Laboratory Screening for Children Entering Foster Care

Mary V. Greiner, MD, MS,[a] Sarah J. Beal, PhD,[a] Katie Nause, BS,[a] Mary Allen Staat, MD, MPH,[a] Judith W. Dexheimer, PhD,[a] Philip V. Scribano, DO, MSCE[b]

abstract

OBJECTIVES: To determine the prevalence of medical illness detected by laboratory screening in children entering foster care in a single, urban county.

METHODS: All children entering foster care in a single county in Ohio were seen at a consultation foster care clinic and had laboratory screening, including testing for infectious diseases such as HIV, hepatitis B, hepatitis C, syphilis, and tuberculosis as well as for hemoglobin and lead levels.

RESULTS: Over a 3-year period (2012–2015), laboratory screening was performed on 1977 subjects entering foster care in a consultative foster care clinic. The prevalence of hepatitis B, hepatitis C, syphilis, and tuberculosis were all found to be <1%. There were no cases of HIV. Seven percent of teenagers entering foster care tested positive for *Chlamydia*. A secondary finding was that 54% of subjects were hepatitis B surface antibody–negative, indicating an absence of detected immunity to the hepatitis B virus.

CONCLUSIONS: Routine laboratory screening for children entering foster care resulted in a low yield. Targeted, rather than routine, laboratory screening may be a more clinically meaningful approach for children entering foster care.

[a]*Department of Pediatrics, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio; and* [b]*Department of Pediatrics, Children's Hospital of Philadelphia, Philadelphia, Pennsylvania*

Dr Greiner made substantial intellectual contributions in designing the study, acquiring the data, analyzing and interpreting the data, and drafting the article and was a part of the Academic Pediatric Association Research Scholars Program and received critical recommendations and feedback throughout the process of this study; Drs Beal and Dexheimer made substantial intellectual contributions in acquiring the data, analyzing and interpreting the data, and drafting the article; Ms Nause made substantial intellectual contributions in acquiring the data and analyzing the data; Dr Staat made substantial intellectual contributions in designing the study, analyzing and interpreting the data, and drafting the article; and Dr Scribano made substantial intellectual contributions in designing the study and reviewing the article and was the Academic Pediatric Association Research Scholars Program national mentor for Dr Greiner on this project; and all authors approved the final manuscript as submitted.

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Address correspondence to Mary V. Greiner, MD, MS, Department of Pediatrics, Cincinnati Children's Hospital Medical Center, 3333 Burnet Ave, ML 3008, Cincinnati, OH 45229. E-mail: mary.greiner@cchmc.org

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WHAT'S KNOWN ON THIS SUBJECT: Children entering foster care are at increased risk for medical illness. It is unclear if routine laboratory screening is useful for this population.

WHAT THIS STUDY ADDS: Routine laboratory screening is low yield for children entering foster care. Targeted laboratory screening may be a more clinically meaningful approach.

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US child welfare agencies hold legal custody of ~430 000 children.[1] Children in foster care have more medical, behavioral, and developmental problems than the general population.[2–5] This is compounded by incomplete medical records and uncoordinated, discontinuous medical care.[6,7]

To address medical concerns, most states mandate a medical examination when children enter foster care.[8,9] Standards for this medical examination are unclear, but published guidance is available. One important resource is the American Academy of Pediatrics (AAP) Healthy Foster Care America, created to "improve the health and well-being outcomes of children and teens in foster care."[10] This 2005 initiative was a sentinel effort to identify the medical needs of this high-risk population and provide guidance to assist the health care professionals who care for these children in the absence of other evidence-based practices. Disease screening by laboratory testing was included because a positive test result, although generally rare, can trigger interventions, leading to substantial improvements in health and wellbeing.[11] Healthy Foster Care America recommended routine[12] screening for the hepatitis B virus (HBV), hepatitis C virus (HCV), tuberculosis (TB) (>3 months of age), and syphilis. HIV screening was recommended for at-risk children. Hemoglobin concentrations were recommended for all children, and lead levels were recommended for children between 6 months and 6 years old.[13] Because research in this population is limited, recommendations were derived from expert opinion[14] and research in high-risk adult populations (eg, incarcerated and substance-abusing adults[15,16]). For sexually active adolescents, sexually transmitted infection screening guidelines from the AAP[17] and the Centers for Disease Control and Prevention (CDC)[18] are also applicable. Even with Healthy Foster Care America recommendations and other AAP policies, there is a lack of clarity around the utility of laboratory screenings for children entering foster care. In the context of high-value, cost-conscious care,[19–21] evaluating practice is important and necessary. The objectives of this study were to determine the prevalence of medical illness detected by routine laboratory screening in a pediatric population entering foster care and to evaluate the clinical utility and financial costs of laboratory screening.

