharge would not be feasible. The largest randomized trial available included 131 patients.[35]

The strength of conclusions that can be drawn from a study of whether early postpartum discharge is associated with rehospitalization depend greatly on the study design. In many situations, the randomized controlled trial would be considered the strongest study design. Usually, however, randomized trials are limited by volunteer bias (ie, only those mothers who are interested in early postpartum discharge might enroll as study participants) and small sample sizes.

Studies which rely on observation alone can usually achieve larger sample sizes and thus more statistical power. Pre- and post-intervention studies (also called non-randomized controlled trials) are considered weaker than randomized trials but typically have larger sample sizes. Longitudinal studies look at how rates of early postpartum discharge and

rehospitalization change over time in a given population where other factors remain constant.

Designs that look at a single population at one point in time, including cohort and case-control studies, are considered to provide weaker evidence that a true association exists. In these designs, mothers and newborns who receive early discharge (cohort design) or who experience rehospitalization (case-control design) are compared with those who do not. However, patients who experience early postpartum discharge may differ from other patients in important ways: they may have lower education and worse insurance,[37] or conversely, they may be carefully selected based on low-risk characteristics. Thus, cohort and case-control studies are prone to confounding, meaning that both early postpartum discharge and the risk of rehospitalization may be caused by an unmeasured third factor – for example, the mother-newborn pair being at high social risk -- which cannot be completely adjusted for using statistical methods.

The controlled trials in North America that have evaluated the effects of early postpartum discharge on newborn rehospitalization are summarized in Table 5. Of the three randomized controlled trials,[33,35,36] none found a significant difference in rehospitalization in the early discharge group, but all lacked statistical power to identify a true difference if one existed. In the five pre- and post-intervention studies, the relative risk of rehospitalization after early postpartum discharge varied from 0.37 to 1.76.[73-77] Only in the study by Lock, which had the largest sample size of 7,009 and a relative risk of 1.76, did the early postpartum discharge group have an increase in risk that was statistically significant.

The longitudinal studies of early postpartum discharge and rehospitalization conducted in North America are summarized in Table 6. All studies found the proportion of births with early discharge had increased over the study period; all looked at the time period before the U.S. legislation. However, these studies give conflicting results, with the three studies from the United States suggesting no increases and the two studies from Canada showing significant increases in rehospitalization. The differences in the studies' findings do not have an obvious explanation, but possible reasons include differences in (1) the definition of early discharge, (2) follow-up services, (3) clinical thresholds for rehospitalizing an infant, and (4) definitions of the exposure period.

It seems most likely that the first and third reasons above explain the differences between the findings. The Canadian studies compared routine hospital stays of 3 to 4 days with early discharge of 2 days or less. In contrast, the United States studies compared hospital stays that were routinely 2 to 3 days with early discharge of 1 to 2 days. Since jaundice peaks and lactation begins on the third or fourth postpartum day, an infant who is in the hospital at 3 days and experiences problems is likely to simply continue the birth hospitalization rather than be discharged. As length of stay decreases from 3 to 4 days to 2 days or less, one could expect an increase in rehospitalization rates because more infants are exposed to the possibility of readmission during the period of vulnerability. By the same reasoning, decreases in length of stay from 2 days to less than 2 days might not affect most rehospitalizations. Also, in the United States, increasing cost containment pressures worked to decrease hospitalization rates generally, so it is possible that the clinical threshold for readmitting an infant increased over the years in the studies.

Table 5. Controlled Trials Evaluating Length of Stay and Infant Rehospitalization

Study Design, Author	Definition of early discharge	Early Discharge Group N	Early Discharge Group % rehos-pitalized	Control Group N	Control Group % rehos-pitalized	Relative risk*	P<.05**	Outpatient services
Randomized Controlled Trials								
Brooten	Mean 86 vs. 116 hours	61	3.3%	61	9.8%	**0.33**	N	Minimum 2 home visits and 10 telephone calls, telephone access
Carty	Mean 1.6 vs. 4.0 days	93	2.2%	38	0.0%	**N/A**	N	Early discharge groups received 3 to 5 home visits; control group received 1 home visit
Yanover	Median 26 vs. 68 hours	44	4.5%	44	0.0%	**N/A**	N	Collaborative perinatal care, home visits
Pre- and Post-Intervention Studies								
Behram	Mean 1.4 days	845	1.1%	2563	2.9%	**0.37**	Not given	2 home visits+ telephone access
Bragg	24 hours	2739	1.2%	3258	1.4%	**0.92**	N	Home visits (no details)
Gries	Mean 1.88 vs. 2.54 days	869	1.4%	1042	0.9%	**1.60**	N	Phone calls at 24 and 48 hours, clinic visits within 24-48 hrs for any problems
Kotagal (J Pediatr)	Mean 32 vs. 48 hours	988	9.0%	1172	8.0%	**1.12**	N	Home visits (mean 1.2/infant), 90% before day 5
Lock	Mean 1.62 vs. 2.25 days	1073	11.7%	5936	6.7%	**1.76**	Y	Office visit at 72 hours (90% attendance)
Other Controlled Non-Randomized Studies								
Pittard	Mean 31 vs. 92 hrs	1714	3.0%	622	2.7%	**1.11**	N	None

* Relative risk of rehospitalization in the early discharge group vs. the control group.
** Statistically significant at P<.05

Table 6. Longitudinal Studies Evaluating Length of Stay and Infant Rehospitalization

Author	Years Studied	Definition of early discharge	Total N	Beginning of Series		End of Series		P<.05*	Comments
				% with early discharge	% rehos-pitalized	% with early dis-charge	% rehos-pitalized		
Cooper, Ohio	1990-94	N/A	N/A	See comments				Y	Number of infants admitted to a children's hospital with breastfeeding malnutrition and dehydration increased from 1 in 1990 to 7 in 1994; birth rate in the region remained unchanged
Kotagal (JAMA), Ohio	1991-95	Within 1 day of vaginal birth or 2 days of cesarean birth	102,678	21.0%	2.1%	59.8%	1.7%	Y	Rehospitalizatio n rates within 14 days of discharge
Lee, Ontario	1987-94	At 2 days or less	920,554	5%	12.9%	56%	0.2%	Y	Readmission rates during the first 2 weeks of life
Liu, Canada	1989-97	N/A; reported mean length of stay (LOS)	2,144,205	Mean LOS 4.2 days	2.7%	Mean LOS 2.7 days	3.8%	Y	Readmission rates within 28 days of age
Marbella, Wisconsin	1989-94	N/A; reported mean length of stay (LOS)	368,955 term newborns	Mean LOS 2.4 days	7.8%	Mean LOS 1.7 days	3.4%	Not reported	Readmission in the first month of life

* Statistically significant at P<.05

Many cohort and case-control studies have evaluated the possibility that early postpartum discharge is associated with rehospitalization. These studies also give conflicting results. Several have observed some increase in risk following early discharge.[78-83] A study of Medicaid-insured deliveries in Maryland found that the odds of readmission associated with early discharge were not elevated amongnormal newborns but were significantly higher among sick newborns.[84]

A study by Malkin used an instrumental variable approach to attempt to adjust for the unmeasured confounding that tends to bias observational designs.[80]

This study estimated that a 12-hour increase in length of stay was associated with a reduction in the newborn readmission rate of 0.6 percentage points, but the strength of this conclusion is limited by the fact that the actual time of discharge was not directly observed but inferred based on the time of delivery and other assumptions. Other cohort and case-control studies have found either no increase in risk[85-88] or an increase in risk that was not statistically significant.[89]

Most newborn rehospitalizations are for jaundice, which occurs naturally but can be worsened by dehydration. Increasing length of postpartum hospital stays from one night to two nights probably would not prevent most jaundice, but the longer stays might make it more readily identifiable and more likely to lead to only a continuation of the original birth hospitalization rather than a rehospitalization. One study estimated that 122 infants would need to stay longer than 30 hours to avoid one readmission for jaundice.[81]

Most rehospitalizations do not have any long-term harmful effects on the physical health of the infant. However, any rehospitalization may cause psychological distress and disrupt the family's adjustment after childbirth. In addition, studies from the United States and Canada suggest that the severity of illness of newborns at the time of readmission for jaundice or dehydration increased, coincident with trends toward early postpartum discharge.[46,90] Although usually benign and self-limited, extreme jaundice can lead to brain damage, also known as kernicterus, in very rare cases. The exact incidence of kernicterus in healthy term infants with severe jaundice is not well-established. Since the third to fourth day of life is when bilirubin peaks and breastmilk comes in, the potential dangers of kernicterus and dehydration underscore the need for careful selection of newborns eligible for discharge even at 48 hours and consistent follow-up on the third or fourth postpartum day.

In summary, the evidence on whether early postpartum discharge leads to increased rehospitalization of the newborn is mixed. Early postpartum discharge may lead to no increase in rehospitalization in some populations, even those insured by Medicaid. However, the risk of rehospitalization after early discharge appears increased in at least some populations. Most of these rehospitalizations do not result in long-term problems. However, the risk of rare, lasting sequelae cannot be ruled out and is likely best reduced by consistent outpatient follow-up on the third or fourth postpartum day.

Emergency department visits by the infant

Emergency department (ED) visits, like rehospitalizations, are an uncommon outcome. Studies vary in their definitions and estimates of ED visit rates, but the larger studies have reported that approximately 5 of every 100 newborns in a health maintenance population made a visit during the first 3 weeks of life[91] and 28 of every 100 newborns in an inner-city population made a visit during the first 3 months of life.[76]

In pre- and post-intervention studies conducted in an inner-city population, full-term infants were equally or less likely to make ED visits during the first 3 months of life after an early postpartum discharge program had been implemented.[76,92] Similarly, the rate of emergency department visits during the first two weeks of life was identical between healthy term newborns born before and after an early discharge program was implemented in a military population.[75] Another study found no

association between length of stay and infant ED visit rates.[91]

One study in Pennsylvania and New Jersey suggested that the incidence of ED visits by newborns 2 to 10 days old increased relative to other ED visits between 1989 and 1995, coincident with a decrease in average length of stay for deliveries from 2.79 to 1.85 days in New Jersey.[93] However, the probability of hospitalization after an ED visit did not change. This study suggested that patient severity did not increase as ED utilization increased over time. However, the strength of this study's conclusions is limited by the lack of a population-based denominator by which to gauge the incidence rates of ED visits.

Urgent outpatient visits by the infant

In contrast with rehospitalizations and ED visits, urgent outpatient visits by the infant are relatively common. In two health maintenance organization studies, approximately one-third of healthy full-term newborns made urgent outpatient visits during the first 14 days of life.[94,95] One randomized trial and one pre- and post-intervention study of early discharge programs that provided relatively consistent early follow-up found no differences in rates of urgent outpatient visits by newborns in the intervention vs. control groups.[36,96] In contrast, one pre- and post-intervention study and two cohort studies found that early discharge was associated with an increase in outpatient visits, both scheduled and unscheduled.[75,78,89] The differences in outcomes among these studies may be attributable to the relatively generous follow-up services provided in the first two studies, while the studies that found an increase in infant urgent care visits were conducted in more naturalistic settings where follow-up services may not have been as consistently provided.

Other infant morbidity and mortality

Various studies have reported on other infant outcomes, ranging from infant weight gain[97] to mortality.[98,99] Because infant mortality is uncommon, it is very difficult to study for the same reasons described in the above section on infant rehospitalization. Two studies have looked specifically at the association between length of hospital stay and infant mortality. A study of four Utah counties between 1985 and 1989 compared 17 infants who died with 51 control infants.[98] The odds ratios for neonatal mortality for discharge at less than 24 hours was 1.65 (95% confidence interval (CI), 0.42 to 3.34), and for discharge at less than 48 hours was 1.16 (95% CI, 0.4 to 3.34). The fact that the confidence intervals include 1.0 means that no statistically significant association was found, but this study's small sample size limited its ability to draw definitive conclusions.

A more recent study of infant mortality and early postpartum discharge used Washington State linked birth certificates, death certificates, and hospital discharge records to assess more than 47,000 biths in 1989 and 1990. The investigators found an association between early discharge (defined as a stay of less than 30 hours) and mortality during the first 28 days after birth. After adjusting for newborn gender and race, mother's marital status, Medicaid status, parity, and age, the odds ratio for death after early discharge compared with later discharge (defined as a stay of 30 to 78 hours) was 3.65 (95% CI 1.56 – 8.54). This alarming odds ratio belies the inherent limitations of the study's cohort design: such studies are prone to selection bias, even when they attempt to control for demographic factors that are associated with both early discharge and infant mortality. A later study by the same

investigators used an instrumental variable approach to attempt to address this limitation, but it reported only on infant rehospitalizations and not on infant mortality.[80]

Infant preventive care, including newborn screening tests

Early postpartum discharge may hinder the delivery of preventive services, especially newborn screening for phenylketonuria (PKU) and other metabolic disorders.[59] This review found no studies that looked empirically at the association between length of stay and missed or inaccurate screening tests. However, indirect evidence, discussed in the section on newborn screening under Key Question 2 above, suggests that this area should be targeted for continued monitoring and improvement.

The current literature review found few studies that evaluated the effects of length of stay on the delivery of subsequent preventive services to the infant. A randomized trial of an early discharge program with multiple home visits and telephone contacts found that more infants in the intervention group than in the control had timely immunizations at 8 weeks.[36] In a pre- and post-intervention trial, Cooper et al found that the implementation of an early discharge program with home visits did not affect the proportion of infants completing one series of immunizations by 3 months of age.[92]

Maternal rehospitalization, emergency department visits, and urgent outpatient visits

Maternal rehospitalization is far less common than newborn rehospitalization. Most studies that attempt to evaluate the association between length of hospital stay and maternal rehospitalization lack the statistical power to draw definitive conclusions. The largest study identified in this review was in an insured population by Gazmararian. Only 63 of 13,945 mothers (0.45%) were readmitted within 28 days of discharge.[58] In the Gazmararian study, the risk of maternal readmission within 28 days after discharge did not vary by length of stay, insurance type, or region of the country.

Other studies, including three randomized controlled trials,[33,35,36] two pre- and post-intervention studies,[73,100] and two cohort studies[85,89] found no associations between early discharge and maternal rehospitalization. However, the sample sizes in these studies were relatively small, ranging from 44 to 554 in the intervention or early discharge group. One cohort study of 4,323 mothers in a health maintenance organization found that mothers who had a longer initial hospital stay (more than 48 hours) were more likely to be readmitted; the longer initial stays and the increased readmission rates likely both reflect elevated medical risk.[78]

For other maternal utilization outcomes, including emergency department visits and urgent outpatient visits, the literature is sparse and inconclusive. However, most controlled studies suggest that the rate of maternal urgent care or complications is not increased in early postpartum discharge programs that provide good follow-up services.[35,36,100] One pre- and post-intervention study of an early discharge program with compensatory services did find an increase in maternal urgent visits, from .01 and .02 visits per mother during the years prior to the program to .05 the year the program was implemented.[96]

Maternal mental health, including postpartum depression

Several studies have evaluated maternal mental health, including postpartum blues or depressive symptoms or perceived competence, after early postpartum discharge. The randomized controlled trial by Brooten, which enrolled 132 women after unplanned cesarean delivery, found no differences between the early discharge and control groups in maternal anxiety, depression, and functional status during 8-week follow-up.[36] Another randomized trial found no differences in depressive symptoms, but higher confidence among the early discharge group.[35] A third randomized trial found no significant differences in perceived maternal competence between the early discharge and control groups.[97] A controlled, non-randomized trial found that mothers who were discharged early with their infants had higher attachment scores than those who had either conventional discharge or early discharge with separation from their infants, who stayed in the hospital until 48 hours.[101]

Although reassuring, controlled trials of early postpartum discharge have limited generalizability because only those mothers who met strict criteria are usually eligible for these studies. In addition, among the eligible group, only mothers who are interested in receiving early discharge would agree to enroll. One observation cohort study found that mothers with one-night stays were more likely to report fatigue and worries about their newborns' health than similar mothers with longer stays.[89] However, most observational studies that have compared mothers who received early vs. later discharge suggest that early discharge has little effect on maternal mental health.[17,91,102,103] Again, these findings need to be interpreted with caution because mothers who received early discharge may have self-selected to this group.

One notable finding from the study by Mandl was the relatively high incidence of maternal depressive symptoms; 9% of all mothers had a score of 16 or more on the Center for Epidemiologic Studies – Depression (CES-D) measure. There is also evidence that newborn outpatient visit use is higher among those whose mothers have depressive symptoms.[104]

Maternal satisfaction

Many studies have evaluated maternal satisfaction with early postpartum discharge. All of the controlled studies reviewed found equal[33,97,105] or greater[35,36,101,106] satisfaction among mothers with early discharge compared with controls. Another study in a hospital with a noncompulsory reduced stay program found no differences in satisfaction associated with length of stay.[91] However, the optimistic findings of these studies probably reflect the fact that the mothers in the early discharge group volunteered to have a short length of hospital stay. If mothers were assigned to early discharge rather than choosing it, more patient dissatisfaction would be expected.[107]

Studies that survey entire populations of mothers provide a somewhat more generalizable picture of whether early discharge affects maternal satisfaction. In one survey of 27,789 mothers in 18 hospitals in one region from 1992 to 1994, those with shorter lengths of stay were more likely to perceive their stays as too short, and had slightly worse satisfaction compared with those with longer stays.[19] Likewise, a survey of 5,201 mothers in a large managed care organization in 1995 found that those with length of stay of 24 hours or less were more likely to describe their stays as too short than those who had stayed

25-48 hours or more than 48 hours (Table 7).[17]

In the survey by Gazmararian, the most commonly cited reasons for why stays were too short included the need for more rest (94%), not feeling well (63%); the needs for more information on infant care (36%) or self-care (38%) were less commonly named. Other studies, including the LAND Study, have shown similar patterns (Henry Bernstein, personal communication, April 2001.[18,20,89] This suggests that mothers' opinions of whether the length of hospital stay feels adequate might be difficult to improve via strategies (eg, more in-hospital education, enhanced follow-up services) without increasing the length of stay itself.

No study has evaluated the same population both before and after the state and Federal laws on early postpartum discharge. However, two studies conducted after the laws took effect show much higher proportions of mothers now say that their hospital length of stay was about right than in the earlier surveys (Henry Bernstein, personal communication, April 2001).[20] Comparing the various studies before and after the legislation, it is reasonable to conclude that the laws have increased the proportion of mothers who feel their hospital length of stay was about right, rather than too short.

Breastfeeding

This literature review found four published studies that evaluated the association between early postpartum discharge and breastfeeding. In two of these, randomized controlled trials of early postpartum discharge programs, there were no significant differences in breastfeeding at 1 or 2 months between the intervention and control groups.[35,97]

Of the observational studies, one that evaluated a group of mothers from 1986 to 1988 found no differences in breastfeeding between early discharge ($\leq$ 36 hours) and late discharge groups.[103] Another that included convenience samples of mothers with early (24-hour) vs. conventional (48-hour) discharge found no difference in the breastfeeding by 6 to 8 weeks postpartum.[108] In contrast, a study at Yale-New Haven Hospital in 1995 found that mothers who had 1-night stays were less likely to start breastfeeding than those who had 2-night stays (67% vs 77%, P=.06).[89] However, the conclusions of these observational studies are limited by the possibility of selection biases that could produce a spurious association between early discharge and breastfeeding, either positive or negative.

Key Question 5: How do other preventive care services, eg newborn follow-up visits, affect key infant and maternal outcomes?

Most studies reviewed evaluated the effects of other preventive care services – eg, the content of hospital care or outpatient postpartum visits – in conjunction with early postpartum hospital discharge programs. However, several studies have evaluated the effects of home visits,[22,78,94] or of other postpartum services on maternal or newborn outcomes.[24,95,109-113]

Newborn Follow-Up Services

Evidence was sought for the recommendation that all infants with short hospital stays (<48 hours) should have a follow-up visit within 48 hours after discharge. This recommendation is based on the fact that jaundice peaks and lactation begins at 72 to 96 hours after delivery. One study found that discharge at any time earlier than 72 hours increases the risk for rehospitalization, and the risk for rehospitalization specifically due to jaundice, compared with later discharge.[83] This study's authors suggested that early follow-up visits should also be conducted with any newborn discharged within 72 hours of birth.

The existence of the AAP recommendation for early preventive follow-up visits for newborns with short hospital stays makes it unlikely that anyone will conduct a randomized trial in which infants are assigned to receive no follow-up. The studies that provide the best direct evidence for this recommendation are three pre- and post-intervention studies, all from California, which tended to lead trends toward early postpartum discharge. In these studies, structured follow-up -- either home visits or clinic visits -- was provided consistently to the intervention group and either inconsistently or not at all to historical controls.[22,24,95] All three of these sutdies found that infant urgent care visits decreased after the intervention, although the effect size varied. The smallest reduction was from 36% to 29% and the largest reduction was from 58% to 28%. Although two of these studies evaluated rehospitalization rates, both lacked statistical power for this outcome and neither found a significant difference between the intervention and control groups.[22,23] A retrospective cohort study in a Colorado health maintenance organization population found that newborns who had received home care visits were less likely to be rehospitalized or to make multiple outpatient visits.[78]

Other studies have evaluated the type of postpartum service provided. Two randomized controlled trials in health maintenance organization populations compared home visits with either pediatric clinic-based follow-up visits[94] or hospital-based group or individual follow-up visits.[109] All follow-up visits were offered to early discharge newborns within 2 to 3 days after hospital discharge. These trials found no differences in outcomes as measured by rehospitalization, urgent visits, breastfeeding discontinuation, and maternal depressive symptoms. However, in both studies, mothers who received home visits were significantly more satisfied than mothers whose infants received usual follow-up care. The increased maternal satisfaction needs to be weighed against the higher

cost of home visits compared with clinic- or hospital-based follow-up visits.

One randomized controlled study evaluated the effects of postpartum nursery visits by the primary care provider in a teaching hospital.[113] More mothers in the intervention group than in the control group made a scheduled clinic visit in the first 30 days of life, but there were no differences between the groups in emergency department use, maternal knowledge or anxiety, or infant receipt of immunizations by 90 days.

