KAS 11a

Benefits of testing	Early detection of bacterial meningitis.
	Detection of CSF pleocytosis or elevated protein attributable to HSV infection.
	Early treatment may decrease neurologic morbidity.
	Identification of pathogen from CSF to target type and duration of antimicrobial treatment.
	A normal CSF analysis helps in the decision whether to discharge infants at 24–36 h.
	Avoids unnecessarily prolonged antimicrobial therapy if CSF was obtained after antimicrobial agents started and diagnosis of meningitis is uncertain. This situation may occur if a blood culture grows a pathogen in 24 h and clinical circumstances suggest an LP is indicated.
Benefits of not testing	Avoids consequences of LP: discomfort or harm.
	Avoids further medical interventions because of false-positive results from CSF pleocytosis or bacterial contaminants.
	Avoids unnecessary or prolonged hospitalizations because of false-positive culture results.
	Avoids cost of procedure and unnecessary hospitalization.
	Avoids transient respiratory compromise resulting from positioning.
Risk, harm, cost of testing	Discomfort for infant.
	Potential for transient respiratory compromise during positioning for LP.
	Traumatic LPs yielding uninterpretable CSFs have been documented to prolong length of stay for hospitalized infants.[132]
	Unnecessary prolongation of hospitalization from false-positive bacterial culture result.
	Substantial cost if hospitalizing because of ambiguous CSF or prolonged hospitalization for bacterial contaminant.
	Parental anxiety.
Risks, harm, cost of not testing	In otherwise low-risk infants, delayed recognition of bacterial meningitis with increased risk of morbidity.
	Prolonged treatment if delay in obtaining CSF raises concern for partially treated meningitis.
Benefit–harm assessment	Benefit in specified situations.
Shared decision-making	Parents must provide consent for this procedure. An option by the committee to not obtain CSF for analysis is based on a consensus regarding the rate and risks of meningitis and benefit–harm assessment. Parents should be sufficiently informed to participate in this decision.
Key references	17–20, 22, 60, 148

Because the prevalence of bacterial meningitis, along with the prevalence of bacteremia, declines in 22- to 28-d-old infants, the committee's tolerance for this risk resulted in a recommendation that differs from the one for 8- to 21-d-old infants.

results are not reported in a timely fashion, the committee recommends using a fever of >38.5°C in combination with other IMs for purposes of risk stratification.

KAS 11a

Clinicians may obtain a CSF analysis on infants 22 to 28 days of age even if all of the following criteria are met:

1. urinalysis result is negative or positive;
2. no IM obtained is abnormal;
3. blood and urine cultures have been obtained; and
4. infant is hospitalized. (Table 13)

Evidence Quality: B; Moderate Recommendation

There are insufficient data to estimate the probability of meningitis in this age group if only 1 IM is abnormal or if only a urinalysis result is positive. Almost all current decision rules and models rely on a combination of at least 2 IMs and a urinalysis to define risk.

Recent studies from primary care and EDs document LPs in infants <28 days of age being performed in 60% to 82% of evaluations. There is wide regional variation ranging from 10.7% to 31.3% of infants going without an LP.[23,24,148] With recent data, Kaiser Northern California documents 39% of 7- to 28-day-old infants with fever did not undergo LP. Infants evaluated in the ED were 5 times more likely to have an LP than those evaluated in the office.[22] There were no reported cases of delayed recognition of bacterial meningitis in settings in which LPs were not universally performed.

In infants <28 days of age, none of the 21 cases of bacterial meningitis in the PROS, PECARN, and step-by-step studies were missed (sensitivity 100%; CI, 84%–100%). Using a bacterial meningitis prevalence in 22- to 28-day-old infants of 0.39[22] or 0.46[94] or ~1 in 200 to 250 and the lower end of the sensitivity CI (84%) suggests 1250 to 1560 interpretable CSF samples would be required to detect each additional case of bacterial meningitis (number needed to test = 1250–1560). Without procalcitonin, these studies detected 14 of 14 cases of bacterial meningitis (95% CI, 80%–100%), indicating a number needed to test of 1000 to 1250.

Researchers in a few studies have addressed a positive urinalysis result or UTI as a risk factor for meningitis. Data for 22- to 28-day-old infants are limited, as are data for UTI without abnormal IMs. For infants 7 to 30 days of age in the Reducing Variability in the Infant Sepsis Evaluation study of 1281 infants with positive urinalysis results who had an LP performed, 0.8% were treated for bacterial meningitis.[149] This was similar to the 1.0% of the 4644 infants with negative results on the urinalysis. The data also indicated that none of the 98 infants with positive urinalysis results did not have an LP ultimately had meningitis detected. Similarly, in an outpatient study of 100 infants with UTI <30 days of age, researchers found no cases of meningitis.[150] However, in both of these studies, the lower limits of the CI indicates up to 4% could be missed.