METHODS

This retrospective study of electronic health record (EHR) data from 2012 to 2015 was approved by the hospital's institutional review board. Subjects were included if they were <21 years old, in the legal custody of the local county child welfare agency, and seen at the Foster Care Clinic (FCC).

The FCC uses a consultation model[22] designed with the local Ohio child welfare agency to evaluate every child entering foster care in 1 county. Children are seen within 5 days of entering foster care and again 1 to 2 months later. The process repeats with every placement change. The first FCC visit includes record review, history taking, physical examination, and laboratory screening to test for HBV, HCV, and syphilis in all children and TB in children >3 months of age. Because there is no consensus on HIV risk-assessment tools, and foster care status could be considered high risk, all patients receive HIV testing. Hemoglobin concentrations and lead levels (in subjects 6 months to 6 years old) are obtained. Laboratory tests available in the EHR and completed within a year of placement in foster care were reviewed and not repeated unless clinically indicated. Laboratory tests that were not obtained at the first FCC visit (ie, unable to obtain blood, purified protein derivative [PPD] not read, etc) were obtained at a subsequent visit.

Gonorrhea and *Chlamydia* screening was obtained in sexually active youth 12 years and older on the basis of screening guidelines from the AAP[17] and the CDC[18] for sexually active girls and high-risk sexually active boys. All sexually active boys were screened because adolescents in foster care are considered high risk.[23] Guidelines for pregnancy screening in foster care were unavailable; pregnancy tests were obtained in sexually active girls to facilitate distributing hormonal contraception.[24]

Laboratory Screening Methods

Table 1 provides laboratory screening methodology.[18,25,26] Screening is obtained regardless of immunization status. Any child found to have negative results for hepatitis B surface antigen, core antibody, and surface antibody testing was considered nonimmune to HBV even with documented vaccination (Table 1). For these youth, a reimmunization plan was initiated. For elevated lead levels, 2 cutoffs were included: a cutoff of 0.84 μg/dL, which is the mean blood lead level from the NHANES 2013–2014, and 3.5 μg/dL, which is the 97.5% level.[27,28] Hemoglobin concentrations were evaluated on the basis of age norms and according to the hospital laboratory reference ranges.[29] Information on the treatment of anemia and elevated lead levels in this sample is unavailable.

Data Collection

Demographic and order data from FCC patient visits were extracted from the EHR with electronic order entry. If subjects were seen at the FCC more than once, data from the first encounter were used. Demographic data were collected at