A series of studies in Elmira, New York, evaluated the long-term effects of a comprehensive nurse home visitation program on high-risk mothers and infants. The study focused on mothers who were young (<19 years), single parents, or low socioeconomic status. Nurses made a mean of 9 home visits during pregnancy and 23 home visits from the child's birth through the second birthday. Short-term follow-up studies found that the program improved pregnancy outcomes and parenting skills, reduced rates of child abuse and neglect during the period of home visitation, and reduced government expenditures for low-income families.[114-117] Fifteen-year follow-up studies found that the intervention reduced the number of subsequent pregnancies, use of welfare, child abuse and neglect, and criminal behavior by mothers, as well as reducing reported serious antisocial behavior and emerging substance abuse by adolescents.[118,119]

Maternal Follow-Up Services

Evidence was also sought to support the recommendation by ACOG that mothers have a postpartum follow-up visit at 6 weeks after delivery. This review did not find studies that compared a follow-up visit with no intervention. However, a randomized controlled trial in Australia in 1995 assigned intervention group mothers to follow-up visits one week after hospital discharge, while the control group had follow-up visits scheduled six weeks after discharge.[110] Women in the intervention group were less likely to attend their check-up (76% vs. 88%, P = .001), and there were no differences between the groups in postnatal depression and health status scores, the number of problems reported, breastfeeding rates, or satisfaction. The researchers concluded that to make clinically important improvements in maternal health will require more than early postnatal follow-up visits.

Postpartum depression is a particularly complex, multifactorial health problem that can be devastating for the minority of mothers who experience it. Minor depressive symptoms may be more common than previously recognized, with prevalences of up to 15%.[91,120] Unfortunately, the optimal approaches to preventing or reducing the impact of postpartum depression have not yet been identified in rigorous studies. One randomized controlled trial of mothers identified as high-risk for postpartum depression assigned them to an intervention with two antenatal group sessions and one postnatal group session.[120] The intervention did not reduce the rate of depression, suggesting that more research is needed on ways of identifying and supporting mothers at risk for depression.

Services to Support Breastfeeding

Breastfeeding has been shown to have important health benefits for the newborn and mother. It has better nutritional content than formula and is associated with reduced diarrheal illness and respiratory tract infections.[121-123] National goals outlined in Healthy People 2010 aim to have 75% of mothers breastfeeding immediately

postpartum, 50% at 6 months, and 25% at 1 year.[25] Current breastfeeding rates fall short of these goals, with only 64% breastfeeding immediately postpartum, 29% at 6 months, and 16% at 1 year. Early postpartum discharge seems likely to increase the risk that breastfeeding problems will occur after hospital discharge instead of during the birth hospitalization.[46,124] This evidence review sought information about services that would be effective in closing this gap.

The US Preventive Services Task Force (USPSTF) and the associated AHRQ-supported Evidence-Based Practice Center at Oregon Health Sciences University are leading a systematic review of the evidence on counseling to promote breastfeeding (Jeanne-Marie Guise, personal communication). This review is expected to be complete and an evidence-based recommendation made by the USPSTF by early 2002. Three recent published reviews provide an excellent overview of the evidence on interventions to promote breastfeeding.[26,27,125] These reviews found good evidence from randomized controlled trials that systematic support for breastfeeding by lactation consultants can increase breastfeeding initiation and duration. There was also evidence from randomized trials that educational programs by health educators or other providers, given either in group or one-on-one formats and of varying intensities resulted in increased breastfeeding. In addition, commercial discharge packs that contain formula were associated with breastfeeding discontinuation.

Key Question 6: How have the laws affected newborn and maternal health outcomes?

Ongoing studies supported by the Maternal and Child Health Bureau and the Agency for Healthcare Quality and Research are evaluating how the Federal and state laws regarding early postpartum discharge, and related services, have affected newborn and maternal health outcomes. These include the Maternity Length of Stay (MLOS) Study led by Stephen Soumerai, the Ohio Medicaid Study led by Ellen Meara, the study of post-discharge services in Seattle by Jutta Joesch, and the Life Around Newborn Discharge (LAND) Study led by Henry Bernstein. The latter two studies do not include data from the time period before the legislation; instead, they seek to identify optimal services under current circumstances.

The MLOS Study uses a large, mixed-income population serviced by an integrated health maintenance organization. It evaluates the effects of two successive policies related to hospital delivery services: first, the HMO's program aimed at reducing length of postpartum hospital stay in 1994, and second, the Massachusetts legislation effective in 1996 mandating minimum 48-hour coverage for postpartum hospital stay. Preliminary findings from this study, presented to SACIM, showed that length of hospital stay decreased, then increased in response to these policy changes (Jeanne Madden, personal communication, February 2001). The rate of primary care use, both visits and telephone contacts, increased over the years studied (1991-1998). Breastfeeding initiation also increased, while breastfeeding continuation remained constant. There were no statistically significant changes in rehospitalization rates, although the sample size had limited power to identify differences in this rare outcome.

The Ohio Medicaid study uses linked birth certificate and claims files and a similar, interrupted time-series design to evaluate outcomes for Medicaid-insured mothers and newborns from 1991 to 1999. This study will evaluate similar outcomes as the MLOS study, except for breastfeeding, which is not reliably coded in the claims data. Preliminary findings show changes in length of stay coincident with early discharge policies and the Ohio state legislation. Analyses of rehospitalization and outpatient visits are currently underway.

The study of post-discharge services in the greater Seattle area relies on interviews with first-time mothers immediately following delivery, and two weeks after delivery. This study will investigate factors influencing mothers' decisions about the use of post-discharge services and will determine the impact of specific services on medical utilization, health status and breastfeeding. This study is currently in data collection and is expected to be complete by late 2001.

The LAND Study is currently collecting data from mothers, pediatricians, and obstetricians in the AAP Pediatric Research in Office Settings network. This study's focal research question is how the perceptions of mothers and physicians on readiness for postpartum discharge affect health care use, health outcomes and health-related behaviors. This study is described in detail in the section under Key Question 2 above.

CONCLUSIONS AND FUTURE RESEARCH

The Federal and state legislation mandating that insurers cover minimum periods of hospitalization after childbirth was associated with an increase in lengths of hospital stay after both vaginal and cesarean deliveries. Maternal satisfaction with length of hospital stay also appears to have increased. For other important postpartum outcomes (including rehospitalization for jaundice, dehydration, and other conditions, emergency department visits, breastfeeding, and maternal mental health), the current evidence on the effects of the laws is limited and studies are in progress. Important gaps still exist in the delivery of postpartum preventive services, especially early follow-up of newborns with <48 hours of hospital stay.

Fair evidence exists that early postpartum discharge can be relatively safe in a carefully selected subset of mothers and newborns if they are given compensatory outpatient services. However, fair evidence also exists that early postpartum discharge applied more broadly in some populations is associated with an increase in the newborn rehospitalization rate. Mixed evidence exists about the magnitude of health risk due to these rehospitalizations, as well as the magnitude of cost incurred by extending postpartum hospital stays by an additional night. Fair evidence exists that early follow-up visits after short hospital stays reduce urgent care visits by the infant.

In future research and policymaking, focusing only on the length of postpartum stay is likely to yield limited health benefit. Future work in this field would have maximum impact by addressing how to increase the consistency of follow-up services during the first week after newborn discharge, as well as how to identify mothers and newborns at risk of adverse outcomes so that services can be better targeted to their needs. Support is also warranted for translating research into practice to promote breastfeeding, and for research into effective strategies to reduce maternal depressive symptoms.

RECOMMENDATIONS OF THE ADVISORY COMMITTEE ON INFANT MORTALITY

1. Broaden the focus on appropriate services to include prenatal care, the content and quality of hospital care, and the first 60 days after delivery.

The NMHPA was a milestone that focused attention on postpartum care. However, to optimize maternal and infant health, concern should focus on both (1) the full range of preconception, prenatal, postnatal, and postpartum services needed for optimal health of newborns and mothers, and (2) how such practices can be implemented in the evolving health care environment in which clinical effectiveness and patient satisfaction as well as costs, reimbursement and financial incentives are important considerations.

For example, postnatal visits within 48 hours for infants who have had short hospital stays appear to reduce subsequent urgent care use and are recommended by national professional organizations, but newborns often do not receive these visits. For families at high socioeconomic risk, intensive programs using home visits have been found to improve long-term psychosocial outcomes. Public policymakers and health care administrators should collaborate on strategies to increase the delivery of such effective services as deemed appropriate for both publicly- and privately-insured families.

2. *Recognize that the outcomes of good prenatal and postpartum care are the optimal physical and psychosocial health of the mother, newborn, and family.*

The goal of postnatal and postpartum services should be to achieve optimal newborn, maternal, and family physical and psychosocial health, not only to prevent rare occurrences such as hospital readmission or catastrophic events leading to permanent disability or death. Interventions and studies must focus on outcomes reflecting important measures of health and well-being for newborns, mothers, and families, both in the short- and long-term.

The outcomes of good prenatal and postpartum care include: initiation and continuation of breastfeeding; timely use of preventive services for the infant; the prevention and timely treatment of postpartum depression; the parents' physical comfort, overall functioning, and sense of competence in parenting; longer-term measures of child and family welfare; and the adoption of healthy lifestyles (eg, a healthy diet and elimination of substance abuse). Funding for studies must be adequate for prospective data collection on these outcomes, since many computerized databases do not routinely collect information on breastfeeding or other health measures beyond rehospitalization or death.

3. *Closely monitor the accessibility and quality of postpartum preventive services via population-based studies and national quality assurance measures.*

Current knowledge of physiologic events in the initial period after childbirth indicates that, regardless of length of stay, all newborns should receive clinical evaluation and health promotion services on the third or fourth day after delivery. At that time point, mothers

should also receive culturally appropriate health promotion and should have ready access to clinical care if needed. The physical needs of the newborn and mother, as well as the psychosocial needs of the mother and family, should be addressed at this time using AAP and ACOG recommendations.

Services should be tailored to the individual family's socioeconomic, psychosocial, and environmental circumstances as well as biomedical risk factors, and should be culturally appropriate. Very young or inexperienced mothers with limited family support warrant special consideration. Public and private payors should include home visits, breastfeeding education, and other postpartum services on their menu of benefits. The choice of location and provider for postpartum follow-up services ideally should be tailored to the specific population being served. Current evidence suggests that postnatal follow-up via home visits results in higher maternal satisfaction and may achieve better outcomes for families at high risk, while office visits are less costly and may result in equivalent clinical outcomes for low-risk populations with good access to primary care. Public health agencies should direct support for home visits toward those families at highest risk.

4. Support further federal funding of research on the benefits and costs of different practices for the birth hospitalization and postpartum period.

This evidence review suggested that ongoing research will address some, but not all, of the important needs for information to improve the health of newborns and mothers. Given that early postpartum follow-up visits are not consistently being provided, close monitoring and better evidence on the effectiveness of such visits and the potential approaches to improving their delivery is needed. Future research should target areas of concern, for example, improving breastfeeding rates and reducing the incidence and severity of maternal depressive symptoms. Efforts in these areas seem likely to have greater health impact than studies that continue to focus on length of postpartum hospital stay.

In addition, the unmet needs of newborns and mothers who are insured by Medicaid or are uninsured deserve closer study. Because the risk of adverse health outcomes tends to vary with demographic, socioeconomic, and psychosocial characteristics, it may be possible to develop practical risk assessment instruments to identify newborns, mothers and families who need more intensive postpartum services than those recommended for the general population.

5. Ensure that the public and private sectors make patients and providers aware of the best services available.

Mothers are often made aware of their right to a minimum length of postpartum stay, and the follow-up services available, by health care providers during the postpartum hospitalization. The delivery and quality of prenatal and postpartum services deserves close monitoring via population-based surveillance systems such as the Pregnancy Risk Assessment Monitoring System, as well as the National Commission on Quality Assurance and other organizations that may influence purchasers' choice of health care delivery systems. It is important to establish mechanisms to proactively give mothers and providers information about the highest-quality services appropriate for their level of risk. State and local public health departments may be able to join with local health providers to ensure that such information reaches mothers during the early prenatal period.

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APPENDICES

APPENDICES

APPENDIX A

Appendix A

Contributors to this Report to Congress

Members of the Secretary's Advisory Committee on Infant Mortality (2000)

Chair	Institution
Antoinette Parisi Eaton, MD	Ohio State University
Executive Secretary	
Peter C. van Dyck, MD, MPH	Maternal and Child Health Bureau
Principal Staff	
Kerry P. Nesseler, RN, MS	Maternal and Child Health Bureau

Members

Larry Roger Anderson, M.D.	Sumner County Family Care Center, P.A.
Polly Arango	Family Voices
Bruce B. Bragg, M.P.H.	Ingham County Health Department
James W. Collins, Jr., M.D., M.P.H.	Children's Memorial Hospital
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Fredric C. Frigoletto, Jr., M.D.	Harvard Medical School
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Elizabeth H. Hadley, M.P.H., J.D.*	
Robert E. Hannemann, M.D.	
Agnes Hinton, R.D., M.S., Dr. P.H.	Center for Community Health
Bette Rusk Keltner, Ph.D.	Georgetown University
Darlene A. Lawrence, M.D.	IMANI Health Care
Tracy A. Lieu, M.D., M.P.H.*	Harvard Pilgrim Health Care & Harvard Medical School
Charles S. Mahan, M.D.	University of South Florida
Marsha McCabe, M.S.	
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Linda A. Randolph, M.D., M.P.H.	Georgetown University
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Carolina Reyes, M.D.	UCLA School of Medicine
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APPENDIX B

Federal / State	Length of Stay Legislation (LOSL) Passed	LOSL specifies that discharge can be earlier	LOSL mandates follow-up visit coverage if discharge is before 48 hours	Specifications for follow-up visits	LOSL applies to Medicaid / Erisa insured or State employees	Other
Federal	September 26, 1996				Medicaid	...Hospital length of stay ... is left to the decision of (or required to be made by) the attending provider in consultation with the mother.
Alabama	1996					Every health benefit plan that provides maternity coverage shall provide coverage for medically necessary inpatient care ... as determined by the ...physician ... and when consistent with ... AAP/ACOG[1] guidelines.
Alaska	May 31, 1996	x (after consulting with mother)				
Arizona	1997*	x (after consulting with mother)				
Arkansas	1997	x (after consulting with mother)				
California	August 26, 1997	x (after consulting with mother)	x (when prescribed by treating physician)	Follow-up visit should be made within 48 hours of discharge		
Colorado	March 23, 1998	x (with agreement of mother)				
Connecticut	May 24, 1996	x (after conferring with mother)	x	Follow-up visit should be made within 48 hours of discharge and an additional follow-up visit within seven days of discharge.		
Delaware	1996*					A carrier offering a health benefit plan shall comply with the provisions of 42 U.S.C. § 300gg-51 and any subsequent changes in federal law.
District of Columbia	April 9, 1997	x (after consulting with mother)	x	The Insurer shall provide coverage for post-delivery care...		
Florida	May 22, 1996		x			Insurer may not limit coverage for length of stay or follow-up care to anytime that is less than determined medically necessary and consistent with AAP/ACOG[1] guidelines
Georgia	April 2, 1996	x (after conferring with mother)	x	Coverage shall be provided for up to two follow-up visits, provided that the first visit occurs within 48hours of discharge. Thereafter, clinician shall confer with mother and determine if a second visit is appropriate.		
Hawaii						
Idaho	1996*					No policy of disability insurance ...shall restrict benefits for any hospital length of stay in connection with childbirth for the mother or newborn child in a manner that would be in conflict with the newborn's and mother's health protection act of 1996.

Federal / State	Length of Stay Legislation (LOSL) Passed	LOSL specifies that discharge can be earlier	LOSL mandates follow-up visit coverage if discharge is before 48 hours	Specifications for follow-up visits	LOSL applies to Medicaid / Erisa insured or State employees	Other
Illinois	Revised July 24, 1996	x†	x	Availability of post-discharge office visit or in-home visit in the first 48 hours after discharge.		

Federal / State	Length of Stay Legislation (LOSL) Passed	LOSL specifies that discharge can be earlier	LOSL mandates follow-up visit coverage if discharge is before 48 hours	Specifications for follow-up visits	LOSL applies to Medicaid / Erisa insured or State employees	Other
Indiana	1996 1997	x†	x (home)	One home postdelivery care visit which shall be conducted within 48 hours of discharge. At the mother's discretion, visit may occur at the facility of the provider subject to the terms of policy.	All	
Iowa	May 30, 1996	x† (after consulting with mother)	x		Medicaid / State employees	
Kansas	April 2, 1996	x†				If health plan covers postdelivery care in the home, coverage of a minimum of 48/96 hours shall not be required unless medically necessary.
Kentucky	March 22, 1996 April 10, 1998	x (with mother's consent)			All	If health benefit plan authorizes an initial postpartum home visit, coverage of a minimum of 48/96hours shall not be required.
Louisiana	July 14, 1997	x (after consulting with mother)				
Maine	1995*	x (after consulting with mother)			All	Decisions regarding length of stay shall be made by the attending physician or certified nurse midwife's determination in conjunction with the mother that mother and newborn meet the criteria in the AAP/ACOG‡ guidelines.
Maryland	May 25, 1995	x (after consulting with mother)	x (home)	The insurer shall provide coverage for one home visit scheduled within 24 hours of discharge and an additional home visit as prescribed by attending provider.	All	
Massachusetts	November 21, 1995	x (after consulting with mother)	x		Medicaid / State employees	
Michigan						
Minnesota	March 19, 1996	x	x (home)	Postdelivery care consisting of a minimum of one home visit within four days following discharge.		
Mississippi	Rejected					
Missouri	June 28, 1996	x† (after consulting with mother)	x	Post-discharge care shall consist of a minimum of two visits, at least one of which shall be in the home.	All	If policy covers post-discharge care, coverage of a minimum of 48/96 hours shall not be required.
Montana	April 1, 1997	x (with mother's consent)				If health benefit plan covers postdelivery care in the home, coverage of a minimum of 48/96 hours shall not be required unless medically necessary.
Nebraska						
Nevada	July 16, 1997	x				

Federal / State	Length of Stay Legislation (LOSL) Passed	LOSL specifies that discharge can be earlier	LOSL mandates follow-up visit coverage if discharge is before 48 hours	Specifications for follow-up visits	LOSL applies to Medicaid / Erisa insured or State employees	Other
New Hampshire	May 13, 1996	x[†] (after consulting with mother)	x	Insurer pays for at least two postpartum visits.	State Employees	Decisions regarding length of stay shall be made by the attending health care provider in accordance to AAP/ACOG[‡] guidelines and that appropriate care can be provided upon discharge.
New Jersey	June 28, 1995	x (at mother's request)			All	If policy covers post-delivery care in the home, coverage of a minimum of 48/96 hours shall not be required unless medically necessary or requested by the mother.

Federal / State	Length of Stay Legislation (LOSL) Passed	LOSL specifies that discharge can be earlier	LOSL mandates follow-up visit coverage if discharge is before 48 hours	Specifications for follow-up visits	LOSL applies to Medicaid / Erisa insured or State employees	Other
New Mexico*[1]	1995	x[†] (after consulting with mother)		Postpartum care shall consist of a minimum of three home visits unless one or two are determined sufficient by a person with appropriate licensure.		Earlier discharge may occur, if decision is made in accordance with medical criteria outlined by AAP/ACOG[‡], including, but not limited to, the criterion that support person(s) be available to the mother the first few days after discharge. If policy covers postpartum care in the home, coverage of a minimum of 48/96 hours shall not be required unless medically necessary or inconsistent with AAP/ACOG[‡] guidelines.
New York	1996*	x (mother has the option of early discharge)	x (home)	Inpatient hospital coverage must include one home visit in addition to home health care coverage available under the policy. Contract must cover home care visit, which may be requested within 48/96 hours of time of delivery and shall be delivered within 24 hours of discharge or time of mother's request, whichever is later.	All	
North Carolina	July 28, 1995 July 1, 1997	x (after consulting with mother)		Follow-up care must be provided within 72 hours of discharge.		Discharge may be earlier if ... coverage is provided for postdelivery follow-up care.
North Dakota	April 17, 1997	x[†] (after consulting with mother)			Medicaid State Employees (covered by health insurance companies)	
Ohio	July 18, 1996 June 30, 1997	x (after consulting with mother or person responsible for mother or newborn)	x	Follow-up care shall be provided within 48 hours.		
Oklahoma	May 14, 1996	x[†]				Discharge may be earlier if ... plan covers one home visit within 48 hours of discharge.

Federal / State	Length of Stay Legislation (LOSL) Passed	LOSL specifies that discharge can be earlier	LOSL mandates follow-up visit coverage if discharge is before 48 hours	Specifications for follow-up visits	LOSL applies to Medicaid / Erisa insured or State employees	Other
Oregon	1997					All clinical decisions regarding length of stay in a health care facility ..., transfer between levels of care and follow-up care shall be the decision of the treating provider in consultation with the patient, as appropriate.
Pennsylvania	July 2, 1996	x	x (home)	Coverage must be provided for at least one home care visit within 48 hours of discharge when discharge occurs prior to the time set forth (48/96 hours).	All	
Rhode Island	August 6, 1996	x[1] (after consulting with mother)	x	In the case of early discharge, post-delivery care shall include home visits, parent education, assistance and training in breast or bottle feeding and the performance of any necessary and appropriate clinical tests or any other tests or services consistent with guidelines.	Medicaid / State employees	

Federal / State	Length of Stay Legislation (LOSL) Passed	LOSL specifies that discharge can be earlier	LOSL mandates follow-up visit coverage if discharge is before 48 hours	Specifications for follow-up visits	LOSL applies to Medicaid / Erisa insured or State employees	Other
South Carolina	March 31, 1997	x (after consulting with mother)			All	
South Dakota	March 14, 1996 March 14, 1998	x[1]			No	... discharge may be earlier if coverage includes one follow-up visit in the first 48 hours after discharge.
Tennessee	May 13, 1996	x	x			The Dept. of Commerce and Insurance and the Dept. of Finance and Administration are authorized to promulgate permanent rules establishing min. standards of coverage for maternity benefits offered by insurers. Post-delivery care must be provided if discharged early (Dept. of Commerce and Insurance website).
Texas	June 18, 1997	x	x	The mother must have the option to receive postdelivery care in the home.		If policy provides in-home post-delivery care, coverage of a minimum of 48/96 hours shall not be required unless medically necessary or requested by the mother.
Utah						
Vermont *[2]	Rejected					
Virginia	1996				Medicaid / State employees	... coverage shall include benefits for inpatient care and a home visit(s) in accordance with medical criteria in AAP/ACOG[4] guidelines or "Standards for Obstetric-Gynecologic Services" prepared by the American College of Obstetricians and Gynecologists.

Federal / State	Length of Stay Legislation (LOSL) Passed	LOSL specifies that discharge can be earlier	LOSL mandates follow-up visit coverage if discharge is before 48 hours	Specifications for follow-up visits	LOSL applies to Medicaid / Erisa insured or State employees	Other
Washington	1996	x (after consulting with mother)	x	At time of discharge, determination of the type and location of follow-up care must be made by the attending provider in consultation with the mother. Covered eligible services may not be denied for follow-up care as ordered by the attending provider in consultation with mother.	All	Every health carrier that provides coverage for maternity services must permit the attending provider, in consultation with the mother, to make decisions on the length of inpatient stay. These decisions must be based on accepted medical practice.
West Virginia	May 7, 1997	x (after consulting with mother)			All	Coverage for maternity and pediatric care shall be provided in accordance with guidelines established by AAP/ACOG† or other established professional medical associations.
Wisconsin						
Wyoming						
Total:	43	37	20			

♦ = Exact date of legislation passage was unclear from available data

† = Discharge decision must be made in accordance with AAP/ACOG guidelines

‡ = AAP/ACOG pertains to the most recent version of the "Guidelines for Perinatal Care" prepared by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

*1 = New Mexico adopted provisions through administrative rules.