TABLE 1 Laboratory Screening Methods

Laboratory	Method	Notes
Hepatitis B screening	CMIA testing for hepatitis B surface antigen, surface antibody, and core antibody	Current hepatitis B infection was diagnosed when the hepatitis B surface antigen and core antibody were positive. Past, recovered hepatitis B infection was diagnosed when the hepatitis B core antibody and surface antibody were positive. If only the HepBSAb was positive, this was considered a demonstration of immunity from hepatitis B immunization. If all test results were negative, then the child was considered susceptible and nonimmune, and an immunization plan was made.
Hepatitis C screening	Hepatitis C antibody test, a CMIA for the detection of antibody to HCV	A positive-antibody test result reflexed to a hepatitis C RNA quantitative PCR test for confirmation.
Syphilis screening	RPR, a qualitative test for nontreponemal antibodies using carbon particle cardiolipin antigen methodology, or syphilis EIA, an ELISA methodology to detect IgM and IgG antibodies against *Treponema pallidum*	All positive-EIA test results had reflex RPR tests, and all positive-EIA and RPR test results had a confirmatory test done by particle agglutination test with specific qualitative detection of antitreponemal antibodies (TP-PA). In August 2014, our laboratory changed the standard screen from the RPR to EIA because of a syphilis epidemic in our county, following CDC recommendations.[19]
HIV screening	Fourth-generation HIV antigen and/or antibody screen, uses CMIA methodology designed to detect p24 antigen and antibodies to HIV type 1 (group M and group O) and type 2	Positive test results reflexed to the HIV-1 and HIV-2 antibody differentiation immunoassay. If the antibody differentiation testing result was negative or indeterminate, quantitative PCR testing was added. This multitest algorithm is consistent with CDC recommendations.[21]
TB screening	For children <5 years old, PPD TST performed by injecting 0.1 mL of tuberculin PPD intradermally into the inner surface of the forearm. For children older than 5 years, the Quantiferon-TB Gold test, a cell culture and semiquantitative ELISA methodology, to detect interferon γ release	The TST was read 48 h to 72 h after administration by measuring millimeters of induration. Children receiving a TST were considered medium risk because of age and exposure to adults in high-risk categories, therefore, induration of 10 mm or more was considered positive.[22] Quantiferon-TB Gold testing provides a qualitative result (negative, positive, or indeterminate) based on interpretation of measured interferon γ release from the venous blood samples. Indeterminate results were repeated.
Gonorrhea and *Chlamydia*	Urine DNA studies, methodology was a transcription mediated amplification to detect the presence of nucleic acid of *Chlamydia trachomatis* and/or *Nesisseria gonorrheae*	Confirmation testing was not reflexively performed but was independently ordered and performed for children with concern for sexual abuse.
Pregnancy test	Qualitative chromogenic urine test for human chorionic gonadotropin	Not applicable.
Lead testing	Venous samples using electrochemistry with gold sensor	Reflex to graphite furnace atomic absorption spectroscopy for levels >4.9 μg/dL.
Hemoglobin	Complete blood count, determined by flow cytometry, fluorescence, and absorption spectrophotometry	Chosen over a finger stick because venipuncture was already performed for the other tests.

Adapted from Weinberger SE. Providing high-value, cost-conscious care: a critical seventh general competency for physicians. *Ann Intern Med.* 2011;155(6):386–388. CMIA, chemiluminescent microparticle immunoassay; EIA, enzyme immunoassay; ELISA, enzyme-linked immunosorbent assay; IgG, immunoglobulin G; IgM, immunoglobulin M; RPR, rapid plasma reagin; TP-PA, treponema pallidum particle agglutination assay; TST, tuberculin skin test.

registration during the first patient encounter with the hospital, typically before FCC visits. Demographic data not in the EHR were collected from foster youth or the accompanying adult at the FCC visit. Laboratory data reviewed or ordered at the initial FCC encounter were included. No data were collected from child welfare records.

Billing data were collected from the EHR and codified by using current procedural terminology codes. All children were insured through Medicaid; Ohio 2016 Medicaid reimbursement rates were used to calculate payment per test. This does not reflect the true cost associated with performing the test, nor does it include professional fees associated with the tests.

Data Analysis

Subjects were dichotomized into 2 groups, <12 and ≥12 years of age, because of increased risks of sexually transmitted infections in adolescents.

Because vertical transmission of maternal HCV antibodies is common and does not necessarily indicate disease,[30] subjects were dichotomized into groups of <18 and ≥18 months of age for HCV testing. Subjects who tested positive for HCV antibodies before 18 months of age had laboratories repeated after 18 months of age, when maternal HCV antibodies are expected to clear[31] (Fig 1).

Descriptive statistics were calculated to understand rates of testing stratified by age. Test frequencies and positive test results were used to calculate the percent of positive and false-positive laboratory results. Relevant laboratory result ranges were also reported.

RESULTS

The study county includes 804 520 people: 68% white and 26% African American, and 26% of children live in poverty. On January 1, 2014, 1434 children were in child welfare custody.[32] During the study period,

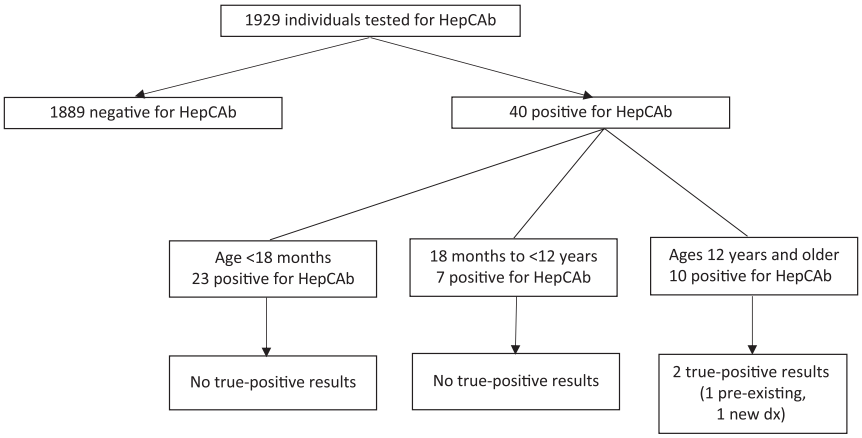

FIGURE 1
Testing for hepatitis C. dx, diagnosis; HepCAb, hepatitis C antibody.