*2 = The Vermont Program for Quality in Health Care developed Postpartum Care Guidelines in 1997.

APPENDIX C

Appendix C. Early Postpartum Discharge: General Inclusion and Exclusion Criteria

Category	Inclusion	Exclusion
Databases	Medline; PubMed	Other databases
Languages	English only	Other languages
Populations	Humans only	Animal Studies
Study design	All	None
Countries	United States; Canada	Other countries

APPENDIX D

Appendix D. Early Postpartum Discharge: Search Strategy Results

	Search Strategy for Key Question 1 - Medline	
1	Postpartum discharge → explode length of stay*,[1]	3,205
2	Limit 1 to (human, English language, newborn (birth to 23 months))	374
	Search Strategy for Key Question 1 - PubMed	
1	Postpartum discharge	417
2	Limit 1 to (human, English, all infant: birth-23 months)	157
	Search Strategy for Key Question 2 - Medline	
1	Follow-up	220,612
2	Newborn, infant	299,841
3	1 and 2	9,763
4	Limit 3 to (human, English language, newborn (birth to 23 months))	7,990
5	Discharge	40,906
6	4 and 5	419
1	Screening	100,731
2	Newborn, infant	299,841
3	1 and 2	7,208
4	Discharge	40,906
5	3 and 4	136
6	Limit 5 to (human, English language, newborn (birth to 1 month))	118
1	Postpartum care	102
2	Limit 1 to (human, English language)	88
	Search Strategy for Key Question 2 - PubMed	
1	Follow-up	351,631
2	1 AND newborn, infant	17,730
3	Limit 2 to (human, English, all infant: birth-23 months)	14,720
4	3 AND discharge	532
1	Screening	3,782,912
2	1 AND discharge	17,629
3	Limit 2 to (human, English, newborn: birth-1 month)	943
1	Postpartum care	1,798
2	Limit 2 to (human, English, all infant: birth-23 months)	657
	Search Strategy for Key Question 3 - Medline	
1	Costs	30,872
2	Postpartum	12,760
3	1 and 2	64
	Search Strategy for Key Question 3 - PubMed	
1	Costs	107,623
2	1 AND postpartum	266
	Search Strategy for Key Question 4a - Medline	
1	Rehospitalization or readmission	2,329
2	Explode length of stay[1]	21,199
3	1 and 2	558
4	Limit 3 to (human, English language, newborn (birth to 1 month))	49

Appendix D. Early Postpartum Discharge: Search Strategy Results (continued)

	Search Strategy for Key Question 4a - PubMed	
1	Rehospitalization or readmission	4,288
2	1 AND length of stay	1,185
3	Limit 2 to (human, English, newborn: birth-1 month)	92
	Search Strategy for Key Question 4b - Medline	
1	Emergency	51,599
2	Explode length of stay[1]	21,199
3	1 and 2	949
4	Limit 3 to (human, English language, newborn (birth to 1 month))	53
	Search Strategy for Key Question 4b - PubMed	
1	Emergency	84,195
2	1 AND length of stay	1,464
3	Limit 2 to (human, English, newborn: birth-1 month)	65
	Search Strategy for Key Question 4c - Medline	
1	Urgent → infant, newborn diseases*	16,666
2	Explode length of stay[1]	21,199
3	1 and 2	93
	Search Strategy for Key Question 4c - PubMed	
1	Urgent	9,119
2	1 AND length of stay	166
3	Limit 2 to (human, English, all infant: birth-23 months)	14
	Search Strategy for Key Question 4d - Medline	
1	Mortality	150,812
2	Infant, newborn	299,841
3	Explode length of stay[1]	21,199
4	1, 2 and 3	252
5	Limit 4 to (human, English language)	222
	Search Strategy for Key Question 4d - PubMed	
1	Mortality	334,468
2	1 AND infant, newborn	34,163
3	2 AND length of stay	478
4	Limit 3 to (human, English)	425
	Search Strategy for Key Question 4e - Medline	
1	Rehospitalization or readmission	2,329
2	Mother	31,254
3	1 and 2	19
	Search Strategy for Key Question 4e - PubMed	
1	Rehospitalization or readmission	4,288
2	1 AND mother	39
	Search Strategy for Key Question 4f - Medline	
1	**Emergency**	51,599
2	Mother	31,254
3	Explode length of stay[1]	21,199
4	1, 2 and 3	5
	Search Strategy for Key Question 4f - PubMed	
1	Emergency	84,195
2	1 AND mother	389
3	2 AND length of stay	9
	Search Strategy for Key Question 4g - Medline	
1	Urgent care → urgent care or explode outpatient clinics, hospital*	8,812
2	Mother	31,254
3	1 and 2	20

Appendix D. Early Postpartum Discharge: Search Strategy Results (continued)

	Search Strategy for Key Question 4g - PubMed	
1	Urgent care	2,160
2	1 AND mother	30
	Search Strategy for Key Question 4h - Medline	
1	Postnatal depression → explode postpartum depression or postnatal depression*	559
2	Explode length of stay[1]	21,199
3	1 and 2	10
1	Explode mood disorders	31,408
2	Explode length of stay[1]	21,199
3	Postpartum or postnatal	46,335
4	1, 2, and 3	6
	Search Strategy for Key Question 4h - PubMed	
1	Postnatal depression or postpartum depression	753
2	1 AND length of stay	12
1	Postpartum or postnatal	72,199
2	1 AND mood disorders	769
3	2 AND length of stay	13
	Search Strategy for Key Question 4i - Medline	
1	Explode length of stay[1]	21,199
2	Explode patient satisfaction	11,649
3	Mother or women	252,967
4	1, 2, and 3	46
	Search Strategy for Key Question 4i - PubMed	
1	Length of stay	25,232
2	1 AND patient satisfaction	569
3	2 AND mother or women	64
	Search Strategy for Key Question 4j - Medline	
1	Explode breastfeeding	12,585
2	Explode length of stay[1]	21,199
3	1 and 2	67
4	Limit 3 to (human, English language)	55
	Search Strategy for Key Question 4j - PubMed	
1	Breastfeeding	13,373
2	1 AND length of stay	85
3	Limit 2 to (human, English)	69
	Search Strategy for Key Question 5a - Medline	
1	Rehospitalization or readmission	2,329
2	Explode health services	624,275
3	Infant, newborn	299,841
4	1, 2, and 3	127
5	Limit 4 to (human, English language)	118
	Search Strategy for Key Question 5a - PubMed	
1	Rehospitalization or readmission	4,288
2	**1 AND health services**	3,499
3	2 AND infant, newborn	207
4	Limit 3 to (human, English)	189

Appendix D. Early Postpartum Discharge: Search Strategy Results (continued)

Search Strategy for Key Question 5b - Medline		
1	Emergency	51,599
2	Explode health services	624,275
3	Infant, newborn	299,841
4	1, 2, and 3	918
5	Limit 4 to (human, English language)	750
Search Strategy for Key Question 5b - PubMed		
1	Emergency	84,195
2	1 AND health services	39,659
3	2 AND infant, newborn	1,340
4	Limit 3 to (human, English)	1,078
Search Strategy for Key Question 5c - Medline		
1	Urgent	8,588
2	Explode health services	624,275
3	Infant, newborn	299,841
4	1, 2, and 3	102
5	Limit 4 to (human, English language)	74
Search Strategy for Key Question 5c - PubMed		
1	Urgent	9,119
2	1 AND health services	1,929
3	2 AND infant, newborn	111
4	Limit 3 to (human, English)	83
Search Strategy for Key Question 5d - Medline		
1	Explode mortality	2,685
2	Explode health services	624,275
3	Infant, newborn	299,841
4	1, 2 and 3	150
5	Limit 4 to (human, English language)	132
Search Strategy for Key Question 5d - PubMed		
1	Mortality	334,468
2	2 AND infant, newborn	34,163
3	3 AND child health services	473
4	Limit 3 to (human, English)	354
Search Strategy for Key Question 5e - Medline		
1	Rehospitalization or readmission	2,329
2	Mother or women	252,967
3	Explode health services	624,275
4	1, 2, and 3	114
5	Limit 4 to (human, English language)	99
Search Strategy for Key Question 5e - PubMed		
1	Rehospitalization or readmission	4,288
2	1 AND mother or women	268
3	2 AND health services	205
4	Limit 3 to (human, English)	181
Search Strategy for Key Question 5f - Medline		
1	**Emergency**	51,599
2	Maternal health services	14,783
3	1 and 2	100
4	Limit 3 to (human, English language)	91
Search Strategy for Key Question 5f - PubMed		
1	Emergency	84,235
2	1 AND maternal health services	170
3	Limit 2 to (human, English)	147

Appendix D. Early Postpartum Discharge: Search Strategy Results (continued)

	Search Strategy for Key Question 5g - Medline	
1	Urgent care → urgent care or explode outpatient clinics, hospital*	8,812
2	Maternal health services	14,783
3	1 and 2	139
4	Limit 3 to (human, English language)	105
	Search Strategy for Key Question 5g - PubMed	
1	Urgent care	2,160
2	1 AND maternal health services	27
	Search Strategy for Key Question 5h - Medline	
1	Postnatal depression → explode postpartum depression or postnatal depression*	559
2	Limit 1 to (human, English language)	508
1	Explode mood disorders[2]	31,408
2	Postpartum or postnatal	46,335
3	1 and 2	532
4	Limit 3 to (human, English language)	490
	Search Strategy for Key Question 5h - PubMed	
1	Postnatal depression or postpartum depression	753
2	Limit 1 to (human, English)	669
1	Postpartum or postnatal	72,239
2	1 AND mood disorders	769
3	Limit 2 to (human, English)	694
	Search Strategy for Key Question 5i - Medline	
1	Explode health services	624,275
2	Explode patient satisfaction	11,649
3	Mother or women	252,967
4	1, 2, and 3	499
5	Limit 4 to (human, English language)	455
	Search Strategy for Key Question 5i - PubMed	
1	Health services	703,265
2	1 AND patient satisfaction	6,688
3	2 AND mother or women	678
4	Limit 3 to (human, English)	627
	Search Strategy for Key Question 5j - Medline	
1	Explode maternal health services	14,783
2	Explode breastfeeding	12,585
3	1 and 2	427
4	Limit 3 to human, English language	340
	Search Strategy for Key Question 5j - PubMed	
1	Maternal health services	15,528
2	1 AND breastfeeding	467
3	Limit 2 to (human, English)	376
	Search Strategy for Key Question 6a-Medline	
1	Legislation or law	30,392
2	Rehospitalization or readmission	2,329
3	Infant, newborn	299,841
4	1, 2, and 3	1
	Search Strategy for Key Question 6a - PubMed	
1	Legislation or law	177,861
2	**1 AND infant, newborn**	3,963
3	2 AND rehospitalization or readmission	5

Appendix D. Early Postpartum Discharge: Search Strategy Results (continued)

Search Strategy for Key Question 6b - Medline		
1	Legislation or law	30,392
2	Emergency	51,599
3	Infant, newborn	299,841
4	1, 2, and 3	10
Search Strategy for Key Question 6b - PubMed		
1	Legislation or law	177,861
2	**1 AND infant, newborn**	3963
3	2 AND emergency	94
4	Limit 3 to (human, English)	84
Search Strategy for Key Question 6c - Medline		
1	Legislation or law	30,392
2	Urgent	8,588
3	Infant, newborn	299,841
4	1, 2, and 3	2
Search Strategy for Key Question 6c - PubMed		
1	Legislation or law	177,861
2	**1 AND infant, newborn**	3963
3	2 AND urgent	13
Search Strategy for Key Question 6d - Medline		
1	Legislation or law	30,392
2	Mortality	150,812
3	Infant, newborn	299,841
4	1, 2 and 3	41
5	Limit 4 to (human, English language)	36
Search Strategy for Key Question 6d - PubMed		
1	Legislation or law	177,861
2	1 AND infant, newborn	3963
3	2 AND mortality	443
4	Limit 3 to (human, English)	363
Search Strategy for Key Question 6e - Medline		
1	Legislation or law	30,392
2	Rehospitalization or readmission	2,329
3	Mother or women	252,967
4	1, 2, and 3	2
Search Strategy for Key Question 6e - PubMed		
1	Legislation or law	177,861
2	1 AND mother or women	3964
3	2 AND rehospitalization or readmission	6
Search Strategy for Key Question 6f - Medline		
1	Legislation or law	30,392
2	Mother or women	252,967
3	Emergency	51,599
4	1, 2, and 3	23
5	Limit 4 to (human, English language)	19
Search Strategy for Key Question 6f - PubMed		
1	Legislation or law	177,861
2	1 AND mother or women	3964
3	2 AND emergency	86
4	Limit 3 to (human, English)	71

Appendix D. Early Postpartum Discharge: Search Strategy Results (continued)

	Search Strategy for Key Question 6g - Medline	
1	Legislation or law	30,392
2	Mother or women	252,967
3	Urgent care → urgent care or explode outpatient clinics, hospital*	8,812
4	1, 2, and 3	1
	Search Strategy for Key Question 6g - PubMed	
1	Legislation or law	177,861
2	1 AND mother or women	3964
3	2 AND urgent care	8
	Search Strategy for Key Question 6h - Medline	
1	Legislation or law	30,392
2	Mother or women	252,967
3	Postnatal depression → explode postpartum depression or postnatal depression*	559
4	1, 2,and 3	1
1	Legislation or law	30,392
2	Mother or women	252,967
3	Explode mood disorders[2]	31,408
4	1, 2, and 3	0
	Search Strategy for Key Question 6h - PubMed	
1	Legislation or law	177,861
2	1 AND mother or women	3964
3	2 AND postnatal depression or postpartum depression	3
1	Legislation or law	177,861
2	1 AND mood disorders	559
3	2 AND postpartum or postnatal	3
	Search Strategy for Key Question 6i - Medline	
1	Legislation or law	30,392
2	Mother or women	252,967
3	Explode patient satisfaction	11,649
4	1, 2, and 3	7
	Search Strategy for Key Question 6i - PubMed	
1	Legislation or law	177,861
2	1 AND mother or women	3964
3	2 AND patient satisfaction	35
4	Limit 3 to (human, English)	31
	Search Strategy for Key Question 6j - Medline	
1	Legislation or law	30,392
2	Mother or women	252,967
3	Explode breastfeeding	12,585
4	1, 2, and 3	12
	Search Strategy for Key Question 6j - PubMed	
1	Legislation or law	177,861
2	1 AND mother or women	3964
3	2 AND breastfeeding	38
4	Limit 3 to (human, English)	33

* = → signifies suggested Medline keyword replaced original keyword

[1] = all subheadings were included

[2] = only subheadings that appeared relevant to key question were included

APPENDIX E

Appendix E. Summary Results from Literature Searches and Reviews*

Search and Review Results	KQ1	KQ2	KQ3	KQ 4a	KQ 4b	KQ 4c	KQ 4d	KQ 4e	KQ 4f	KQ 4g	KQ 4h	KQ 4i	KQ 4j
Number of Article Titles													
From literature search	531	2,757	330	141	118	107	647	58	14	50	41	110	124
Excluded at preliminary review phase	438	2,690	318	96	109	99	642	45	10	47	39	95	97
Included at preliminary review phase	93	67	12	45	9	8	5	13	4	3	2	15	27
Number of Abstracts													
From literature search	93	67	12	45	9	8	5	13	4	3	2	15	27
From author's files	7	3	6	24	17	14	16	14	14	14	15	27	20
Reviewed	98	70	18	69	26	22	21	27	18	17	17	42	47
Excluded at abstract review phase	30	28	3	12	1	2	0	3	0	0	1	2	15
Included for full article review	70	42	15	57	25	20	21	24	18	17	16	40	32
Number of Articles													
Included in Evidence Tables	7	10	4	44	12	9	12	9	5	5	5	21	9

Search and Review Results	KQ 5a	KQ 5b	KQ 5c	KQ 5d	KQ 5e	KQ 5f	KQ 5g	KQ 5h	KQ 5i	KQ 5j
Number of Article Titles										
From literature search	307	1,828	157	486	280	518	132	2,445	1,082	716
Excluded at preliminary review phase	286	1,808	153	448	271	516	129	2,085	1,061	659
Included at preliminary review phase	21	20	4	38	9	2	3	160	21	57
Number of Abstracts										
From literature search	21	20	4	38	9	2	3	160	21	57
From author's files	16	15	15	15	13	13	13	15	18	14
Reviewed	37	35	19	53	22	15	16	175	39	71
Excluded at abstract review phase	6	10	1	38	2	1	0	153	14	51
Included for full article review	31	25	18	15	20	14	16	22	25	20
Number of Articles										
Included in Evidence Tables	9	8	9	5	6	6	6	5	7	2

Search and Review Results	KQ 6a	KQ 6b	KQ 6c	KQ 6d	KQ 6e	KQ 6f	KQ 6g	KQ 6h	KQ 6i	KQ 6j
Number of Article Titles										
From literature search	6	94	15	399	8	90	9	7	38	45
Excluded at preliminary review phase	3	93	15	397	5	90	8	7	36	44
Included at preliminary review phase	3	1	0	2	3	0	1	0	2	1
Number of Abstracts										
From literature search	3	1	0	2	3	0	1	0	2	1
From author's files	0	0	0	0	0	0	0	0	0	0
Reviewed	3	1	0	2	3	0	1	0	2	1
Excluded at abstract review phase	2	0	0	2	0	0	0	0	0	0
Included for full article review	1	1	0	0	3	0	1	0	2	1
Number of Articles										
Included in Evidence Tables	0	0	0	0	0	0	0	0	0	0

* = Some articles were duplicated in Medline and PubMed

APPENDIX F

Evidence Tables Summarizing Studies That Address Key Questions in the Review
Draft, print date: 2/1/02

Author, Journal, Year	Key Question	Study Design	Setting, Population (N, demographics)	Data Collection Methods	Interventions and Usual Care	Outcomes Studied	Results	Conclusions	Quality Considerations
Arborelius E, Scand J Soc Med, 1989	4i, j	Matched cohort	Sweden, 22 who chose early discharge and 22 controls	Survey	Early discharge at 0-2 days + home visit vs. usual care hospitalization x 5-6 days	Maternal satisfaction, breastfeeding	No diffs except the experience of the postpartum stay was rated worse by the early discharge group		Non-randomized and subject to volunteer bias
Arthurton MW, Br Med J 1967	4a, d	Time series	Bradford, England, 9,718 babies, 42% were discharged early	Hospital and public health records?	Early discharge = within 72 hours of birth.	Infant readmission, mortality	No significant diff in mortality; babies discharged before 24 hours required readmission significantly more often than those sent home on the second day	Early discharge has had no serious adverse effects	Non-randomized and did not adjust for socioeconomic factors
Avery MD, et al, JOGN Nursing, 1982	5a-l	Prospective cohort	Midwestern University Hospital, 154 families	Chart and worksheet review, written satisfaction survey	D/c 12-24 hrs postpartum with extensive antepartum planning, postpartum instruction and home follow-up. No comparison group	Maternal complications and readmission rate, infant complications and readmission rate, maternal satisfaction	Two mothers followed as outpatients (UTI and rectovaginal fistula), 3 women readmitted (abscessed episiotomy, post-partum hemorrhage, postpartum depression). 60 infants had bilirubin levels drawn on home visits, 11 had outpatient bili f/u, 8 readmitted with hyperbili , one for periodic breathing, overall "favorable response" on satisfaction surveys	"early d/c with careful planning and decision making through pregnancy is a satisfying and safe alternative for families" even though 8/154 infants readmitted	No control group
Beck CT, JOGNN 1992	4h	Prospective cohort	US Midwest teaching hospital, 13 mothers with early discharge and 36 with usual care	Interviews with mothers	Early discharge = 1st or 2nd day; usual care = 3 days	Maternity blues at 1 week and postpartum depression at 6 and 12 weeks	No signlficant differences between groups	Early discharge poses no threat to psychological well-being	Nonrandomized; selection bias; limited power
Beebe SA, Pediatrics 1996	4d	Case-control	Four Utah counties; 17 infants discharged at 5 days or younger and 3 controls/case	Death certificate reviews	Length of hospital stay	Infant mortality	OR for neonatal mortality for discharge at < 24 hours was 1.65 (95% CI 0.42 - 3.34); for discharge at < 48 hours was 1.16 (95% CI, 0.4 3.34). Most full-term infants who died were symptomatic within 18 hours	Did not find association between length of stay and mortality	Nonrandomized, not adjusted for sociodemographic factors; limited power
Behram S, South Med J 1998	4a, e	Pre- and post-intervention cohort	Community-based teaching hospital in Virginia, N=554	Computerized database and birth certificate	Discharge on first postpartum day vs. 2nd or 3rd postpartum day; no new services. During intervention period, 66% of all vaginal deliveries had one-day stay.	Infant and maternal readmission	In post-intervention period (1994-1995), combined readmission rate was 2.2%, compared with control period (1991-1993), combined readmission rate was 3.9%. Also, cost was $1,714 for <24 hour stay vs. $2,477 for 2-day stay	Early discharge can be safe if patients are carefully selected	Limited power, confounding by secular trends