TABLE 2 Testing Rates for Youth in Foster Care by Type of Test and Age

	<12 y		≥12 y		Overall	
	Tested	Positive	Tested	Positive	Tested	Positive
Hepatitis B						
Immunity	1284	714	645	177	1929	891
Current infection	1277	3	641	1	1918	4
Hepatitis C						
Antibody screen	1285	30	644	10	1929	40
Confirmed infection	30	0	10	2	40	2
Syphilis						
RPR, EIA screen	1289	1	645	3	1934	4
Confirmed infection	1	0	3	1	4	1
HIV						
Ag/Ab screen	1283	2	636	0	1919	2
Confirmed infection	2	0	0	0	2	0
TB						
Latent TB (PPD)	340	0	63	1	403	1
Latent TB (Quantiferon)	514	2	485	6	999	8
TB by chest radiograph	2	0	7	0	9	0
Elevated lead level	640	81	0	—	640	81
Anemia	1206	51	592	35	1798	86
Gonorrhea	19	2	561	4	580	6
Chlamydia	19	2	562	37	581	39
Pregnancy	0	—	142	6	142	6

For hepatitis C, 40 youth (30 who were <12 y and 10 who were ≥12 y) initially screened positive and were tested to confirm infection. Of those, only 2 tested positive. For syphilis, 4 youth initially screened positive and were tested to confirm infection. Of those, 1 tested positive and was subsequently treated. For HIV, 2 youth initially screened positive and were tested to confirm infection. Of those, none tested positive. For TB, 8 youth initially tested positive with Quantiferon, and 1 youth tested positive with PPD. All subsequently had chest radiographs to confirm diagnosis; none had TB by chest radiograph. EIA, enzyme immunoassay; RPR, rapid plasma reagin; —, not applicable.

1977 unique subjects completed an evaluation at the FCC. Subject ages ranged from 0 to 21 years ($Mean_{age}$ = 8.7), and 1317 (66.9%) were <12 years old. The population was 54% boys, and the racial and/or ethnic distribution was 51% African American, 35% white, 2.7% Hispanic, and 14% other or unknown. With the exception of race and/or ethnicity, clinic demographics reflect national child welfare demographics ($Mean_{age}$ = 8.7 years, 52% boys, 24% African American, 42% white, 22% Hispanic, and 14% other or unknown).[1]

During the study period, 16 754 laboratory screening tests were performed, and 1193 children (60%) had at least 1 laboratory abnormality (Table 2). The most common was a negative result for hepatitis B surface antibody (HepBSAb) testing, which indicates an absence of detected immunity to HBV (see Table 1 for an interpretation).

Children <12 Years Old

Among children <12 years of age, 690 (52%) had at least 1 laboratory abnormality. The most common was a negative result for HepBSAb testing (570 of 1284 subjects, 44%).

HCV was the most common positive laboratory result (30 [2.3%] of 1285 individuals tested; Fig 1). Subjects with a positive-HCV antibody result had confirmatory polymerase chain reaction (PCR) testing; no patients had true infection. The false-positive rate in these subjects was 100%.

Two of 514 subjects tested positive for TB (0.39%). Both subjects had a positive-Quantiferon test, a negative chest radiograph, were diagnosed with latent TB, and were treated.

No new infections of HIV, hepatitis B, or syphilis were diagnosed. Two false-positives for HIV (0.16% of the 1283 tested) were identified by a positive-HIV antigen/antibody screen with a negative HIV-1 and HIV-2 antibody differentiation immunoassay and negative quantitative PCR. Three of 1277 patients (0.23%) had false-positives for HBV resulting from positive-hepatitis B surface antigen results shortly after receiving the HBV immunization. All were retested and had negative results. One of 1289 tested patients (0.07%) was false-positive for syphilis, with a positive-enzyme immunoassay result and a negative treponema pallidum particle agglutination assay result.