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Berryman GK, Milit Med 1991	4 a, e	Retrospective cohort, not controlled	Air Force Academy hospital, Colorado, N = 371	Chart review?	Discharge at average 1.6 days with nurse phone contact within 48h and pediatric appointment 3 days postdischarge	Infant readmission, maternal readmission	2 maternal readmissions, no infant readmissions	Early discharge is safe and cost-effective	Uncontrolled
Bragg EJ, Obstet Gynecol 1997	4a	Pre- and post-intervention cohort, 1993-1995 vs. 1992-1993	University Hospital, Cincinnati, N = 4,538 born during early discharge period and N = 5,279 during conventional discharge period	Chart review	Early discharge (avg 30h) with home visits vs. conventional dischage (avg 49h)	Infant readmission	Infant readmission rate = 1.24% in early discharge group and 1.35% in conventional discharge group; 1.46% among infants discharged within 24 h	Early discharge does not have an association with infant readmission	Could not control for secular trend
Braveman P, J Am Board Fam Pract 1996	5a, b, c	Pre- and post-intervention cohort, 1991-92 vs. 1989-90	UCSF, N = 82 before and 91 after home visiting	Chart review	Home visiting program vs no routine follow-up before 2 weeks	Infant acute care visits, rehospitalizations, and missed well-baby visits	Twofold reduction in odds of acute care visit in home visit group; other findings not statistically significant	Potentially important benefits of home visiting policy	Limited power, potential confounding by secular trends
Britton HL, AJDC 1984	4a	Retrospective cohort, not controlled	Tucson Medical Center, large private metropolitan hospital, N = 1,735 term infants	Chart review	No intervention; looked at association between normal initial 6 hours after delivery (transitional period) and readmission	Infant readmission	0.7% of initially well infants had problems (excluding jaundice) that required rehospitalization; most illness requiring hospitalization could have been safely detected during an outpatient visit	Early discharge with careful follow-up may be effective alternative	Observational; did not look specifically at whether actual length of stay was associated with readmission
Britton HL, Britton JR, AJDC, 1984	5a	Retrospective cohort	Tuscon Medical Center, 1735 infants born 11/81-3/82	Medical record review	None. Compared outcomes of early d/c'd infants with normal vs. abnormal 6 hr transitional period.	Infant hospitalization (either stay in hospital or readmitted), growth parameters, Apgar score, blood group incompatibility	4% of infants with normal transition vs. 30% of abnormal transition infants required inpatient care. Predictive properties of transition period for inpt. Care required past 72 hrs: sens=56.4%, spec=93.5%, PPV=28.9%, NPV=97.9%	Normal transition period may help predict safety of early d/c	Includes infants who stayed longer than 48 hours; possible that interventions made between 48-72 hrs that kept babies out of hospital at 72 hrs.
Britton JR, Pediatrics 1999	4j, etc.	Prospective cohort, not controlled	146 mothers recruited from private obstetric clinic, university hospital, and community health clinic, 1986-1988	Interviews and observation of mothers and infants	No intervention; compared early (≤36h) vs. late (>36h) discharge groups	Breastfeeding, mother-infant interaction, attachment to 3, 9, 12 months	No significant differences between early and later-discharged groups	Parenting outcomes are not affected by early discharge0	Mothers self-selected to these groups; may not generalize; primarily Caucasian

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Brooten D et al., Obstetrics & Gynecology, 1994	5a-i	RCT	Philadelphia, 122 women	chart review	Early d/c after emergency or unplanned C/S with nurse specialist evaluation/consultation in hospital and home visits/telephone contact after d/c	Maternal and infant duration of initial hospitalization, rehospitalization, acute-care visits, maternal satisfaction, anxiety and depression, functional status. Costs.	Intervention group d/c'd at mean of 86 hours (?median) vs. 116 hours for controls. Mean satisfaction scores higher for intervention group. No differences in maternal rehosp and acute care visits. No signif diff in infant rehosp or acute-care visits. Total charges for control were $11,490 vs. $8165 for early d/c group	Early d/c after c/s using nurse specialist transitional home care is safe, feasible and cost-effective	Patients not blinded, did not analyze by intention to treat, study not likely powered to detect small differences in outcomes, cost analysis was crude and unadjusted for severity of illness, which authors admit biased results.
Brown AK, J Perinat Med 1999	4a	Retrospective case series	391 newborns readmitted to 9 hospitals in New York, 1995	Chart review	No intervention; no specific evaluation of length of stay; looked at predictors of readmission	Factors associated with readmission (?)	Abnormalities which should have precluded early discharge included feeding difficulties, congenital heart defects, hemolytic disease, and early jaundice	Readmissions could be reduced by attending to risk factors	Couldn't understand this analysis: didn't analyze risk factors among those infants not readmitted
Brumfiel CG et al., Obstetrics & Gynecology, 1996	5a-g	Prospective cohort	University Hospital in Birmingham, Alabama, 972 mothers and 856 newborns d/c'd at 24 hours, All low income receiving Alabama Medicaid, 75% African American	Chart review, maternal interview at 2 week clinic visit	D/c of "low-risk" mothers and infants within 24 hours with one home health nurse visit 48 hrs. after deliver.	Maternal and infant clinic visits and rehospitalization, costs/savings	98.5% mothers had normal findings at home health visit, 1.5% had problems requiring an obstetrician telephone consultation and of those half ((0.7%) had to return to the clinic same day. Total of 2 mothers readmitted.. 93% infants had normal exam at home visit. 7% required a pedi phone consultation, 12 returned to clinic same day, none were readmitted. Hospital saved $506,139 over 2 years	In a selected, low-risk, low-income population, mother-infant d/c 24 hours after delivery with a home follow-up visit is safe and cost-effective.	Difficult to evaluate results without control group. Maternal satisfaction, mental health, and breast feeding rates not assessed.
Carty EM, Birth 1990	4a, b, c, h, i, j	Randomized controlled trial	Tertiary care maternity hospital, Vancouver, Canada, N= 131	Interviews with mothers	Discharge at 12-24h, 25-48h, or 4 days, plus 1 to 5 home visits during the first 10 days postpartum	Maternal and infant problems requiring physician referral; breastfeeding, satisfaction, depression	No significant differences in health problems; early discharge mothers reported higher satisfaction and less depression; may have been more likely to breastfeed at 1 month (though differential response rate)	Early discharge led to more satisfaction, less depression, nursing visits may have helped	Excluded crossovers, ie did not analyze by intention to treat

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Conrad PD, AJDC 1989	4a	Retrospective cohort study	University Hospital with indigent population; N= 2000 consecutive admissions	Chart review	No intervention; observed 55% of infants (N=1,091) were discharged within 24 to 36 hours of birth, 91% had outpatient follow-up visit within 48 hours	Infant readmission	Readmission within 7 days was more common among infants in early discharge group (24-36h) = 2.3%, than in later-discharge group (>48h) = 0.89%, P < .05. 24 of 25 had outpatient follow-up and no serious complications occurred	Early discharge can be safe in an indigent population with good outpatient follow-up	Nonrandomized so pts were clinically selected for early discharge; but clear criteria for early discharge
Coody D, et al., Clinical Pediatrics, 1993	2	Retrospective cohort	Hermann Hospital in Houston, Texas, 971 infants	Chart review, nursery log book review, lab log book review	Time of discharge and insurance status	Timing of newborn screening	6% c/s screened before 4 hours (mean 17 hrs), 39% vag screened before 24 hrs (mean 20 hrs). No difference in insurance status among those screened before 24 hours.	As Pressures to shorten hospital LOS increase, health-care providers must consider the impact of such changes on ability to obtain adequate newborn screens.	Would have been nice to see how this % of screened before 24 hours has changed over longer period of time.
Cooper WO, Pediatrics 1995	4a, j	Case series and time series	Children's Hospital, Cincinnati; referral center, N = 16	Chart review	No intervention; time series looked at years 1990-1994	Infant readmission for dehydration/hypernatremia, malnutrition	Increase in incidence (1-2 per year in 1990-1992 vs 5, 7 in 1993-1994, P < .05) and severity based on serum sodium	Increase in breastfeeding malnutrition may stem from inadequate parent education, inadequate follow-up	Nonrandomized, no true denominator with which to gauge incidence
Cooper WO, Pediatrics 1996	4k	Pre- and post-intervention cohort	University Hospital and Children's Hospital, Cincinnati, N = 253 in early discharge and 212 in control group	Chart review	Early discharge program with goal of discharge by 24h; nurses visited in hospital and home visits were given	Primary care visits, immunizations, ED visits, and rehospitalization by 3 mos	Early discharge = 35h, control 52h. In early discharge group, 88% received 1 or more home visits; early discharge infants more likely to have a primary care visit < 1 mo and less likely to have ED visit < 3 mo. Both groups had 10% readmission < 3 mos.	Early discharge with home visits may result in earlier primary care service use and reduced ED use	Nonrandomized; possible secular trend; limited power to identify differences in readmission

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Dalby DM et al., Canadian Jo of Public Health, 1996	5i	Interrupted time series	Ontario, Canada	Mail survey	Early d/c (before 48 hrs) with PP home visit program, vs. usual LOS	Satisfaction: confidence in newborn care, eval of PP care and eval of the hospital environment	Early d/c group signif more satisfied than the traditional care group		Study design not clear, comparisons not clear, response rate about 50%
Danielsen B, Pediatrics 2000	4a	Retrospective cohort, 1992-1995	Healthy vaginally delivered and routinely discharge California newborns (about 300,000 / year)	Computerized hospital database	No intervention; compared very early (same-day) with early (1 night) with 2+ night discharges	Readmissions	% of infants discharged early increased from 66% in 1992 to 78% in 1995. Readmission rate decreased from 1992 to 1994, then increased in 1995. Very early discharge increased the probability of readmission by 30%; so did Medicaid, primiparity, and maternal complications. One-night stays did not result in increased risk. Very early discharge became less of a risk for hospital readmission over time.	One-night stays did not increase the risk of readmission, but same-day discharge did.	Nonrandomized; potential confounding by clinical selection.
Edmonson MB, JAMA 1997	4a	Nested case-control	Wisconsin 1991 to 1994; 210 readmissions and 630 controls	Birth certificate and hospital discharge data	No intervention	Early discharges; readmission at 4 to 28 days with feeding problems	Early discharges increased 3-fold (to 521/1000) but feeding-related readmissions remained stable (1.7/1000). Adjusted OR for early discharge = 1.05.	Early discharge has little or no independent effect on this risk	Limited power; observational; but did adjust for confounders
Finkelstein BS, et al., Am J Managed Care, 1998	5i	Cross-sectional survey	Cleveland, Ohio, 27,789 surveyed (58% responded)	Mail survey	Predictor variables: perceived appropriateness of length of stay, LOS	Satisfaction from Patient Judgement System survey	Patients with shorter LOS more likely to perceive their LOS as "too short." Patients with perceived short LOS had lower satisfaction scores, but shorter LOS was not associated with lower satisfaction.	Pt. Satisfaction with obstetric care may not depend on LOS but rather whether patients perceive LOS to be adequate.	Low response rate ?bias results, confounding by indication-- pt's with shorter LOS wanted shorter LOS and thus were satisfied with care
Fishbein EG, JOGNN 1998	4i, j	Cross-sectional survey	Academic hospital convenience sample, N = 100	Mailed survey	No intervention	Described maternal concerns	More than half of the participants said they would visit a nurse-run clinic during the 1st postpartum week if one were offered	Need to provide early care for postpartum mothers	Convenience sample; descriptive

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Foster D, report by HCIA 1995	4a	Cross-sectional	Inpatient database for 1993; 274,731 mothers and 1,418,416 newborns	Computerized database	No intervention	Infant readmission	HMO insurance and non-black race were associated with shorter LOS; readmission rate for newborns was 1.7% and readmission was not associated with LOS	Early discharge of vaginally delivered does not increase risk of readmission	Observational; did not adjust for confounders; no multivariate analysis
Fox MH, Kanarek N	4a	Retrospective cohort	Maryland Medicaid 1989-92, n=75,000	Medicaid claims data	Predictor variable: LOS, "sick" vs. "well" infants d/c'd before 24 hours	Infant readmission	Early d/c of sick babies increased over time. Odds of readmission for normal babies d/c'd early were about the same as for those kept longer, but for sick babies d/c'd early they were significantly greater.	Early d/c of newborns with physical problems increases their likelihood of readmission.	No adjustment for sociodemographic factors.
Frank-Hanssen MA, J Comm Health Nurs 1999	4a	Cross-sectional	Midwest health system, convenience sample of 1999 infants	Chart review	No intervention; all got a home visit	Infant readmission	Infants delivered vaginally and discharged early were more likely to be readmitted	Postpartum follow-up care and education are important	Convenience sample; descriptive
Gagnon AJ, Am J Obstet Gynecol 1997	4?	Randomized controlled trial	175 women in a Quebec, Canada university hospital. Of 1354 approached for participation, 416 were ineligible and 578 declined; 360 entered. After randomization, 85 in intervention and 74 in control group were excluded. Then, 3 withdrew from usual care and 18 withdrew from the early postpartum discharge program, leaving 80 in epd group and 100 in usual care.	Prospective data collection via chart review and mailed surveys	Intervention = hospital discharge at 6 to 36 hours and nursing care by phone at < 48 h and 10 d and home visits at 34-38 weeks and 3 and 5 days postpartum. Usual care was hospital stay of 48-72h and follow-up as determined by the woman's and infant's physicians.	Perceived competence in mothering, infant weight gain, identification of significant jaundice, maternal satisfaction, breastfeeding, and infant health contacts for guidance	No significant differences, except maternal satisfaction was higher in the early discharge group, however there were differential withdrawals so this might account for the difference. Also, program participants had less frequent bilirubin testing. In recent immigrants, perceived maternal competence was higher in the epd group.	Early postpartum discharge with compensatory services lead to no apparent disadvantage and may yield benefits for some.	Did not analyze by intention to treat, excluded a lot of mothers who were initially randomized. Also, no definition was given for significant jaundice.
Gazmararian JA, Health Affairs 1996	1, 4a	Cross-sectional	Prudential 1994, all normal vaginal deliveries (N=13,945)	Computerized database	No intervention; looked at HMO vs. POS vs. indemnity as predictors	Length of stay; infant readmission	62% of newborns were discharged within one day after delivery; HMO>POS>indemnity had short stay. Newborn readmission rate did not vary with plan type.	LOS varies with plan type and region, but readmissions as not associated with plan type or LOS	Confounding by clinical indication; all insured

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Gazmararian JA, Health Affairs 1997	4a, I	Cross-sectional	Prudential 1995 normal vaginal deliveries (N=5,201)	Mailed survey	No intervention; looked at LOS as predictor	Maternal preferences; infant readmission	56% of women thought their stay was a little or a lot shorter than they needed; those who stayed <24 h were more likely to say stay was too short and to have newborns readmitted. LOS < 48h was not associated with readmission.	LOS and readmissions were not statistically associated, LOS varied by maternal features	Confounding by clinical indication; all insured; did not report specifically on multivariate analysis of LOS < 24h
Gazmararian JA, MCH Journal, 1997	2	Cross-sectional	Prudential 1995; normal vaginal deliveries with discharge < 24h	Mailed survey	No intervention; descriptive	Receipt of home health visit	30% of women received 1 or more home health visits during 2 weeks after discharge.	Focus on improving quality of services and increasing satisfaction	Did not report on other types of follow-up or on follow-up within 48 h of discharge
Gjerdingen DK, Fam Pract Res J 1988	4i	Case series	49 mothers during a nurses' strike at a Minnesota hospital	Survey and chart review	Before strike, LOS = 2.7 days, during strike, LOS = 1.6 days, and after strike, LOS = 2.4 days.	Maternal satisfaction	Mothers who stayed <2 days were less satisfied.	Not all women can be discharged within 24 hours, and one may expect some patient dissatisfaction when early discharge is mandated.	Limited power, no comparison group
Graven MA, J Perinatol 1999	4a	Cross-sectional vs. time-series	Florida hospitals, 1992-94, N = 364,528 full-term, singleton, vaginally delivered babies	Computerized hospital and birth certificate data	No intervention; length of stay as predictor	Infant readmission for GBS or E coli	OR for readmission, discharges on DOL 1 vs DOL 2 was 2.27 for GBS and 2.16 for E. coli (significant) and for DOL 1, readmission rates for GBS and E. coli increased from 1992 to 1994	Increase in early discharge was associated with increase in readmission for GBS and E.coli	Observational; could not control for relevant confounders; no deaths
Gries DM, Milit Med 2000	4b, c, i	Pre- and post-intervention	Military teaching hospital, 1994 and 1996; total of 1,911 deliveries	Computerized database and maternal survey during 1996	Early discharge (mean LOS went from 2.54 to 1.88 days) with telephone follow-up routinely and in-person follow-up if problems	Infant clinic visits, ED visits, readmission, and maternal satisfaction	44% of infants during 1996 had discharge at <48 hours; 25% of infants in 1996 had clinic visits before the 2-week well-child visits, up from 10% in 1994; no change in ED visits or readmissions. Program saved 599 inpatient hospital days.	Early discharge program did not increase adverse outcomes and reduced costs	Limited power to identify rehospitalizations; maternal survey had 39% response rate; used average cost data for hospital day

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Grupp-Phelan J, Arch Pediatr Adolesc Med 1999	4a	Case-control	Washington State, 1991 to 1995, 750 infants readmitted with 3,192 controls	Vital statistics, birth certificates, and hospital discharge abstracts	Early discharge < 30h, late discharge 30 to 78 h	Mild and severe jaundice	Early discharge was associated with increased risk for jaundice (OR 1.34, 95% CI 1.10-1.64), but risk was similar for brief vs. prolonged and complicated vs. uncomplicated readmissions. 122 infants would have to stay longer to avoid 1 readmission.	Early discharge has increased risk for hospital readmission but clinical significance is limited.	Observational, adjusted for many but not all confounders
Gunn J, Br J Obstet Gynaecol 1998	5h, i, j, other	Randomized controlled trial	683 women in Victoria, Australia	Survey at 3 and 6 months after birth	Intervention group got a maternal check-up one week after discharge; control got a check up 6 weeks after birth	Maternal mental health; breastfeeding; satisfaction; physical problems; used SF36 and Edinburgh Postnatal Depression scores	No differences between groups in these outcomes;	To make clinically important improvements in maternal health more is required than early postnatal review	Reported on reasons for non-participation and withdrawal; well-done study.
Heimler R, Clin Pediatr 1998	4a	Case series	664 newborns readmitted at <15 days between 1993 and 1995 to Children's Hospital Wisconsin	Chart review	No intervention; early discharge = LOS ≤ 2 days	Morbidity related to early discharge = onset of sx within 1d of ED, bili > 20 or dehydration from poor breastfeeding	17% of all readmitted infants had morbidity related to early discharge; 9% had major morbidity	Close to half of the cases with acute-onset major morbidity can be identified within 3 d of birth.	No control group; definition of morbidity was not "preventable" morbidity; tertiary referral center
Hellman LM, Lancet 1962	4i, and medical outcomes	Randomized controlled trial	Brooklyn, NY hospital with a bed shortage; 1941 mothers	Prospective data collection by nurses	0-48h vs. 49-72h, vs. control = 5 days hospitalization. Early discharge included two home visits within the first week	Maternal satisfaction, maternal and infant morbidity	No statistically significant differences in febrility, maternal symptoms, or weight gain.	No differences in morbidity, but numbers were limited and mothers who had early discharge were inclined to be dissatisfied	Limited power to identify rehospitalizaiton differences
Hunter MA, J Nurs Care Qual 1998	4i	Controlled nonrandomized trial	Convenience samples of 30 women receiving traditional vs. 30 women receiving family-centered postpartum care	Interviews by nurses	Traditional care (infants in nursery, limited visiting and protocol-driven decisions) vs. family-centered care (earlier rooming-in, family bonding, choices)	Maternal satifaction (quality, beneficence)	Significantly higher scores in the family-centered group	Family-centered care is a means of improving quality and benefits	Convenience sample; possible response bias

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Keppler AB, J Perinat Neonat Nurs 1999	4a, i, costs	Case series	2,794 families seen in Postpartum Care Center in 1997	Prospective data collection on readmission rates, other problems	Postpartum Care Center as above; no comparison group	Infant readmission, breastfeeding, patient and provider satisfaction	Readmission rates have not changed; no-shows are less common now that appointments are scheduled at 3-4 days after birth instead of 5-8 days after; can take advantage of hospital support services	Cost-effective and support services (eg lab, physician consults) are in close proximity	Uncontrolled
Keppler AB, JOGNN 1995	4a, i, costs	Case series	Families (>1,000/year) in Washington community hospital, 1991-1994	Readmission records and telephone survey	Postpartum Care Center, one-third the cost of a home visit, 45-minute clinic visits with nurses	Infant and maternal readmission, maternal satisfaction	4 mothers and 12 infants have been readmitted; qualitative information presented from interviews, ratings of 4.8 for mothers and infants on a scale of 5	One-third the cost of a home visit, it works	Uncontrolled
Klingner JM, Eff Clin Pract 1999	4i, other	Cross-sectional	563 mothers of 1,009 in a mixed-model plan in Minnesota	Mailed survey	Length of stay; 1-day stays were encouraged but not required	Maternal satisfaction, complications, receipt of home health visits	Mothers with 1-day stays were more likely to say their length of stay was too short (75% vs. 37% with two-day stays); also more likely to receive home health visits (44% vs. 10% of those with 2-day stays)	Length of stay does not seem related to clinical outcomes, but mothers are less satisfied	Uncontrolled; limited power to identify differencesin outcomes; all insured
Kotagal UR, J Pediatr 1997	4a, b	Pre- and post-intervention / retrospective matched cohort	Metropolitan university hospital and children's hospital; 1172 controls and 988 intervention group pts	Computerized database and chart review	Early discharge program with coordination of posthospital care and liberal home visiting	Infant readmission and ED use within the first 3 months of life	Early discharge group had a shorter stay (32 vs. 48h), no effect on rehosptalization rate, age at rehosp, or reason for rehosp. 28% in both study and control groups had an ED visit by 3 mos. Discussion gives some cost information.	Early discharge can be accomplished without increasing hospital-based resource use if good follow-up is given	Limited power for rehospitalizations
Kotagal UR, JAMA 1999	4a, b, c	Retrospective cohort / time series	102,678 Medicaid-insured neonates in Ohio, 1991 to 1995	Medicaid claims data linked to vital statistics files	No intervention, looked at short stay (<1 day after vaginal delivery and <2 days after Cesarean)	Rehospitalization rates within 7 and 14d, postdischarge health care use, and regional variation	Short stay increased from 21% to 60%; mean LOS decreased from 2.2 to 1.6 days. Rehospitalization rates decreased; primary care visits increased; factors associated with rehosp were white race, shorter gestation, primiparity, earlier year of birth, lower 5-min Apgar, vaginal delivery, married mother, and region of the state.	Reductions in length of stay have not resulted in an increase in rehospitalization rates	Good statistical power, though cannot rule out other secular trends as reason for lower rehospitalization rates

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Lane DA, Arch Fam Med 1999	4a, b, c, d, i, j	Observational cohort	Yale-New Haven Hospital, N = 244 volunteers from 400 eligible deliveries, 1995	Telephone interviews	No intervention, but looked at 1-night vs. 2-night length of stay as predictor. Says, "Random assignment to a 1- or 2-night postpartum stay was approximated by the preapproved LOS set by third-party payers before each mother's admission - an assignment unaffected by patients' predelivery sociodemographic attributes or by their postdelivery clinical course." Not clear why this was random.	Readmission within 1 month, report of outpatient morbidity, use of outpatient health services within 1 week, breastfeeding within 1 week, patient satisfaction	Mothers in the 1-night group reported more morbidity in newborns (31% vs 16%), averaged more pediatric visits (96 vs 54 per 100 newborns), and were more fatigued and had more worries. The difference persisted for both scheduled and unscheduled visits. Also, no differences in clinical outcomes due to home visits. Also gives qualitative results of distress among the 1-night stay group.	In this unselected group, mothers with 1-night stays had more distress and more pediatric problems and greater use of outpatient health services than those who stayed 2 nights.	Potential for uncontrolled confounding and interviewer bias. Also, what were the absolute differences in scheduled vs. unscheduled outpatient visits?
Lee KS, J Pediatr 1995	4a, d	Time series and case series	Ontario, population-based study of 920,554 helathy infants with BW 2500 g or more, 1987-1994; also used one university hospital and did chart review of the infants readmitted there.	Computerized data for length of stay and readmission rates; chart review for readmitted infants at one hospital	No intervention; looked at length of stay as a predictor; did not adjust for other predictors	Readmission rate, and at the university hospital, bilirubin and sodium	Length of stay decreased from 4.5 to 2.7 days and readmission rate during first 2 weeks increased from 1.3% to 2.1%. Jaundice and dehydration accounted for much of the increase. At the hospital where chart review was conducted, the readmitted infants had increased severity of illness as indicated by higher bilirubin and sodium concentrations.	Shorter stay was associated with increased readmission rates. The severity-of-illness data raise the question of whether shorter neonatal hospital stay is always safe.	Good study. Uncontrolled but time series is convincing and severity data are convincing.
Lemmer CM, JOGNN 1987	4d, i, other	Double cohort study	Large metropolitan hospital in a southwestern city; 1984; 21 primiparas choosing early discharge vs. 21 primiparas who chose longer stays	Questionnaires completed during home visits, 6-8 days after delivery	Short stay group had stays of 12-24h, long-stay group had median LOS 48 h; no comment on compensatory services for short-stay group	Infant morbidity, maternal morbidity, maternal satisfaction, contacts with health care providers	No differences between groups, except that 7 of 21 infants in the early discharge group had jaundice tests as outpatients, vs. 1 of 21 infants in the long-stay group ($P<.05$). Mothers who chose short stay were more likely to have good social support at home.	Need further research.	Patients self-selected to the early vs. long-stay groups; small numbers.

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Lieu TA, Pediatrics 1998	4a, b, c, e, f, g, i, j, costs	Controlled, nonrandomized pre- and post-intervention (double cohort) study	Hospital in HMO setting; normal newborns with hospital stays of 48h or less, 456 in Revised Care group and 344 in Baseline Care group, 1995	Computerized databases and telephone interviews at 3 weeks	Routine hospital-based follow-up within 48h, lactation consultant hours increased, LOS decreased from 30 to 27h	Rehospitalization, ED visit, urgent clinic visit by mother or newborn within 14d, or breastfeeding discontinuation; satisfaction and costs	Morbidity decreased in the Revised Care group (45% vs 52% with combined adverse event outcome). Newborns in Revised Care group were less likely to make an urgent visit (29% vs 36%). Maternal satisfaction was higher in the intervention group. No differences in other outcomes, but overall savings in cost.	The revised model of perinatal care improved outcomes and satisfaction without increasing costs.	Limited power for rehospitalizations; also, excluded pairs who stayed > 48h
Lieu TA, Pediatrics 2000	5a, b, c, e, f, g, h, i, j	Randomized controlled trial	Hospital in HMO setting; 580 mother-infant pairs to home visits and 583 to usual care, pediatric clinic visits, after early postpartum discharge, 1997	Computerized databasesand telephone interviews at 2 weeks	Home visit vs. pediatric clinic visit	Rehospitalization, ED visit, urgent clinic visit by mother or newborn within 14d, or breastfeeding discontinuation; maternal depressive symptoms, satisfaction and costs	No differences in clinical outcomes; markedly higher maternal satisfaction in home visit group. Home visit cost $255 and pediatric clinic visit $120.	Home visits were more costly but had equivalent clinical outcomes and higher satisfaction.	Limited power to study rehospitalization; 1,163 of 1,506 eligible patients were randomized.
Liu L, JAMA 1997	4a	Case-control	Washington State, 310,578 births from 1991 to 1994. 2029 case patients and 8657 controls, excluded C-sections, multiple births, and births at <36 weeks.	Linked birth certificate and hospital discharge abstracts	No intervention, looked at early discharge (<30h) vs. later discharge (30-78h). Adjusted for maternal age, married, education, race, payer, and pregnancy/labor/newborn characteristics.	Infant rehospitalization	17% of newborns were discharged early. Early discharged newborns were more likley to be rehospitalized within 7d (OR 1.28, 95% CI 1.1-1.5), 14d, and 28 d. Subgroups at increased risk were primigravidas, mothers <18y, and mothers with PROM. Early discharge also was associated with increased risk of readmission for jaundice, deydration, and sepsis.	Newborns discharged home eary are at increased risk for rehospitalization	Population-based, observational. Controlled for many confounders but the study design cannot exclude uncontrollable confounding.

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Liu S, Can J Public Health 2000	4a	Time series	Canada, 2.1 million infants from 1989 to 1997	National computerized database	No intervention, looked at length of stay and readmission rates and diagnoses.	Infant rehospitalization and specific diagnoses	Length of stay decreased from 4.2 to 2.7d, while neonatal readmission rates increased from 2.7% to 2.8%. Increases in dehydration, jaundice, feeding problems, and weight gain. Provinces and territories with decreased length of stay usually had increased readmission rate and early age at readmission.	Neonatal readmission rates have increased substantially, associated with early discharge policies.	Good power; no adjustment for other confounders
Lock M, CMAJ 1999	4a	Pre and post-intervention double cohort; could have used time series approach	Toronto hospital, 1993-1997. Pre-intervention, 5,936 infants, and post-intervention, 1,073 infants with uncomplicated vaginal deliveries.	Computerized database?	An early discharge policy was implemented April 1, 1997 which recommended a postpartum clinic visit at 72 h.	Infant rehospitalization and specific diagnoses	Length of stay decreased gradually while readmission increased also gradually. Pre-intervention, LOS 2.1 days, while post-intervention, was 1.6 days. Readmissions within 7d of discharge, 4.7% vs. 10.9%, OR 2.5, (95% CI 2.0-3.1). Primary reason for readmission was jaundice.	Decreases in newborn length of stay may result in substantial increases in morbidity.	Good power, reasonable design, though did not look at other adjusters.
MacDonald MG, Pediatrics, 1995	4d or 2 if you consider G6PD a screening issue	Case series	4 cases of severe neonatal hyperbili with resulting kernicterus	Cases encountered by author in 18 months after March 1993	None	None		Onset of significant jaundice on 3rd to 5th day of life makes early discharge problematic for infants with G6PD deficiency	Selected cases only
Maisels JM and Newman TB, Pediatrics, 1995	4d	Case series	22 cases of suspected bilirubin encephalopathy	Cases referred to authors by attorneys throughout the US	None	Meet inclusion criteria (full-term healthy newborns without hemolysis, classic signs of acute bili encephalopathy and neuro sequelae, Clinical data on infants	6 infants met inclusion criteria for diagnosis of kernicterus; all breast fed; Age at D/C 36 h to 3 d; all jaundiced at time of d/c		Selected cases only; true numerator and denominator unknown.

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Maisels JM, Kring E, Pediatrics, 1997	2	Pre and post intervention time series analysis	21 private pediatricians who care for at least 20 newborn infants in the well baby nurseries during 1995	Chart review (five times between 9/94 and 3/96	In late 10/94, sent both oral and written communications to pedi's emphasizing importance of infant f/u within 2-3 days after d/c < 48 hours	Interval between d/c from nursery and scheduled f/u visit	At first two reviews (9/94, 3/95) no signif difference in f/u scheduling by pedi for infants d/c'd <48 vs >48 hours. On 7/95, 11/95 and 3/96 reviews differences were significant, but on 3/96 review 38% of early d/c infants still seen 4 or more days after d/c and 33% 14 days after d/c. Presence of risk factors for jaundice did not affect follow-up scheduling	A significant proportion of pedi's are not following the AAP guidelines for f/u of early d/c infants.	No control group to compare for secular trends
Maisels JM, Kring E, Pediatrics, 1998	4a, d	Case control	Large suburban community hospital in SE Michigan, newborn infants born 12/1/88-11/30/94	Chart review	Exposures: IDM, prematurity (<36 wks), jaundice in the nursery, breastfeeding, sex, LOS,	Readmission, : readmission for jaundice	29,934 infants d/c'd in study period, 0.8% readmitted by 14 days, half for hyper bili and 1/3 for r/o sepsis. Factors assoc. with readmission were IDM (OR 3.45), GA<36 wk (OR 4.56), GA 37-38 weeks (OR 2.95), jaundice in nursery (OR 1.73), breastfeeding (OR 1.78), male sex (OR 1.58), LOS <48 hr vs. >72 hr (OR 1.91), LOS 48-72 hr vs >72 hr (OR 2.09). Factors assoc with readmission for jaundice were GA <36 weeks (OR 13.2), GA 36-37 wk (OR 7.7), GA 37-38 wk (OR 7.2), jaundice in nursery (OR 7.8), LOS <48 hr vs >72 hr (OR 2.4), LOS 48-72 hr vs. >72 hr (OR 3.15), male sex (OR 2.89), breastfeeding (OR 4.21). No signif diff in readmission for infants with LOS < 48 hr vs >48 hr.	D/c at any time prior to 72 hrs increases risk for readmission to hospital and readmission with hyperbili. AAP recommendation for f/u of early d/c'd infants should extend to those d/c'd at <72 hours.	Did not control for potential confounders - is it possible that those d/c'd early are different from those d/cd later in a way that affects the likelihood of readmission of their infant-- eg. SES, insurance status

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Malkin JD et al, HSR, 2000	4a	Secondary data analysis using instrumental variables	150,000 newborns in Washington between 1989-1990.	Secondary data set developed by RAND MOC PORT	None	Newborn readmission rate.	Newborns with different LOS differ in unmeasured characteristics, biasing (underestimating) estimates of correlation between LOS and readmission based on standard statistical methods. IV analysis showed that a 12 hr increase in LOS is associated with a reduction in newborn readmission of 0.6% or 23,400 readmissions averted nationally per year.	An increase in LOS may result in a decline in newborn readmits. The magnitude of the decline may be larger than previously thought.	States that his instrumental variables (hour of birth and vaginal vs. c/s delivery) may not be entirely valid (only associated with LOS and not determinants of outcome (readmission)).
Malkin JD et al, Obstetrics and Gynecology, 2000	4d	Secondary data analysis	47,879 newborns in Washington between 1989-90	Secondary data set developed by RAND MOC PORT	Discharge before 30 hours (early) vs. after 30 hrs (later)	Risk of death within the first year of life	Newborns discharged early were more likely to die within 28 days of birth (OR 3.65), between 29 d an 1 year (OR 1.61) and any time within the first year (OR 1.84). Newborns d/c'd early were more likely to die of heart-related illnesses (OR 3.72), infection (OR 4.72) and other causes (OR 2.27) within 1 year of birth.	Newborns d/c'd within 30 hours of birth are at increased risk of death within first year of life	Concerned about residual confounding by factors related to SES -- did not control for insurance status and hospital characteristics, variables for which he had data.
Mandl KM et al, Arch Pediatr Adolesc Med, 1997	4a,b,c,d,e,f,g,h,i,j	Prospective cohort	1364 mother infant dyads in Boston, MA, 2/95-5/95	Telephone surveys of mothers	LOS <30 hr, 31-39 hrs, 40-48 hrs and >48 hrs	Health services use within 21 days, breast-feeding, depression, sense of competence, satisfaction	LOS was not related to outcomes, except that women hospitalized <48 hours had more (?less) emergency department visits than those staying 40-48 hours (abstract different from text)	With adequate postpartum outpatient care, a moderately shorter length of postpartum stay after NSVD had no adverse effect on an array of outcomes	Study not powered to detect subtle differences, LOS measure may have been inaccurate, outcomes all reported by patients, not chart review

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Mandl KM et al, Pediatrics, 2000	4/5 b,c	Quasi-experimental (pre- and post-intervention study)	Harvard Community Health Plan in Mass	Chart review (computerized medical records)	Pre or post- ROLOS (reduced obstetrical LOS program)	Total # of postpartum primary care utilization events for each mother-infant dyad-- includes routine well-child visits, routine pp checks, urgent care visits, home visits and telephone calls.	Before ROLOS, LOS decreased gradually (from 51.6 to 44.3 hours) and after, sharply to 36.5 hours. Signif increase in primary care utilization: Total infant utilization--(including well-child visits, telephone calls and home visits) increased. Total maternal utilization (including routine visits, urgent visits, telephone calls and home visits) all increased.	ROLOS resulted in shortened LOS and an increased amount of primary care use-- mostly planned visits (home and office) and telephone calls; not urgent care visits for infants.	Internal validity good, though I'm skeptical about combining primary care services into a single score the way they did. Difficult to generalize from this higher SES population.
Marbella AM, Pediatrics 1998	4a, costs	Time series	Wisconsin 1989-1994 data on 368,955 full-term and 26,668 premature newborns; also, 1994 birth certificate and infnat mortality data	Computerized database	No interventions, looked at length of stay	Charges during the first 28 days of life and infant readmission rates	Length of stay decreased from 2.4 days to 1.7 days for healthy full-term newborns between 1989-1994, while average hospital charges including delivery and readmission rose >40%. Readmission rates fell in half and stayed constant from 1991 to 1994, but charges per readmission doubled. Of full-term newborns, 43% were classified as sick in 1994 compared with 19% in 1989; sick newborns had longer lengths of stay than healthy newborns.	Managed care efforts to control costs of neonatal care through earlier newborn discharge policies may have limited impact.	Observational; conclusions overextend the results. What would charegs have done if length of stay had not decreased?

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Margolis LH, Arch Pediatr Adolesc Med 1997	1	Cross-sectional	1988 National Maternal and Infant Health Survey	Secondary data analysis	No intervention; looked at predictors of postpartum discharge after 1 night or less	Length of stay	In logistic regression, 8 factors were associated with early discharge: < HS education, age >35, inadequate prenatal care, lack of private or Medicaid insurance, Western region, plans to breastfeed, and care by midwives.	Significant numbers of mothers discharged early manifested health and social risk factors. Economic factors seemed important, as did inadequate use of health services.	Observational, but straightforward in its results and conclusions.
Massachusetts Dept of Public Health, unpublished report 1998	1, 2, 4i	Cross-sectional survey	Randomly selected mothers with uncomplicated deliveries in Massachusetts hospitals between Oct 1 and Dec 31, 1996	Mailed survey in April-May 1997	Post-intervention study; MA law took effect May 1996	Length of stay, follow-up services, knowledge of law, satisfaction	48% of women had early discharge, including 60% of cesarean deliveries and 45% of vaginal deliveries. Average LOS was 49h after vaginal birth and 91h after c-sections, 41% received a home visit, although 93% of women who wanted a home visit received one. 33% were not asked if they wanted one. Mothers were usually informed about the law during the hospitalization, and three-quarters of mothers felt their length of stay was about right. 23% of pediatricians reported recommending a follow-up visit within 3d of discharge for infants discharged early.	Regulations have been implemented consistently across the state, and obstetric and pediatric providers are key to making sure that mothers who want home visits receive them.	Observational, only post-intervention, but useful findings from mothers' and clinicians' perspectives.

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McIntosh ID, Med Care 1984	3	Pre- and post-intervention cohort with external controls	Alberta, Canada, single hospital, pre-intervention N = 343, post-intervention Ns = 367 and 291	Chart review?	Early discharge program, details not given	Length of stay and bed occupancy	In early discharge cohort, average length of stay fell from 4.4 days to 3.9 days for vaginal deliveries, 15% received early discharge. Re bed occupancy, there was no association between the daily discharges vs. daily number of occupied beds, or the % occupancy rate. Estimates a savings of 1.3 days (4.76-3.46 days).	Early discharge may be effective in reducing length of stay and hospital costs, but little evidence that it is used to reduce pressure on bed space.	
Meikle SF et al., Am J Obstet Gynecol, 1998	4/5 a-c, e-g	Case-control	Kaiser Permanente dyads with vag delivery at St. Joseph Hospital, Denver, CO, n=4323	Perinatal database, administrative db's, bill records, inpatient charts.	Multiple exposures (predictors): LOS, other demographic factors that might have increased health care use	rehospitalization, outpatient visits, stratified by presence or absence of home care visits	Increased LOS (>48 hrs) was assoc. with maternal readmission and increased outpt care. No assoc between initial LOS and infant readmission.		
Millar KR, et al., Ped Emerg Care, 2000	4b	Case series/ retrospective char review	PED in Ontario, Canada, 559 visits by neonates <8days over 5 yr. Study period	Chart review	None	Profile of early noenatal presentations to PED, Influence of maternal characteristics on neonatal PED visits, Influence of early d/c on PED visits	Neonatal use of the PED increased 245% compared to an overall increase in PED use of 8.7% during study period. Self-referred patients were at a significantly lower risk of serious illness (16% admitted vs. 49% of consult pt's). Self-referral rate increased with maternal age <21, single, no prenatal classes and primip. Early d/c group had signif increase in annual PED utilization compared to late d/c group, but did not differ in complaints, frequency of dx's, admission rates or maternal char's.		Meticulous record review, Important trends, harder to make statements about relation of LOS to admission without adjusting for potential confounders.

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Nelson VR, J Pediatric Health Care 1999	5c	Pre- and post-intervention ; double cohort	Kaiser Permanente, Fontana CA, N = 315 in intervention and N = 324 in historical control group. However, only those parents who participated in the intervention were included in the intervention group. Also, said it was a convenience sample.	Chart review	Great Starts, an early discharge follow-up program, with a dedicated clinic within the obstetric clinic area and appointments 2 to 3 days after discharge	Infant urgent visits before the 2- to 3-week follow-up appointment	Urgent care visit rate was .58 in the control group and .28 in the Great Starts program group.	Follow-up programs in which qualified nurse practitioners provide care for both the mother and newborn are demonstrated to decrease the utilization or urgent care serivces.	Non-equivalent groups -- post-intervention group included only those who attended the clinic, while pre-intervention group included any
Norr KF, JOGNN 1989	4h, i, other	Nonrandomized controlled trial	Low-income population in metropolitan university hospital, Ns = 94, 115, and 124 (see interventions)	Interviews and outcome assessment at 7-15 days after delivery.	Early discharge with separation: mother dced at 24-47h with infant dced at 48 or more hours, simultaneous early discharge at 24-47h, and conventional discharge at 48-72h. Assignment to groups depended on which phase of the study, and also whether the hospital obstetric unit was overcrowded.	Health problems and maternal attachment and maternal satisfaction	Rates of maternal and infant physical problems were not different among groups; mothers who were discharged early with their infants had highest attachment scores. Most women in all 3 groups preferred simultaneous discharge with a home visit. Average cost of simultaneous early discharge was $75 less than early discharge with separation and $130 less than conventional discharge.	Shorter hospital stay with more health monitoring postdicharge may be a better use of health resources than conventional hospital stay.	
Patterson PK, Qual Rev Bull 1987	4i	Double cohort (controlled nonrandomized observational)	Kaiser Permanente Portland, 90 mothers who chose early discharge vs 93 mothers who chose late discharge	Mailed questionnaire	No intervention; self-selected to early vs usual discharge. 40% were eligible for early discharge; had to attend prenatal class and got home visit within 1-2d after discharge.	Maternal satisfaction; also, predictors of choice of early discharge	Early discharge group were more likely to be multips, more self-reliant. Both groups were highly satisfied but early discharge mothers were more satisfied with the number of home visits and with the recognition of their baby-care skills.	Various implications.	Observational and self-selected, small sample sizes

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Pittard WB, J Pediatr 1988	4a	Nonrandomized controlled trial	Medical University of South Carolina, Ns = 1,714 with early discharge and 622 with extended hospitalization	Chart review	Moderately early discharge (mean 31h post-delivery) vs. similar cohort with extended hospitalization as a result of maternal illness.	Infant rehospitalization within the first 6 weeks and specific diagnoses	In early discharge group, 3.0% were readmitted and in later discharge group, 2.7% were readmitted. Only 4 of the 52 readmission diagnoses among infants discharged moderately early could potentially have been identified (not prevented) by an extended hospitalization.	Moderately early hospital discharge does not result in an increased incidence of rehospitalization within the first 6 weeks of life.	Limited power, nonrandomized and non-equivalent groups. Also, differs from other studies in that rule out sepsis was the most common dx and jaundice was rare at readmission.
Popovic JR, Vital Health Stat 2000	1	Time series, descriptive	National Hospital Discharge Survey			Length of stay after vaginal and cesarean deliveries	Mean length of stay after vaginal delivery was 2.1d in 1995, 2.5d in 1998.	None.	Descriptive only.
Raube K, Am J Public Health 1999	3, 4a	Cross-sectional	Illinois births (164,905 infants) during 1995-1996, before the law in 1997	Analysis of state computerized database	No interventions	Costs, readmissions	Fixed cost is much higher than day 2, and day 2 is less than day 3 for both infant and mother. Readmission rate for newborn = 2.1%; net effect of the law might range from 0.1% savings to 20% cost increase.	There may be large cost implications to the legislation, even with savings from avoided readmissions.	Descriptive only, but good sensitivity analysis.
Rhodes MK, Milit Med 1994	4a	Cohort/case series	USAFA birthing center, N=1340 subjects with vaginal delivery	Chart review	Early discharge with average LOS 35h	Infant readmissions, maternal readmissions	8 maternal readmissions (0.59%) and 4 infant readmissions (0.29%).	24-hour discharge is safe, cost effective, and promotes access to care, and is desirable for patient satisfaction.	Not controlled.
Rollins AJ, J Fam Pract 1979	4a	Cohort/case series	UC Davis Medical Center, N = 190 infants followed	Chart review	Early discharge within 6-24h after delivery, 2 home visits at 48h and 96h after delivery	Infant readmissions	7 readmissions out of 190 infants followed.	No increased risk to mother or infant.	Not controlled, small sample size