Of 1206 subjects receiving hemoglobin testing, 51 (4.2%) were anemic. Hemoglobin values ranged from 9.1 to 17.3 g/dL (Mean = 12.8 g/dL).

Blood lead levels ≥3.5 μg/dL (≥97.5%) were detected in 17 of 640 patients tested (2.7%) between 6 months and 6 years of age. The highest risk was in children ages 2

years to 3 years of age (3.2%), with levels up to 32.8 μg/dL (Table 3).

Children 12 Years and Older

In subjects ≥12 years of age, 504 of 660 (76%) had at least 1 laboratory abnormality. The most common was a negative HepBSAb test result (468 of 645, 73%).

Chlamydia was identified in 37 (6.6%) of 562 subjects tested. Four subjects had positive-gonorrhea test results (4 of 561, 0.71%).

Ten subjects had positive-HCV antibody results (10 of 644, 1.6%). Two subjects had true infection confirmed by PCR (80% false-positive rate).

Three of 645 subjects tested for syphilis were positive (0.5%); 2 were false-positive. One true HBV infection was detected (hepatitis B surface antigen–positive, hepatitis B core antibody–positive, and HepBSAb–negative) among 641 subjects tested (0.16%), with no false-positives.

Seven of 548 subjects tested positive for TB (1.3%); all were diagnosed with latent TB after a negative chest radiograph and treated.

There were no positive-HIV test results among 636 subjects tested.

Thirty-five of 592 subjects (5.9%) were identified as anemic. Hemoglobin ranged from 4.4 to 18.7 g/dL, with an average of 14.2 g/dL.

Of the 142 girls receiving pregnancy tests, 6 (4.2%) were positive. One was previously aware of her pregnancy.

Payments associated with laboratory screenings are provided in Table 4. The 16 754 laboratory tests billed to Medicaid accounted for a total payment of $370 214; $349 122 (94%) were associated with negative or normal findings.

TABLE 3 Lead Levels Among Subjects 6 Months to 6 Years of Age

Age	Tested, *n*	With >0.84, *n* (%)	With >3.5, *n* (%)	With >5.0,[a] *n* (%)	Maximum Value for Lead Level (μg/dL)
6–12 mo	79	14 (17.7)	2 (2.5)	1 (1.3)	8.4
12–18 mo	60	7 (11.7)	1 (1.7)	1 (1.7)	7.3
18–24 mo	66	8 (12.2)	2 (3.0)	2 (3.0)	9.4
2–3 y	126	18 (14.3)	4 (3.2)	2 (1.6)	32.8
3–4 y	112	12 (10.7)	3 (2.7)	2 (1.8)	20.8
4–5 y	88	10 (11.4)	2 (2.3)	1 (1.1)	6.8
5–5.9 y	109	12 (11.0)	3 (2.8)	3 (2.8)	28.8

[a] Level >5.0 included to reflect 2008–2012 CDC recommendations.

DISCUSSION

The utility of routine laboratory screening for children entering foster care is unclear.[13,14] This is the first study in which researchers describe results of routine laboratory screening in this population. Eighty-six children (4.8% of those screened) were identified with anemia, 17 children (2.6%) were identified with lead levels ≥3.5 μg/dL, and 57 children (2.9%) were identified with infectious disease.

Reported anemia rates in foster care children <6 years old range between 1.8%[3] and 10%.[33] This study's anemia rates fall within those rates (4.2% for children <12 years old; 5.9% for children ≥12 years old) and are higher than the national anemia rate.[34,35] The Bright Futures Guidelines for Health Supervision of Infants, Children, and Adolescents recommend hemoglobin testing for all children at age 12 months and risk assessments at subsequent well-child checks[36]; the CDC recommends screening female adolescents for anemia every 5 years and risk assessments yearly.[35] Children in foster care are less likely to receive well-child care,[7] thus, laboratory assessments for anemia at the time of entry into foster care seem appropriate for all children in foster care.