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Sacchetti et al., Pediatric Emergency Care, 1997	4b; 4a	Time Series Analysis 1989-95(Tracy wrote retrospective cohort, but I'm not sure I'd call it that	30 community ED's and 1 university ED in NJ and PA, 3.1 million ED visits reviewed	?Administrative database, reviewed all ED visits to identify ED visits of infants 2-10 days of age	Decreasing post partum length of stay	Neonatal visits (NV)/10,000 ED visits; # and % of neonates admitted from ED; Diagnosis category.	NV/10,000 ED visit ratio increased from 4.3 in 1989 to 7.8 in 1995 ($p<0.001$) as the average post-partum LOS decreased from 2.79 to 1.85 days; The mean % of patients admitted from the ED was 10.3% and showed no statis signif change over time	Decreasing post partum LOS associated with increasing ED utilization but no effect on admission	Did not adjust for any confounders, like secular changes in community socio-demographics
Serwint JR et al., Pediatrics, 1991	5h	RCT	Johns Hopkins Hospital Newborn Nursery,	Daily chart review of ER and clinic visits, complete patient chart reviews. Structured maternal interview.	routine nursery care plus provider mt mother and examined infant in her presence within 24-36 hrs of birth, special 24-hr telephone access to physician via on-call beeper system for 2 months, telephone call 2-3 days post d/c by physician	Health care utilization by infant for first 90 days, maternal infant care knowledge, anxiety and depression	More intervention group mothers made a scheduled clinic visit in the first 30 days, were more likely to seek some form of care at the clinic, and tried to reach their physician by phone more often. No diff in ER utilization, immuniz by 90 days, maternal knowledge of infant care, maternal anxiety, or pp depression.	Intervention may improve relationship between mother and clinician	
Sinai LN et al.	2	Cross sectional survey	US, Stratified sample of nurseries from the 1992 AHA guide and pediatricians from Ross Labs list	Telephone surveys for nurseries, telephone followed by mail for pediatricians	None	% of term newborns discharged by 24 hours, actions taken by pedi's and nurseries to avoid false negative PKU screens	24% newborns d/c'd by 24 hrs; 93% of nurseries screen all infants for PKU before d/c; in states without rescreening laws 64% of pedi's rescreen and 48% of institutions rescreen after early d/c	PKU rescreening policies among pedis and institutions vary widely in states where rescreening is not mandated; many infants are not rescreened and are thus at risk of delayed or missed dx, pedi awareness of problem is poor	

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Soskolne EI et al., Arch Pediatr Adoles Med, 1996	4a	Unstated, but seems to be case-control	All newborns born 1/1/92-12/31/92	Retrospective chart review	Cases: readmitted within 3 weeks of birth, Controls: not readmitted	Various exposures (gestational age, age at d/c, LOS (<24, 36, 48 and 72 hrs), Sex, Weight, weight loss, feeding, method of delivery, 5 min APGAR, CBC, jaundice, visit to pedi within 48 hr of d/c, maternal factors	Bivariate analyses: statis signif relationship between readmission and gestational age, d/c weight, vaginal delivery, CBC prior to d/c, jaundice, LOS < 72 hours PROM; Multivariate models not presented; Effect modification by mode of delivery demonstrated in exploratory analyses	D/c prior to 24, 36, and 48 hours not associated with readmission. D/c prior to 72 hours and previously mentioned factors are associated with readmission. Authors report that d/c prior to 72 hours remained signif when adjusted for "other covariates"	Case control study, authors only present results of bivariate analyses. Ascertainment bias makes finding of 72 hour cut-off for relationship with readmission not surprising.
Strong TH et al., Am J Obstet Gynecol, 1993	4 e-g	Pre- and post-intervention study	Fresno, CA, 117 women meeting inclusion criteria and agreeing to be sent home on post-op day 2	chart review	"low risk" c/s d/c'd on post-op day 2 vs. all women undergoing c/s during 6 months immediately before Initiation of early d/c protocol	LOS, post-op complications, post-op office visits, hospital readmission	LOS: intervention group was 44 hrs, vs. 70 hrs in controls. No diff in post op complications. Early dismissal group required more pp office visits. No mother in intervention group required readmission.	Among properly selected candidates, early post-c/s d/c is a reasonable option	Poor-- did not adjust for differences in groups (results likely highly confounded by self-selection for participation in early d/c program), in particular the greater # of repeat c/s and c/s for malpresentation in the intervention group. No power calculations to know what kind of difference in outcomes would be detectable with sample size.

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Sward-Comunelli S, et al., Journal of Perinatology, 1996	2	Pre and post-intervention	Kansas City, MO, whites only, 200 early d/c infants and 36 prolonged hospital stay infants	Chart review	None. Predictors: Early (<36 hrs) vs. late d/c, formula vs. breast fed	Total serum bilirubin at 2-4 d, 5-7 d and 8-10d, Incidence of hyperbili	No statistically significant difference between time of d/c and total serum bili or hyperbilirubimenia. Signif difference in total serum bili and hyperbili between breast fed and formula fed infants.	No adverse effects on serum bili in infants d/c'd early	No discussion of power to detect differences, selection bias in comparison of bili levels-- early d/c'd infants with jaundice might have returned earlier
Tai-Seale M et al, Medical Care Research and Review, 1999	3	Pre and post-intevention/time series	5585 vaginal deliveries from 1993-1995, Medicaid managed care in Indiana	Computerized cost and utilization data	Introduction of Medicaid managed care	Total cost/delivery, cost/day in hospital, LOS. (Does not include costs of home health nurse visits, readmission of some mothers and newborns, or other post-partum outpatient services.)	After introduction of Medicaid managed care, LOS decreased by 21%. Total hospital costs decreased by $280/delivery (12%).	Program saving of $280/delivery less than expected and may be even smaller when all costs related to early d/c are included.	

Evidence Tables Summarizing Studies That Address Key Questions in the Review
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Taniguchi H, J Obstet Genaecol Res, 1999	4 a - l	Cross sectional survey	Hawaii, women at high sociodemographic risk (no insurance, no income or below 185% poverty level) and receiving care under publicly funded Perinatal Support Services system, 6/17 - 7/12/96	Responses to personal interviews collected and recorded by perinatal providers at first post-partum f/u visit	None	Survey participant characteristics, time of maternal d/c by type of delivery, mothers condition at time of d/c ("ready to go home, feeling well"), mothers' concerns at time of d/c, Maternal and infant health problems within 2 weeks of d/c, receipt of home visit, pedi visit or phone call, readmission	54% vaginal deliveries d/c'd by 24 hours, 68% of c/s d/c by 96 hours, 76% mothers wanted to go home at time of d/c though 35.5% reported not feeling well or having problems at time of d/c. Most frequent concerns at time of d/c were baby's health, pain, bleeding, depression and tiredness, 18% called their doctor in first 2 weeks, 20% of infants considered unhealthy by mothers. 12.5% received home visit, 40.3% a telephone call, 36.5% a pedi visit. Readmission rate of 6.5%	Practice of early d/c implemented without compliance to AAP/ACOG early d/c guidelines. Very high neonatal readmission rate. Significant maternal anxiety about babies at time of d/c	Response bias a major problem--unclear how many surveys distributed, % returned, how those who returned surveys were different from those who did not.
Udom NU, Betley CL, Health Affairs, 1998	1, 3	pre- and post-intervention study	Maryland, all uncomplicated c/s and vaginal deliveries in the 3rd and 4th quarters of 1995 before minimum maternity stay law and in 3rd and 4th quarters of 1995 after the law	HSCRC hospital discharge abstract data	Minimum maternity stay law (requiring coverage of >48 hours for uncomp vag delivery and >96 hours for uncom c/s) enacted in July 1996	Hospital LOS and total inpatient hospital charges, adjusted for patient and hospital characteristics likely to influence LOS (age, race, type of insurance, teaching hospital, hospital location)	Average LOS increased for both vag (38%) and c/s (17%) deliveries. Impact less on mothers in higher-risk categories. Charges increased - 10% vag, 6% c/s -- though not as much as LOS. Payers were charged on average an additional $250/vag delivery and $225/c/s delivery. Law reduced the sources of variation among mothers' LOS and hospital charges	Minimum stay legislation in Maryland increased LOS and charges. These changes varied among patients, payers and delivery sites. White women 19-35 y.o. with private health insurance delivering in rural and suburban hospitals benefited most.	Did not include post-partum costs

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Volpp KGM, Bundorf MK, Inquiry, 1999	1	Cross sectional and time series analysis	Patients from all nonfederal short-term general hospitals in New Jersey, all uncomplicated vaginal deliveries in 1990, 1992 and 1994	NJ inpatient discharge database	HMO vs. non-HMO coverage	Probability of a one day stay adjusting for demographic hospital dn time characteristics.	% of one day stays increased from less than 4% for all payers in 1990 to 48.1% for HMO patients and 31.5% for non-HMO patients in 1994. Odds of HMO pt. staying one day nearly twice as great as non-HMO pt in 1994.	Regulations should be targeted at particular policies rather than insurers	
Waldenstrom U et al, Acta Paediatr Scand, 1987	4j	RCT	Falun and Borlange, Sweden, N=164 women	Case records in hospital and at Child Health Centers, Domiciliary midwife and hospital nurse records.	Discharge 24-48 h after birth and domiciliary visits (experimental group (EG)) vs. traditional hospital care (mean 6 days) (control group (CG))		Breast feeding: No differences in breast feeding rates at 2 months and 6 months, except in multiparous subgroup, where 63% of EG and 41% of CG were still BF'iing at 6 mo. Supplementary food: 2%in EG vs. 72% in CG. Meals/day in first days: EG>CG. Satisfactlon: no difference. Weight on 5th day: no dif	Early d/c dos not affect duration of breastfeeding. Infants d/c'd early fed more often during first days and less likely to receive supplements.	Did not analyze according to intention to treat (and significant #'s dropped out). Data collection on outcomes not complete or uniform. Sub-group analyses not specified a priori and thus purely exploratory. Generalizable only to women interested in early d/c.
Waldenstrom U, Scan J Caring Sci, 1987	4i	Cross sectional survey	Sweden, 60 families	Semi-structured interviews of parents	Non-participants (NP) vs. Participants (EG and CG)	Parents' experiences of early discharge combined with home visits, men's and women's experiences of post-partum care in hospital	92% women and 83% men in EG 40% and 30% in CG and 78% and 66% NP had positive post-partum experience. EC and CG parents emphasized home setting as more natural and calm and importance of family being together. NP group emphasized medical security and support and opportunity for mother to rest.		
Welsh C, Ludwig-Bemer P, Lippincott's Prim Care Pract, 1998	2, 4a, 4e	Prospective cohort	Three Advocate Health Care hospitals (?state), n=14557	Computerized databases from home health sites and hospitals	none	f/u by home health visits, readmission rates and sentinel events for mother and infant	2827 received home health visits, 92% within 48 hours. Infant readmission rate 1.7% (range 1.1-2.6%), maternal readmission rate 0.32% (range 0-0.52%). Three sentinel events in 1996 requiring infant readmission to an ICU (2 sepsis, 1 kernicterus).		

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Welt SI et al, American Jo of Perinatology, 1993	4 and 5 a-g	Prospective cohort	Small urban center in Tennessee, 40% private, 60% low income, n=160	Chart review	Discharge within 12-36 hours	Predictors of maternal attitude toward rapid pp d/c, maternal and infant pp problems requiring action by the nurse practitioner or MD	Education, marital status and occupation not predictive of choice of participation in early d/c. 4.3% of mothers and 3% of neonates had significant problems in the first 72 hours after delivery. 10% of mothers and 5% of infants had significant problems after 72 hours. Newborn readmission rate=1.8%	Incidence of problems is c/w other studies and suggests that some type of early f/u of both mother and infant is needed after early pp d/c	No comparison group, problems after 72 hours are common to all mothers (early and late d/c), "problems" included social problems, poor bonding-- not sure how those outcomes were ascertained.
Wiley CC et al, Arch Pediatr Adolesc Med, 1998	1, 2	Cross sectional survey	US nurseries with more than 100 births per year, Head nurses from 204 nurseries and 200 pediatricians	Data extracted from returned mail surveys	None	Presence of written neonatal jaundice protocol, system to track jaundiced newborns after d/c, D/c prior to 36 hours or 24 hors, Rate of scheduled follow-up within 2-3 days	Response rate 62% (124/204) head nurses and 55% (109/200) pedi's. 45% head nurses reported lack of written neonatal jaundice protocol, 27% head nurses and pedi's reported no system in place to track jaundiced newborns after d/c. Nurseries serving high risk populations were no more likely to have protocol or tracking system. 70% head nurses and 62% pedi's describe frequent (>50%) d/c before 36 hrs. Only 16% and 12% reported frequent d/c before 24 hr. >50% nurseries scheduled f/u within 2-3 days for infants d/c before 24 hours. Likelihood of such f/u did not differ by high risk status.	Many nurseries lack neonatal jaundice protocols and tracking systems. Many newborns d/c'd early are not scheduled for f/u visits within 2 3 days despite AAP guidelines.	Figures may actually overestimate quality given that outcomes were reported by health care providers.
Williams LR, Cooper MK, JOGNN, 1993	4a,e	Retrospective cohort	Cleveland, Ohio (1616 mothers, KP of Ohio, ?demographics)	Not clearly stated	24 hour LOS followed by home visit within first 24 hours and then 2-3 days later	Maternal and infant readmission rate	Maternal readmission rate<1%; most common cause was endometritis. Infant readmission rate slightly less than 2%; most common cause was hyperbili and r/o sepsis.	Early d/c is safe and cost-effective	Unclear who this population is; data provided are crude. Cost and satisfaction data are crude.

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Yanover MJ, et al, NEJM, 1976	4a,d,l, 5a,d,l	RCT	San Francisco KP, 88 families, Not stated ?demographics		Early discharge with family centered perinatal care program (home visits) vs. traditional care (LOS > 48 hrs)	Labor and delivery characteristics, LOS, infant morbidity, maternal readmission maternal satisfaction, costs/savings	No differences in length of labor, amount or frequency of oxytocin or analgesic but more study women had local or no anesthesia. Study group had more NSVD (not signif), no difference in number or type of neonatal or maternal morbidity . 39/41 would have done it again, 41/41 would recommend it to a friend, 34/41 thought the LOS was appropriate, cost of program is = to immediate savings from early d/c	Early d/c with home care f/u is safe, economically feasible and well accepted by patients	Violation of intention to treat contaminated Initial randomization and probably introduced serious confounding. Failure to show differences in outcomes is more likely due to underpowering, not lack of relationship (can't be powered to show 1% vs.2% readmission rate difference with only 40 subjects in each arm).

APPENDIX G

Articles Reviewed But Not Included in Evidence Tables

Draft, Print Date: February 1, 2002

Author, Journal, Year	Reason or Summary
Aitken ME, The effect of health maintenance organization vs commercial insurance status on obstetrical management and outcome, Arch Pediatr Adolesc Med 1997	HMO vs. private insurance was associated with more prenatal care use and screening; infant distress was higher among HMO patients
Arnold S, Newborn discharge: A time to be especially thoughtful, Contemporary Pediatrics 2000	Review article; talks about LAND pilot and gives clinical recommendations.
Arthurton MW, Bamford FN, Paediatric aspects of the early discharge of maternity patients, BMJ, 1967	Interesting, but methodologically messy study from Bradford, England circa 1967, looking at effects of "early" d/c prior to 72 hours on mortality, morbidity, and breast-feeding rates.
Barton JJ, Alternative birthing center, Am J Obstet Gynecol 1980	Alternative birthing center had a 24% transfer rate and 9% Cesarean rate; low incidence of neonatal morbidity
Bernier JA, Early postpartum discharge and breastfeeding, Arch Pediatr 1995	Abstract alone. Maryland state retrospective cohort study of computerized database, N = 14,509. No effect of length of stay was found, though could not adjust for many relevant confounders.
Bernstein HH, Postpartum discharge: Do varying perceptions of readiness make a difference? In draft, from Hank Bernstein 2001	55 mother-infant pairs; on the day of discharge there were 4 discrepancies where the mother felt unready and the practitioner felt the pair was ready for discharge. Maternal education was a significant predictor of unreadiness. One month after discharge, only poor agreement between practitioners and mothers. In retrospect, 18 mothers changed their assessment from ready to not ready.
Bramadat IJ, Satisfaction with childbirth, Birth 1993	Discusses methodologic issues in measuring satisfaction with childbirth; found support for a discrepancy theory of satisfaction .
Braveman P, Early discharge of newborns and mothers, Pediatrics 1995	Review of literature; has useful older references
Braveman P, The prevalence of low income among childbearing women in California, Am J Public Health 1999	65% of all childbearing women had low income (0-200% of poverty level); these are not a special needs group. Efforts to increase timely prenatal care cannot focus only on Medicaid, uninsured, women in absolute poverty, or those who get care at public-sector sites.
Britton J, Postpartum discharge preferences of pediatricians: Results from a national survey, in draft, from Hank Bernstein 2001	490 pediatricians in 2000 AAP Periodic Survey, female pediatricians reported a more biopsychosocial approach to determining discharge readiness. Those providing care for publicly insured or uninsured patients were less likely to identify an optimal LOS as >36 hours.
Britton JR, Early discharge of the term newborn, Pediatrics 1994	Review of literature; includes only those studies with a control group
Britton JR, Postpartum early hospital discharge and follow-up practices in Canada and the United States, Birth 1998	Surveyed ACOG and Canadian obstetricians. Only 39% of obstetricians routinely recommended additional folow-up after early discharge; most defined early discharge as <24h after vaginal and <72h after Cesarean and defined optimal lengths of stay < 48h.
Brooten D, A randomized clinical trial of early hospital discharge and home follow-up of very-low-birth-weith infants	Randomized 39 infants to discharge at <2200 g. No difference between these and the control infants in rehospitalization, acute care visits, or physical and mental growth
Brown S, Davis B, Krastev A, Small R, The Cochrane database of systematic reviews	This is exactly what we're looking for! What state is it in?
Brown S, Satisfaction with care in labor and birth: A survey of 790 Australian women, Birth 1994	Dissatisfaction was related to lack of involvement in decision making, insufficient information, ostetric intervention, and perception that caregivers were unhelpful. Looked mostly at intrapartum and antenatal care.

Butz AM, Infant health care utilization predicted by pattern of prenatal care, Pediatrics 1993	Can predict infant utilization based on prenatal utilization.
Catz C, Summary of workshop: Early discharge and neonatal hyperbilirubinemia, Pediatrics 1995	Anecdotal reports of 22 full- or near-term infants born in the last 4 years who have developed kernicterus after early discharge. Infants with risk factors may deserve closer follow-up than is currently being recommended in practice.
Centers for Disease Control and Prevention, Prevalence of selected maternal and Infant Characteristics from PRAMS, MMWR 1999	Gives descriptive data on smoking, prenatal care entry, breastfeeding, contraception, intention, and other maternal behaviors.
Clemens CJ, Pediatric home health care in King County, Washington, Pediatrics 1997	14 agencies replies to a survey; many agencies lacked internal methods to ensure the provision of quality pediatric care
Craig GA, Muirhead JMB, Obstetric aspects of the early discharge of maternity patients, BMJ, 1967	Ditto.
Declercq E, The politics of "drive-through deliveries", Milbank Q 1997	Review article on the legislative history of early postpartum discharge laws.
Eaton AP, Early postpartum discharge: Recommendations from a preliminary report to Congress, Pediatrics 2001	SACIM interim report recommendations
Escobar GJ, Rehospitalization of healthy term newborns in Kaiser Permanente, unpublished	2.2% rehospitalization rate, N = 158. Among babies with LOS < 72h, there were no differences in rehospitalization rates by subgroup.
Evins GC et al. Postpartum depression: A comparison of screening and routine clinical evaluation, Am J Obste Gyncecol, 2000	Compared spontaneous detection to screening with Edinburgh Postnatal Depression Scale for PP depression.
Finkelstein BS, Patient assessments of hospital maternity care, HSR 1999	Mailed surveys to 27,000 patients admitted at 18 hospitals in NE Ohio for labor and delivery in 1994-1994
Finkler MD, Cost-effectiveness and obstetric services, Med Care 1991	Employs two risk-adjustment strategies to model the cost-effectiveness of obstetric services for eight hospitals in Southern California Kaiser Permanente. The costs and mortality rates were positively correlated; the lowest-cost hospital had excellent outcomes.
Frank J. The risk of readmission and ER visits in newborns with early discharge, Pediatr Res 1995	Abstract alone. New Hampshire hospitals, cross-sectional, discharge at 0-1 day had 1.6% readmission rate, higher than discharge at 2 or more days, with 1.1% readmission rate.
Gaylord MS, Early discharge of high risk Medicaid infants can be safetly achieved with home health visits, Pediatr Res 1995	Abstract alone. Implemented home health visits in one group, and looked at external control group. Readmissions higher in external control group (OR 2.6, 95% CI 0.98 - 3.03). Concluded that infants not receiving home health visits were more likely to be readmitted in 7 days.
Gazmararian JA, Economic aspects of the perinatal hospital stay, Clin Perinatol 1998	Describes costs of various services and charges for different types of hospitalizations. Good review of studies that included cost data. Estimates cost at 900 million to 2.2 billion annually
Green JM, Expectations, experiences, and psychological outcomes of childbirth: A prospective study of 825 women, Birth 1990	6 hospitals in England; 3 questionnaires, 2 prenatal and 1 postnatal. Four indices of psychological outcome.
Grullon KE, The safety of early postpartum discharge: A review and critique; Obstet Gynecol 1997	Good review; includes articles through January 1997; rates evidence according to USPSTF standards and gives early discharge a C recommendation
Guerriero, WF, A maternal welfare program for New Orleans, ?reference, pre-1941	Interesting description (from historical standpoint) of early PPD program with home nursing f/u-- pre-1941.
Healthy People 2000	Breast feeding rate goals
Hickey LA, Maternity day care program offers economical, family-oriented care, Hospitals, JAHA 1977	Description of maternity day care program with 24-hour LOS then home visits by nurses on the 2nd, 3rd, and 6th day. For uninsured or underinsured, vs. 3-4 day hospitalization. Contains some cost information.

Higgins P, Self-esteem, social support, and satisfaction differences in women with adequate and inadequate prenatal care, Birth 1994	Low-income, uninsured, Hispanic women less likely to receive adequate prenatal care as defined by 1st trimester care
Hyman DA, Drive-through deliveries: Is "consumer protection" just what the doctor ordered?, N Carolina Law Rev	Detailed review of the history of the legislation and of evidence and cost
Hyman DA, What lessons should we learn from drive-through deliveries?, Pediatrics 2001	Commentary on SACIM's interim report, published in Pediatrics in same issue
Igati SD, Inadequate breastfeeding counseling by health care providers in the prenatal and early postpartum period, Pediatr Res 1995	Abstract alone. Survey of 181 breastfeeding mothers, many women do not routinely receive counseling about breastfeeding.
Interim Report to Congress Mandated by the NMHPA of 1996	Review
Jansson, Peg, Early postpartum discharge, American Jo of Nursing, 1985	Nice description of a pp dc program with home visits. Presents outcomes as an afterthought-- during 1984 92% of mothers with uncomplicated vaginal births (674) d/c'd within 48 hours. 1084 pp home visits made to 925 mothers and infants ????. 3 mothers required rehospitalization, 9 infants rehospitalized.
Kessel W, Early discharge: In the end, it is judgment, Pediatrics 1995	Commentary: There is not a universal correct length of stay that is considered adequate
Kiely M, Early discharge: Risks, benefits, and who decides, Clin Perinatal 1998	Review, good organization of different outcomes that may be affected by length of stay
Kojo-Austin H, Women's satisfaction with maternity health care services in Finland, Soc Sci Med 1993	Questionnaire and interview study in Helsinki, Finland; women are more satisfied with visits to maternity centers than visits to hospital clinics
Korfmacher J, Differences in program implementation between nurses and paraprofessionals providing home visits during pregnancy and infancy: A randomized trial, AJPH 1999	Nurses vs. paraprofessionals who made home visits to pregnant women in Denver, Colo, during pregnancy and the first 2 years of the child's life: paraprofessionals had visits that lasted longer; equal satisfaction, but more dropouts, and higher staff turnover.
Kuehl KS, Failure to diagnose congenital heart disease in infancy, Pediatrics 1999	Analysis of age at death of infants with undiagnosed congenital cardiovascular malformation suggests that such infants may be at risk if discharged within the first 2 days of life; 800 (18%) of 4,390 died; median age at death for previously undiagnosed infants was 2 days; in this study; left heart obstructions were identified after day 2 of life; strategies to ensure diagnosis after discharge are important
Lawrence JM et al., Satisfaction with pregnancy and newborn care: Development and results of a survey in a HMO, Am Jo of Managed Care, 1999	Describes development, implementation and results of a survey to measure satisfaction with pregnancy and newborn care. Contains item about LOS, but not focus of the article.
Lawrence RA, Early discharge alert, Pediatrics 1995	Editorial that gives guidelines for what milestones for breastfeeding pediatricians should check after early discharge
Leff E, Using importance-performance analysis, Nursing Management 1990	Studied satisfaction with postpartum nursing care in 15 randomly selected patients.
Leslie J, Key drivers of patient satisfaction in the pregnancy and childbirth care experience, unpublished review, 1996	Good review of maternal satisfaction literature.
Lomas J, The labor and delivery satisfaction index, Birth 1987	Used a new maternal satisfaction index which seemed sensitive and valid.

Lydon-Rochelle M, Association between method of delivery and maternal rehospitalization, JAMA 2000	Good retrospective cohort study that loowd at all primiparous women with live singleton births in Washington State, N=256,795, between 1987-1996. Women with cesarean and assisted vaginal deliveries had increased risk for rehospitalization Overall, 1.2%were rehospitalized within 60 d, RR 1.8 for cesareans and 1.3 for assisted vaginal delivery, usually for peripartum infection. Did not look at length of stay as predictor or effect modifier, although stated that LOS was 3.9 d in cesarean and 3.3 d in spontaneous vaginal deliveries.
MA Association of HMO's	Hospital Maternity Stay: An annotated bibliography-- I wasn't sure what we should do with this.
Maisels JM, Newman TB, Kernicterus in otherwise healthy, breast-fed term newborns	Review of legal cases in which author opinions were solicited about kernicterus. Documented kernicterus in 6 infants between 1979-91 who were otherwise healthy, full-term breast-fed newborns without hemolytic disease or other discernible reason for their jaundice. Closer f/u after birth and d/c from the hospital might have prevented some of these cases.
Mandl KD et al, Infant health Care Use and maternal Depression, Arch Pediatr Adoles Med, 1999	
Margolis LH, The role of state maternal and child health programs in the issue of newborn discharge, Maternal Child Health J 1998	Telephone interview with MCH representative in each state. 20 states reported mandates for postdischarge services. 18 states reported they had undertaken specific studies on the effects of discharge timing in their states. However, only 15 programs believed they had been effective and only 19 were satisfied with the discharge policies in their states. Looked at MCH programs' role in assessment, assurance, and policy functions.
Marut JS, Comparison of primiparas' perceptions of vaginal and cesarean births, Nurs Res 1979	Mothers with cesareans had more negative perceptions of labor and delivery.
McDuffie RS, Effect of frequency of prenatal care visits on perinatal outcome among low-risk women, JAMA 1996	RCT of fewer prenatal visits; outcomes were similar, 2,764 pregnant women in Kaiser Colorado 1992-1994
Misra D, Benefits and limitations of prenatal care, from counting visits to measuring content, JAMA 1996	Commentary on McDuffie article
Mittelstadt P, Maternal and Child Health Bureau meeting on early discharge of neonates, memo from GHAA 1995	2-page summary of discussions on early postpartum discharge
Moffit TE, Helping poor mothers and children, JAMA 1997	Commentary on Olds studies of home visiting
Moss GD, Routine examination in the neonatal period, BMJ 1991	Among 1795 babies, an abnormality was detected in 8.8% on first examination, and of the 1,428 who had a routine second examination, 63 had previously detected abnormalities, 7 were important (dislocatable hips), = 0.5%.
Munro BH, Re-examination of the psychometric characteristics of the La Monica-Oberst patient satisfaction scale, Res Nurs Health 1994	The scale is useful for nononcologic female patients, including women with unplanned cesarean birth
Nabors GC and Herndon ET, Home Puerperal care following hospital delivery, Obstetrics and Gynecology, 1956.	Interesting report from 1956 of home visit program necessitated by population growth in the Dallas area. "Low risk" mothers/infants were d/c'd prior to 24 hours. From 1950 to 1954, 6608 (57.6%) were d/c'd early. 107 were readmitted for pp complications (mostly endometritis). No figures on neonatal outcomes were available but authors state they "knew of no neonatal death." (!)

National Center for Health Statistics, Longer hospital stays for childbirth, www.cdc.gov accessed 4/2000	The average length of a hospital stay for childbirth increased to 2.4 days in 1997, from 2.1 days in 1995. The increase was due to a reduction in the proportion of very short stays for childbirth: the number of women hospitalized for 1 day or less dropped from 37% in 1995 to 25% in 1997. Stays of 2-3 days increased from 54% to 64%.
National Health Policy Forum, Postpartum Stay: A No-Win for Managed Care?, unpublished report from George Washington University, 1996	Well-written review of the policy and legislative issues
Navale-Waliser M, Factors predicting completion of a home visitation program by high-risk pregnant women, Am J Public Health 2000	Women with greater social support needs and healthier behaviors were more receptive to long-term home visitation than other women.
Newman TB, Evaluation and treatment of jaundice in the term newborn: A kinder, gentler approach, Pediatrics 1992	Says currently available data justify an approach to the jaundiced term infant that is less aggressive than previously recommended.
Norr KF, Outcomes of postpartum early discharge, 1960-1986, Birth 1987	Literature review, includes articles from 1962 to 1985 in US
Oh W, Fourth edition of the Guidelines for Perinatal Care: Summary of Changes, Pediatrics 1997	New guidelines state that it's unlikely the criteria for discharge can be achieved within 48h after birth; also strong emphasis on the need for a physician-directed follow-up program to provide the subsequent care for the mother and infant after discharge.
Onal EE, Early newborn hospital discharge after delivery: A comment on cost-effectiveness, Arch Pediatr 2000	Letter commenting on Grupp-Phelan study, from Turkey, describes reasons for readmission among 32 of 526 infants discharged early.
Posner NA et al., Screening for postpartum depression: An antepartum questionnaire, Jo of Repro Med, 1997.	Describe the development and evaluation of a questionnaire used antepartum to screen for pp depression.
Reever MM et al. Early pp d/c versus traditional LOS, Southern Medical Jo, 1998	Described predictors of maternal choice of postpartum care (early vs. traditional LOS) using questionnaire of women at 28 weeks gestation. Only 24% chose early d/c option. Variables assoc with choice of d/c plan included family bonding concerns, comfort at home, fear of inability to care for self, discomfort with ease of return to the hospital, concern over the need for more medical supervision, inability to attend approp prenatal education classes, need for more training in newborn care.
Reinhardt UE, Efficiency and civility in maternity care or How much Jello can a mother eat?, Med Care Res Review 1999	In a 1996 article, the present author had taken issue with this nation's seemingly mindless pursuit of reduced length of stay for hospital inpatient care. Days lopped off hospital stays could not have saved more than a pittance. The incremental cost of an additional convalescent day is <$300. Need more efficient pricing than per diem. For the hospitals this government intervention represents an official license to foist on the health-insurance industry additional, essentially discretionary hospital days at a high per diem charge. For the health plans, this was a reminder that commonsense economic principles matter in a market economy and that consumers do warrant a respect that goes beyond mere lip service.
Robinson JC, Health plan switching in anticipation of increased medical care utilization, Med Care 1993	Employees often switch to HMOs when anticipating increased needs for maternity care.
Rubin HR, Maryland Medicaid recipients' ratings of prenatal and pediatric care by HMOs and fee-for-service providers, AHSR abstract 1995	Cross-sectional 3-cohort telephone interview; HMO mothers graded their care worse than FFS and MD mothers; HMOs may pose access problems for Medicaid recipients.

Schwartz RM et al. Administrative Data for QI, Pediatrics, 1999	Review of use of admin. Data for QI
Seidman DS, Hospital Readmission Due to Neonatal hyperbilirubinemia	Assess the incidence of severe hyperbilirubinemia (>18)in term health newborns discharged from hospitals I Israel (0.36%). Not included in review because did not relate to early discharge
Sharma V, Factors Influencing Infant Visits to Emergency Departments, Pediatrics, 2000.	Sought to explore predictors of ED utilization by infants in first year of life. Found direct relationship between length of stay in nursery and ED utilization, but were looking at LOS of 1-2, 3-4, 5-7, 8-14 and >15 days as indicators of neonatal illness. Not really relevant for our evidence review.
Simkin P, Just Another Day..., Birth, 1991	Qualitative, ethnographic research; interviewed 20 mothers after natural childbirth in 60's and 70's immediately after deliver and then 15-20 years later.
Slade P, Expectations, experiences and satisfaction with labour, British Journal of Clinical Psychology, 1993.	Explored emotional, medical and control aspects of labour in 81 women.
Sola A, Changes in clinical practce and bilirubin encephalopathy in healthy term newborns, Pediatr Res 1995	Abstract alone. Case series of 4 in a birth cohort of est >200,000 with historical control incidence of 1 in >2,000,0000.
Stier DM, Rehospitalization for sepsis in the era of early newborn discharge, Arch Pediatr 1995	Abstract alone. Rehospitalization for sepsis is low rate, in most cases, a longer nursery course would not have improved detection.
Sullivan DA et al, Satisfaction with maternity care, Medical Care, 1982	Evaluated satisfaction with maternity and care and explored relationship between maternal satisfaction and patterns of communication between caretakers and patients as well as other choices in the labor and delivery process
Swigonski NL et al, Prenatal health behaviors as predictors of breast-feeding, injury and vaccination, Archives, 1995	Not sure if you want to include this one in the review-- sought to identify maternal prenatal preventive health behaviors associated with breast-feeding, early childhood injuries and vaccination. Does not address LOS or post-partum services and their impact on neonatal/maternal outcomes.
Taylor JA et al, A RCT of GWCC vs. IWCC for high-risk children, Pediatrics, 1997	GWCC is a viable alternative to IWCC for high-risk children in terms of developmental outcomes and maternal-child interaction
Taylor JA et al, GWCC for high-risk children, Pediatrics, 1997	Similar study and conclusions to one above
Temkin E, Driving through: Postpartum care during WWII, American Jo of Public Health, 1999	Interesting history of how America dealt with short post-partum LOS (due to the baby boom) shortly after WWII-- community services and community cohesion
Thilo EH, The history of policy and practice related to the perinatal hospital stay, Clin Perinatol 1998	Talks about early postpartum discharge history in the US; also includes a survey of other countries. US is short compared with other countries, although all have experienced a decrease in length of stay.
US GAO, Maternity care: Appropriate f/u services critical with short hospital stays	
Waldenstrom U, Early and late d/c after hospital birth: father's involvement in infant care, Early Human Development, 1988	Evaluated father's involvement in his baby's care for women in RCT discharged early (24-48 hr) vs. later (5-6 days) vs. non-participants. Found increased paternal involvement in EG during days 2-4 after birth, but not during 2nd and 6th week after birth. No increased utilization of parental leave during first year. All outcomes self-reported and the participants are obviously not blinded, so there is serious potential for reporting bias.

Waldenstrom U, Lindmark G, Early and Late d/c after hospital birth: a comparative study of parental background characteristics, Scand J Soc Med, 1987	Compared background characteristics of participants and non-participants in RCT of early vs. late d/c. Participants had less positive attitude to post-partum care in hospital and greater self-confidence about birth and parenthood, more often multipara with less complicated pregnancies, a little younger and less educated, attended prenatal classes to a lesser extent but felt better prepared for the delivery, had more supportive persons available.
Walker CR, Discharge of mothers and babies from hospital after..., Canadaian Jo of Pub Health, 1999	Describes development of guideline for discharge timing in Ottawa-Carleton
Waskerwitz S et al, A comparative analysis of newborn outcome in a hospital-based birthing center	Compared 123 birthing center born infants to 100 similar but hospital born controls and found no differences in morbidity at 24 and 72 hours and showed cost reduction of $340/infant, suggesting that birthing center deliveries are both safe and cost-effective.

APPENDIX H

Criteria for Grading Individual Studies and Linkages in the Analytic Framework

Largely during 1999, the Methods Work Group for the US Preventive Services Task Force (USPSTF) developed a set of criteria by which the quality of individual studies could be evaluated in terms of both internal validity and external validity and a related set of criteria relating to the linkages within the analytic framework for the topic of a given systematic evidence review (SER). The USPSTF provisionally accepted these approaches and criteria, and the associated definitions of quality categories, at two quarterly meetings in mid-1999.

The first part of this Appendix describes the criteria relating to internal validity and the procedures that topic teams follow for all updates and new assessments in making these judgments. The overall evaluation for each study is recorded in the Evidence Tables typically provided in Appendix D of any SER. The second part of this Appendix provides similar information relating to aggregate internal validity, aggregate external validity (generalizability), and consistency of the results from related sets of articles (also referred to as coherence).

Criteria for Grading the Internal Validity of Individual Studies

Introduction

All topic teams will use initial "filters" to select studies for review that deal most directly with the question at issue and that are applicable to the population at issue. Thus, studies of any design that use outdated technologies or technologies that are not feasible for primary care practice may be screened out before the abstraction stage, depending on the topic and the decisions of the topic team. The teams will justify such exclusion decisions if there could be reasonable disagreement about this step. The criteria below are meant for those studies that pass this initial filter.

Design-Specific Criteria and Quality Category Definitions

Presented below are categories of criteria for which to judge internal validity; they are given for several major study designs (systematic reviews, case-control studies, randomized trials and cohort studies). With these are given general definitions of three ratings — "good," "fair," and "poor" — relating to those criteria. These specifications are not meant to be rigid rules. Rather, they are intended to be general guidelines, and topic teams can make individual exceptions when those are cexplicitly explained and justified.

In general, a "good" study is one that meets all criteria well. A "fair" study is one that meets all but one criterion but has no known "fatal flaw." "Poor" studies have at least one fatal flaw.

Systematic Reviews

Four categories of criteria apply to systematic reviews. They are:

1. Comprehensiveness of sources considered/search strategy used;
2. Standard appraisal of included studies;
3. Validity of conclusions; and
4. Recency and relevance of the included studies.

The definitions of the three rating categories for these types of studies are as follows:

Good: Recent, relevant review that has comprehensive sources and systematic search strategies; explicit and relevant selection criteria; standard appraisal of studies; and valid conclusions.

Fair: Recent, relevant review that lacks comprehensive sources and systematic search strategies but is not clearly biased and meets the other criteria for a rating of "good."

Poor: Outdated, irrelevant, or biased review that lacks comprehensive sources and/or systematic search strategies, explicit and relevant selection criteria, and/or standard appraisal of studies or that draws invalid conclusions.

Case-Control Studies

Six categories of criteria apply to case-control studies. They include:

1. Accurate ascertainment of cases.
2. Nonbiased selection of cases and controls with exclusion criteria applied equally to both.
3. Response rate.
4. Diagnostic testing procedures applied equally to each group.
5. Measurement of exposure accurate and applied equally to each group.
6. Appropriate attention to potential confounding variables.

The definitions of the three rating categories for these types of studies are as follows:

Good: Appropriate ascertainment of cases and nonbiased selection of case and control participants; exclusion criteria applied equally to cases and controls; response rate equal to or greater than 80 percent; diagnostic procedures and measurements

accurate and applied equally to cases and controls; and appropriate attention to confounding variables.

Fair: Appropriate ascertainment of cases and controls and exclusion criteria applied equally to cases and controls, and without major apparent selection or diagnostic work-up bias; response rate less than 80 percent; or attention to some but not all important confounding variables.

Poor: Major selection or diagnostic work-up biases; response rates less than 50 percent; or inattention to confounding variables.

Randomized Controlled Trials and Cohort Studies

Seven categories of criteria apply to RCTs and cohort studies. They include:

1. Initial assembly of comparable groups.
   a. For RCTs: adequate randomization, including first concealment and whether potential confounders were distributed equally among groups.
   b. For cohort studies: consideration of potential confounders with either restriction or measurement for adjustment in the analysis; consideration of inception cohorts.
2. Maintenance of comparable groups (includes attrition, cross-overs, adherence, contamination).
3. Levels of follow-up: differential loss between groups; overall loss to follow-up.
4. Measurements: equal, reliable, and valid, and including masking of outcome assessment.
5. Clear definition of interventions.
6. All important outcomes considered.
7. Analysis:
   a. For RCTs: intention-to-treat analysis.
   b. For cohort studies: adjustment for potential confounders.

The definitions of the three rating categories for these types of studies are as follows:

Good: Comparable groups assembled initially and maintained throughout the study; follow-up at least 80 percent; reliable and valid measurement instruments applied equally to the groups; outcome assessment masked; interventions defined clearly; all important outcomes considered; appropriate attention to confounders in analysis; for RCTs, intention-to-treat analysis.

Fair: Generally comparable groups assembled initially but some question remains whether some (although not major) differences occurred with follow-up; measurement instruments acceptable (although not the best) and generally applied equally; outcome assessment masked; some, but not all important, outcomes considered; appropriate attention to some, but not all, potential confounders; for RCTs, intention-to-treat analysis.

Poor: Groups assembled initially not close to being comparable or not maintained throughout the study; measurement instruments unreliable or invalid or not applied at all equally among groups; outcome assessment not masked; key confounders given little or no attention; for RCTs, no intention-to-treat analysis.

Diagnostic Accuracy Studies

Seven categories of criteria apply to diagnostic accuracy studies. They include:

1. Screening test relevant, available for primary care, adequately described.
2. Study uses a credible reference standard, performed regardless of test results.
3. Reference standard interpreted independently of screening test .
4. Handles indeterminate results in a reasonable manner.
5. Spectrum of patients included in study.
6. Sample size.
7. Administration of reliable screening test

The definitions of the three rating categories for these types of studies are as follows:

Good: Relevant, available screening test; credible reference standard; interpretation of reference standard independent of interpretation of screening test; reliability of test assessed; few indeterminate results, or indeterminate results handled in a reasonable manner; large same size (more than 100 subjects) and a broad spectrum of patients with and without disease.

Fair: Relevant, available screening test; reasonable although not best reference standard; interpretation of reference standard independent of interpretation of screening test; moderate sample size (50 to 100 subjects) and a "medium" spectrum of patients.

Poor: Inappropriate reference standard; screening test improperly administered; biased ascertainment of reference standard; very small sample size or very narrow spectrum of patients.

Criteria for Grading Linkages in the Analytic Framework

Introduction

As documented just above, the USPSTF Methods Work Group developed a set of criteria by which the quality of individual studies could be evaluated in terms of both internal validity. The Methods Work Group also developed definitions and criteria for judging the strength or quality of evidence for key questions — i.e., linkages in the analytic frameworks — for the topics of SERs. These quality criteria were discussed at the May 1999 quarterly meeting and were essentially adopted for use by the Evidence-

based Practice Centers in developing their first set of SERs. This document describes the criteria relating specifically to linkages in the analytic framework.[1]

Linkage Category Definitions

The rating scheme for grading the evidence for a linkage in the analytic framework rests on three classes of criteria: aggregate internal validity, aggregate external validity, and consistency or coherence. The Methods Work Group did not establish set formulae for arriving at any linkage score for these criteria sets. As with the criteria for quality of individual articles, they are intended to be applied as general guidelines, and the judgments are made implicitly. Judgments can be made about evidence of benefits and evidence of harms. In addition, a summative grade — i.e., an overall rating — combining the evaluations of the three categories defined below can be given.

Also as with the criteria for individual studies, these three categories can be labeled as "good," "fair," or "poor." That is, the linkages can be understood to be supported by good evidence, fair evidence, or poor evidence. The summative, overall rating can also range from good to poor.

Aggregate Internal Validity

This category refers to the overall extent to which data are valid for conditions addressed within studies. It would be rated according to quality grading information about individual studies.

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[1] The USPSTF is developing a separate set of criteria for rating its recommendations about an entire preventive service, including policies for appropriate extrapolation to populations or settings not reflected in the reviewed literature. These criteria are expected to be put into final form in early 2000. However, because the SERs do not contain USPSTF recommendations, those ways of grading recommendations are not dealt with here.

Aggregate External Validity

This category concerns the generalizability of evidence to questions addressed by the linkage. This would include the concordance between populations, interventions, and outcomes in the studies reviewed (on the one hand) and those to which the linkage pertains (on the other). In short, this category reflects the applicability of the evidence to real-world conditions.

The Methods Work Group expects that differences between conditions examined in studies and those addressed by the linkages should be considered if they could potentially influence outcomes. These might include (but not necessarily be limited to): (a) biologic or pathologic characteristics; (b) incidence and prevalence of clinical conditions; (c) distribution of comorbid conditions that might affect outcomes; and (d) likelihood of acceptability and adherence on the part of patients or providers (or both).

Consistency

This category relates to the overall "coherence" of the body of evidence relating to the linkage. Specifically, it includes the number of studies, the homogeneity of those studies (in terms of clinical conditions, populations, settings, and the like), the level of precision of findings in the studies, and the direction of results. In addition, it can include dose-response relationships.

APPENDIX I

Results of Survey of States

State	Most recent update	Eval/Monitor in place or planned	Content of Eval/Monitor in place or planned	Contact Person(s)
Alabama	1998	No evaluation	N/A	Mary Scisney (334) 206-2975 Jean Norris (334) 206-2971
Alaska	1998	No evaluation	N/A	Debra Caldero (907) 269-3400
Arizona	1998	Chris is in touch with someone who needs to write up a study on early discharge done through the Arizona Task Force.	N/A	Chris Rogers in AZ Dept. of Health Svs. (NB & Infant Care Program) (602) 220-6550 (602) 364-1400
Arkansas	1998	No evaluation	N/A	Donnie Smith (501) 661-2269 Dr. Dick Nugen (501) 240-7424 (cell phone)
California	1998	No evaluation	N/A	
Colorado				
Connecticut	2001	No evaluation or research planned	N/A	Kelly Adams at the legislative library. (860) 240-8410
Delaware	2001	No state evaluation Evaluation conducted by the Delaware Health Statistics Center	Average length of stay for vaginal delivery in Delaware hospitals 1994-2000	Ted Jarrell provided evaluation. Prue Albright (302) 739-4785

State	Most recent update	Eval/Monitor in place or planned	Content of Eval/Monitor in place or planned	Contact Person(s)
Florida	1998/ 2001	Required to do a study to understand the impact of early postpartum discharge and to analyze the effect of implementing the enacted legislation and practice guidelines. Areas of study mandated by SB1860; Actual volume of early discharges; Payor policies; Health effect complication rates in infants; Health effects (physical/psych) on mother; Extent of opportunity for maternal/infant care education; Physical/psych effects on family; Extent of opportunity for maternal/child psychosocial assessment; Extent of f/u care provided to mothers/nbs; Volume of readmissions and catastrophic and readmissions; Costs associated with early discharge		Kim Schafer sent cesarean data report. (850) 922-5531 Debbie Walters (850) 922-5532 General number (850) 488-8394
Georgia	1998	No evaluation	N/A	Dr. Wendy Bell, Director of Child & Adolescent Health (404) 657-2712
Hawaii*	1998	No evaluation	N/A	
Idaho	1998	No evaluation	N/A	Susan Ault in Family Planning (308) 334-5959
Illinois	1998	No evaluation	N/A	Marty Milligan (217) 782-2736 Dave Colton, Div. of Info/Eval. (217) 524-5987 Trish Egler, Div. of Epi. (217) 785-1873 Illinois Hospital Assoc. (217) 789-7272

State	Most recent update	Eval/Monitor in place or planned	Content of Eval/Monitor in place or planned	Contact Person(s)
Indiana	1998			Rick McKinn (317) 233-1254 Ed Bloom (317) 233-1252
Iowa	2001	No evaluation or research planned	N/A	Dr. Hein, Univ. of Iowa, statewide Perinatal Program 319-356-2637.
Kansas	1998	No evaluation	N/A	Rita Davenport (785) 296-1306
Kentucky	2001	No evaluation	N/A	Charlie Kindall, Health Policy (502) 564-9592
Louisiana	1998	No evaluation	N/A	Donna Sacknoff (504) 568-7730 Dr. Mami Shields (504) 568-5312
Maine	1998	Monitoring through complaints	N/A	Eugene Stanton, Health Data Org. (207) 624-8658 SueAnn Singer, Maine Health Info Center (207) 623-2555 Glen Griswold, Bureau of Ins. (207) 624-8494
Maryland	2001	Tracking LOS	Track the Infants age of time of first newborn screen	Dr. Susan Panny (410) 767-6721.

State	Most recent update	Eval/Monitor in place or planned	Content of Eval/Monitor in place or planned	Contact Person(s)
Massachusetts	2001	Mandated by legislation	To assess the implementation and impact of the early discharge regulations including (los; receipt of home visit; mothers' & providers awareness of law/regulations; decision-making regarding discharge; mother's satisfaction; impact of regulation on provider practice; impact of leg on health care delivery system	Mary Eileen O'Neill (617) 624-5280
Michigan*				
Minnesota	1998	Pilot project to evaluate home visiting effective Jan 1, 1998.	Gave grants to 2 groups to evaluate the effectiveness of universal home visiting	(Marissa) Mary Rossi, MCH (612) 623-5503
Mississippi	1998	No evaluation	N/A	

State	Most recent update	Eval/Monitor in place or planned	Content of Eval/Monitor in place or planned	Contact Person(s)
Missouri	2001 1998	No evaluation In 1996 legislation mndated data analysis 6 months before and 6 months after Jan 1, 1996.	N/A	Joe Stockbauer Center for Health Info. And Mgmt. (573) 751-6272
Montana	1998	No evaluation	N/A	Debra Hinderson (406) 444-2794 Sam Sperry, Vital Statistics (406) 444-4250
Nebraska*				
Nevada	1998	No evaluation	N/A	Gloria Deyhle, MCH (702) 687-4885 Cynthia Hiss, Nevada State Health Div. (775) 684-4250
New Hampshire	2001	No evaluation of the law conducted. The Foundation for Healthy Communities conducted a maternal satisfaction survey. Results are internal information.	N/A	Lisa McGunnigel (legal) Rachel Rowe (603) 225-0900. E-mail: rrowe@nhha.org
New Jersey	1998/ 2001		In 1996 they had done a maternal satisfaction survey to be published in JAMA. Already in MMWR.	James McGarry, Dir. of Gov. Relations (609) 292-7557
New Mexico	1998	No evaluation	N/A	Jerry Dickinson, Office of General Council (505) 827-2997
New York	2001	No evaluation	N/A	Dr. Mary Applegate (518) 474-1911

State	Most recent update	Eval/Monitor in place or planned	Content of Eval/Monitor in place or planned	Contact Person(s)
North Carolina	1998	No evaluation	N/A	Jean Livesay (919) 733-3816 Lib Moore, Div. of Women's & Children's Health (919) 715-3420
North Dakota	2001	No evaluation	N/A	Sandra Anseth, Dir. of MCH (701) 328-2493
Ohio	1998	No evaluation	N/A	Caroline Ferriman (614) 644-8389 Debbie Cheatham
Oklahoma	1998	No evaluation	N/A	Paul Patrick (405) 271-4476 x56840 Marguerite Keesee (405) 271-4476 x56922
Oregon	1998	No evaluation	N/A	Donalda Dodson (503) 731-4398
Pennsylvania	2001	No evaluation	N/A	Milo Woodward (Director of Maternal & Infant health) (717) 787-7262
Rhode Island	2001	No state evaluation. Hospital Abstracts found the avg. LOS	Vaginal: 1996: 3rd Q-44% of newborns had a LOS < 2 days 1998: 2nd Q 2.9% < 2 days Cesarean: 1996 3rd Q-55.7% < 4 days 1998: 2nd Q-10.8%< 4 days	Sam Viner-Brown (401) 222-1185 ext. 180

State	Most recent update	Eval/Monitor in place or planned	Content of Eval/Monitor in place or planned	Contact Person(s)
South Carolina	2001	1995-1996 (before law) home visits taking place profiled	Impact of Department of Health home visits evaluated.	Sarah Cooper (803) 898-0776 Khosrow Heidari sent results. (803) 545-4928
South Dakota	2001	No state evaluation.		Susan Sporrer (605) 773-3361 Kayla Tinker (605) 773-4439
Tennessee	2001	No research or evaluation planned	N/A	Debra Yoder (615) 741-0370 Deana Vaughn (receptionist) (615) 741-0370 Provided guidelines
Texas	2001	Texas Health Care Information Council, 1999 produced the Texas Hospital Inpatient Discharge Data, 1999	LOS for general vaginal delivery is 2.0 days. LOS for cesarean delivery is 3.6 days.	Marilyn Calhoun (Texas Dept. of Health) (512) 458-7111 ext. 3740 Gayle Harris (Director, Public Health Dept., TX Medical Assoc.) (512) 370-1670 Jim Loyd provided study results. (512) 482-3312
Utah*	2001			
Vermont*	2001			
Virginia	1998	No evaluation	N/A	Joan Corder-Mabe (804) 786-5916
Washington	2001	The legislation required the Health Care Policy Board to conduct an evaluation but the board was dissolved. Evaluation has been conducted by PRAMS and Post Birth Partnerships		Cherylnn Casey, Mgr MCH (360) 236-3519

State	Most recent update	Eval/Monitor in place or planned	Content of Eval/Monitor in place or planned	Contact Person(s)
West Virginia	2001	No evaluation	N/A	Diane Kopcial, Division of Women's Health (304) 558-5388
Wisconsin*	2001	N/A	N/A	
Wyoming*	2001	N/A	N/A	

* = State has no length of stay law.

APPENDIX J

PRELIMINARY Results for SACIM
LAND Study
May 20, 2001

Preliminary results are given for the first 600 cases of the LAND study. Data are available from four of the nine collection instruments: 582 (97%) Practitioner Initial Questionnaires (PracIQ), 510 (85%) Mother's Enrollment Questionnaires (MEQ), 569 (95%) Practitioner Follow-up Questionnaires (PracFQ), and 385 (64%) Mother's Follow-up Questionnaires (MFQ).

Demographic information

The **enrollment period** for these 600 cases was between 9/20/99-7/5/00.

The **participation rate** for the 20 practices that enrolled these first 600 cases was 92% (600/659). Of the 20 practices, five practices did not record any patients as being missed. The reasons for nonparticipation are as follows: refused=28, unable to approach=7, and other=18.

The **practice characteristics** for these 20 practices are:

Practice Type

5= Solo practitioner
3= Two-physician practice
6= Pediatric group
2= Multispecialty group
2= HMO staff model
1= Medical school
1= Non-government hospital

Practice Area

1= Urban, inner city
3= Urban, non-inner city
12= Suburban
4= Rural

The **maternal/infant dyad characteristics** for these 600 enrollees are:

Type of Delivery N=550 (32 missing)	N (%)
Vaginal	447 (81%)
C-section	103 (19%)

Baby Minority Status* N=555 (27 missing)	N (%)
Yes	73 (13%)
No	482 (87%)

*Non-minority is defined as white, non-Hispanic

First baby? N=508 (2 missing)	N (%)
Yes	200 (39%)
No	308 (61%)

Maternal Education N=505 (5 missing)	N (%)
8th grade or less	7 (1%)
9th-12th grade, but not high school graduate	52 (10%)
High school graduate or equivalent (GED)	110 (22%)
Some college	114 (23%)
Associate's degree/technical school graduate	66 (13%)
Bachelor's degree	102 (20%)
Graduate/professional degree	54 (11%)
Maternal education < high school? N=505 (5 missing)	
Yes	59 (12%)
No	446 (88%)

Maternal Age N=503 (7 missing)	
Mean ± SD	27.9 ± 5.9
Median ± IQR	28 ± 9
Minimum, Maximum	17, 46
Maternal Age ≤ 18? N=503 (7 missing)	N (%)
Yes	20 (4%)
No	483 (96%)

Length of Stay (LOS)

LOS was defined as the time from the baby's birth to the baby's discharge (in hours, based on pediatrician information in the PracIQ).

	Type of Delivery		
LOS (hr)	**Vaginal**	**C-Section**	**All**
N	384	88	495
Mean (SD)	39.1 (39.7)	70.2 (18.4)	44.9 (37.8)
Median (IQR)	37.8 (13.2)	69.9 (18.7)	41.6 (21.5)
Min, Max	7.5, 760.2	36.25, 137.8	7.5, 760.2

Follow-up: *Determine the proportion of newborns whose doctors recommended follow-up appointments, whether those appointments were recommended for the home vs. office setting*

PRACIQ.Q7: Did you discuss follow-up plans with parent(s)? If yes, did you recommend an appointment with the baby's doctor or home care visits? If yes, in how many days?

	n/N (%)
Discussed Follow-up Plan	577/580 (99.5%)
Either Office or Home Care Visit	541/548 (98.7%)
Office Visit	536/539 (99.4%)
Mean ± SD	9.6 ± 6.4
Median ± IQR	11 ± 11
Minimum, Maximum	0, 30
Home Care Visit	48/365 (13%)
Mean ± SD	2.9 ± 3.2
Median ± IQR	2 ± 2
Minimum, Maximum	1, 14

On the Day of Discharge, Pediatric Practitioner Assessment of Maternal and Baby Discharge Readiness: *Determine the proportion of deliveries in which the practitioner felt that the postpartum length of stay was about right, too short, or too long*

We summarize the proportion of pediatric practitioners responding that today was the right day for discharge for mother or baby, with reasons for earlier or later discharge. A joint assessment of readiness for the mother/infant dyad was calculated.Note that the reasons for suboptimal LOS are not mutually exclusive.

	From Pediatric Practitioner Perspective		
	Do you feel that today is the right day for the MOTHER to be discharged? N=561	Do you feel that today is the right day for THE BABY to leave the hospital? N=571	Do you feel that today is the right day for BOTH THE MOTHER AND BABY to leave the hospital? N=553
	N (%)	N (%)	N (%)
Yes	**532 (95%)**	**549 (96%)**	**519 (94%)**
No, should have left earlier	**2 (0.4%)**	**2 (0.4%)**	**0 (0%)**
Mother needs to care for other children at home	0	0	
Mother has concerns about insurance coverage	0	0	
Mother would have preferred it	0	0	
Mother was medically stable the prior day	2 (100%)	0	
Baby was medically stable the prior day	NA	2 (100%)	
Other	0	0	
No, should stay longer	**27 (5%)**	**20 (3.5%)**	**16 (3%)**
Mother needs more medical care for herself	7 (26%)	0	
Baby needs more medical care	2 (7%)	2 (10%)	
Mother is too tired to care for the baby or herself	5 (18.5%)	3 (15%)	
Mother does not have support at home	2 (7%)	2 (10%)	
Mother needs more education about baby care or feeding	9 (33%)	9 (45%)	
Baby does not feed well yet	5 (18.5%)	8 (40%)	
Mother does not feel comfortable with breastfeeding yet	7 (26%)	7 (35%)	
Other	2 (7%)	3 (15%)	
*Discrepancies**	NA	NA	**18 (3%)**

* Discrepancies indicate that there was a disagreement between readiness for discharge for mom and baby

Four Weeks after Discharge, Maternal Assessment of Mother and Baby Discharge Readiness: *Determine the proportion of deliveries in which the mother felt that the postpartum length of stay was about right, too short, or too long*

We summarize the proportion of mothers responding that today was the right day for discharge for mother or baby, with reasons for earlier or later discharge. A joint assessment of readiness for the mother/infant dyad was calculated. Note that the reasons for suboptimal LOS are not mutually exclusive

	From Maternal Perspective		
	Do you feel that you left the hospital on the right day for YOU? N=374	Do you feel that YOUR BABY left the hospital on the right day? N=382	Do you feel that YOU AND YOUR BABY left the hospital on the right day? N=373
	N (%)	N (%)	
Yes	**315 (84%)**	**337 (88%)**	**312 (84%)**
No, should have left earlier	**10 (3%)**	**7 (2%)**	**7 (2%)**
Mother needs to care for other children at home	6 (60%)	4 (57%)	
Mother has concerns about insurance coverage	1 (10%)	1 (14%)	
Mother would have preferred it	2 (20%)	2 (29%)	
Mother was medically stable the prior day	5 (50%)	2 (29%)	
Baby was medically stable the prior day	NA	3 (43%)	
Other	0	0	
No, should stay longer	**49 (13%)**	**38 (10%)**	**36 (10%)**
Mother needs more medical care for herself	13 (26%)	3 (8%)	
Baby needs more medical care	4 (8%)	8 (21%)	
Mother is too tired to care for the baby or herself	18 (37%)	14 (37%)	
Mother does not have support at home	5 (10%)	3 (8%)	
Mother needs more education about baby care or feeding	13 (26%)	12 (32%)	
Baby does not feed well yet	11 (22%)	10 (26%)	
Mother does not feel comfortable with breastfeeding yet	16 (33%)	14 (37%)	
Other	7 (14%)	2 (5%)	
*Discrepancies^*			**18 (5%)**

^ Discrepancies indicate that there was a disagreement between readiness for discharge for mom and baby

Health Care Utilization: *Determine the number of visits made in office, home and emergency department settings*

We provide the percent of mothers responding that their baby has had a medical visit since the baby left the hospital (through 4 weeks post-discharge). Of those responding, we summarize the number of each type of visit in those four weeks.

MFQ.Q11. Since your baby left the hospital, how many medical visits has your baby had with the following (Write "0" if no medical visits were made):

N=383-384	N (%)	Mean ± SD	Median ± IQR	Minimum, Maximum
Any	**370 (97%)**	**2.6 ± 2.1**	**2 ± 2**	**1, 23**
Doctor's office	362 (94%)	1.7 ± 0.9	2 ± 1	1, 6
Visiting nurse/Home care agency	59 (15%)	1.6 ± 1.2	1 ± 1	1, 8
Health center or clinic	31 (8%)	1.5 ± 1.4	1 ± 0	1, 8
Emergency room	21 (6%)	1.3 ± 0.7	1 ± 0	1, 4
After-hours care center	4 (1%)	1 ± 0	1 ± 0	1, 1
Outpatient clinic during regular hours	20 (5%)	2.0 ± 2.0	1 ± 1	1, 8
Breastfeeding/lactation consultant	69 (18%)	1.9 ± 1.6	1 ± 1	1, 9
Breastfeeding/lactation consultant among breastfeeding mothers only (n=311)	66 (21%)	1.9 ± 1.6	1 ± 1	1, 9

# Visits	Doctor's office	Visiting nurse/Home care	Health center / clinic	ER	After-hrs care center	Outpt clinic during regular hrs	Breastfeeding/ lactation consultant
0	21 (6%)	325 (85%)	353 (92%)	363 (94%)	380 (99%)	364 (95%)	314 (82%)
1	179 (47%)	44 (12%)	25 (6%)	17 (4%)	4 (1%)	13 (3%)	44 (12%)
2	124 (32%)	6 (2%)	4 (1%)	3 (1%)	0	4 (1%)	10 (3%)
3	43 (11%)	5 (1%)	0	0	0	1 (0.3%)	7 (2%)
4	10 (3%)	2 (0.5%)	0	1 (0.3%)	0	0	1 (0.3%)
5	3 (1%)	1 (0.3%)	1 (0.3%)	0	0	0	5 (1%)
6	3 (1%)	1 (0.3%)	0	0	0	0	1 (0.3%)
7	0	0	0	0	0	1 (0.3%)	0
8	0	0	1 (0.3%)	0	0	1 (0.3%)	0
9	0	0	0	0	0	0	1 (0.3%)

APPENDIX K

Studies of Length of Postpartum Hospital Stay and Outcomes, Grouped by Study Design

	OUTCOME											
Study Design, Author	Infant rehospitalization	Infant emergency department visits	Infant urgent outpatient visits	Other infant morbidity	Maternal rehospitalization	Maternal ED visits or urgent visits	Maternal mental health	Maternal satisfaction	Breastfeeding	Infant preventive care	Cost	**Comments**
Randomized controlled trial												
Brooten	x		x	x	x	x	x	x		1	x	1. Immunizations
Carty	x	x	x				x	x	x			
Gunn							x	x	x			
Hellman								x				
Gagnon				1			2	x	x			1. Infant weight gain; 2. Perceived competence in mothering
Waldenstrom (multiple papers)	x				x			x	x		x	
Interrupted time-series												
Madden, in progress	x	x	x		x	x			x			
Meara, in progress	x	x	x		x	x						

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Study Design, Author	OUTCOME											
	Infant rehospitalization	Infant emergency department visits	Infant urgent outpatient visits	Other infant morbidity	Maternal rehospitalization	Maternal ED visits or urgent visits	Maternal mental health	Maternal satisfaction	Breastfeeding	Infant preventive care	Cost	Comments
Time series												
Arthurton	x			x								
Kotagal (JAMA 1999)	x	x	1									1. Infant primary care visits
Lee	x			1								1. Severity of jaundice and dehydration at readmission
Liu	x											
Marbella	x										x	
Sacchetti	x	x										
Pre- and post-intervention study												
Behram	x				x							
Bragg	x											
Cooper	x	x	x									
Dalby	x	1	1		x	1	1	x				1. Visit to doctor, after hours clinic or ED
Gries	x	x	x					x				
Kotagal (J Pediatr 1997)	x	x										
Mandl (Pediatrics 2000)		x	x									
Strong					x	x						

Studies of Length of Postpartum Hospital Stay and Outcomes, Grouped by Study Design

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	Infant rehospitalization	Infant emergency department visits	Infant urgent outpatient visits	Other infant morbidity	Maternal rehospitalization	Maternal ED visits or urgent visits	Maternal mental health	Maternal satisfaction	Breastfeeding	Infant preventive care	Cost	Comments
Other controlled non-randomized study (eg, matched control)												
Arborelius								x	x			
Hunter								x				
Patterson								x				
Norr							x	x				
Pittard	x											
Prospective cohort												
Avery	x		x		x	x		x				
Beck							x					
Britton									x			
Brumfiel	x		x		x	x					x	
Gazmararian (Health Affairs 1997)	x							x				

Studies of Length of Postpartum Hospital Stay and Outcomes, Grouped by Study Design

	OUTCOME											
Study Design, Author	Infant rehospitalization	Infant emergency department visits	Infant urgent outpatient visits	Other infant morbidity	Maternal rehospitalization	Maternal ED visits or urgent visits	Maternal mental health	Maternal satisfaction	Breastfeeding	Infant preventive care	Cost	**Comments**
Lane	x	x	x	x				x	x			
Lemmer				1				x				1. Infant and maternal morbidity; contact with health care providers
Lock	x											
Mandl (Arch Pediatr 1997)	x	x	x		x	x	x	x	x			
Welsh	x				x							
Welt	x			1	x	x						1. Significant problems
Retrospective cohort												
Berryman	x				x							
Britton	x											
Conrad	x											
Danielsen	x											
Foster	x											
Fox	x											

Studies of Length of Postpartum Hospital Stay and Outcomes, Grouped by Study Design

	OUTCOME											
Study Design, Author	Infant rehospitalization	Infant emergency department visits	Infant urgent outpatient visits	Other infant morbidity	Maternal rehospitalization	Maternal ED visits or urgent visits	Maternal mental health	Maternal satisfaction	Breastfeeding	Infant preventive care	Cost	Comments
Gazmararian (Health Affairs 1996)	x											
Malkin (Health Serv Res 2000)	x											
Malkin (Obstet Gynecol 1999)				x								
Massachusetts Dept of Public Health								x				
Rhodes	x				x							
Rollins	x											
Williams	x				x							
Case-control												
Beebe				x								
Edmonson	x											
Grupp-Phelan	x											
Liu	x											
Maisels	x											
Soskolne	x											

Studies of Length of Postpartum Hospital Stay and Outcomes, Grouped by Study Design

	OUTCOME												
Study Design, Author **Case series**	Infant rehospitalization	Infant emergency department visits	Infant urgent outpatient visits	Other infant morbidity	Maternal rehospitalization	Maternal ED visits or urgent visits	Maternal mental health	Maternal satisfaction	Breastfeeding	Infant preventive care	Cost	Comments
Brown	x											
Cooper	x								x			
Finkelstein								x				
Fishbein								x	x			
Frank-Hanssen	x											
Graven	x											
Heimler	x											
Keppler, 1995	x							x			x	
Keppler, 1999	x							x			x	
Klingner								x				home health visits
Gjerdingen								x				
Maisels												kernicterus
MacDonald												kernicterus
Millar		x										
Raube	x										x	
Taniguchi	x	x	x	x	x	x	x	x				
Waldenstrom								x				