Elevated lead levels (≥3.5 μg/dL) have been identified in 2.7% of children 6 months to 6 years of age, similar to previously reported rates in a foster youth population (2.6%, cutoff not reported)[3] but lower than the rates for the county of this study (6.3%, using a higher cutoff of 5 μg/dL).[37] Children ages 2 years to 3 years had the highest rates of elevated lead levels (3.2%). Although the reasons for elevated lead levels in this sample are unknown and could be related to lead exposures in the study county, it is possible that residential instability in the population, both before and after entry into foster care, may result in increased opportunity for exposure. It is possible that lead levels for this study are actually higher than reported because of the use of the LeadCare machine, which read falsely low and was recalled.[38] Elevated lead levels, although typically asymptomatic, can lead to neurocognitive deficits, and no safe threshold is established.[39] For this reason, Bright Futures recommends testing for all children at ages 12 months and 24 months.[36] Because children entering foster care are less likely to have received routine well-child care,[7] the rates of elevated lead levels found in this study emphasize the value of screening children 6 months to 6 years of age at the time of entry into foster care.

The prevalence of infections except gonorrhea and *Chlamydia* (eg, HIV, HBV, HCV, syphilis, and TB) was <1%, with a Medicaid payment of >$200 000. This is despite the county of study having the highest sexually transmitted infection rate in the state, with 362 per 100 000 people diagnosed with HIV[40] (US average is 353), 0.1 per 100 000 diagnosed annually with HCV (US average is 0.3), 9.3 per 100 000 diagnosed annually with syphilis (US average is

TABLE 4 Billing and Price Information for Laboratory Tests Performed

Test Name, Description	CPT Code	2016 Ohio Medicaid Reimbursement, $	Total Tested			
			N	Positive	Negative, Normal	Medicaid Reimbursement, $
Hepatitis B						
Hepatitis B Surface Antibody	86706	14.39	1929	1038	891	27 758.31
Hepatitis B Core Antibody	86704	16.16	1918	7	1911	30 994.88
Hepatitis B Surface Antigen	87340	12.47	1918	4	1914	23 917.46
Hepatitis C						
HepCAb	86803	17.66	1929	40	1889	34 066.14
PCR	87522	57.42	40	2	38	2296.80
Syphilis						
EIA	86780	17.29	613	1	612	10 598.77
RPR	86592	5.72	1321	3	1318	7556.12
TP-PA	86780	17.29	4	1	3	69.16
HIV						
Antigen, antibody	87389	31.45	1919	2	1917	60 352.55
PCR	87535	45.83	2	0	2	91.66
TB						
TST (PPD)	86580	7.00[a]	403	1	402	2821.00[a]
Quantiferon	86480	83.99	1006	8	998	84 493.94
Chest radiograph	71020	28.03[a]	9	0	9	252.27[a]
Venous lead level	83655	16.22	640	81	559	10 380.80
Hemoglobin	85025	10.42	1798	86	1712	18 735.16
Gonorrhea Transcription Mediated Amplification	87591	47.05	580	6	574	27 289.00
Chlamydia Transcription Mediated Amplification	87491	47.05	581	39	542	27 336.05
Urine pregnancy	81025	8.48	142	6	136	1204.16

Reimbursement estimates do not include professional fees. CPT, current procedural terminology; EIA, enzyme immunoassay; HepCAb, hepatitis C antibody; RPR, rapid plasma reagin; TP-PA, treponema pallidum particle agglutination assay.

[a] Price data from 2015 Medicare Clinical Diagnostic Laboratory Fee Schedule.

3.9), and 2.7 per 100 000 diagnosed annually with TB (US average is 4.6).[41] As a result of routine screening, 46 children (2.3%) had false-positive results for infectious disease. This raises questions about the benefit of routine screening.

The CDC recommends routine HIV screening in settings where prevalence is >0.1%.[42] This study's prevalence rate was 0% (95% confidence interval = 0–0.006). CDC recommendations would deem routine HIV screening unnecessary unless additional HIV risk factors are present.[42] Clinicians should use their best judgment for screening in their populations, in which rates may differ.

Researchers in a 1998 study in California found a <1% positive-TB PPD rate in children ages 12 and younger, and a 12% positive-PPD rate in children ages 13 years to 18 years entering foster care.[33] Our study's latent TB rate was 1.1% and may reflect a lower percentage of Hispanic patients (2.7% compared with 18%) and decreased exposure to immigrants or travelers to Latin America.[43]

One patient (0.05% of those tested) tested positive for HBV. Fifty-four percent of children tested negative for HepBSAb. Negative-HepBSAb results may indicate susceptibility to HBV despite vaccination.[44] When susceptibility is established, reimmunization is recommended with a booster vaccination and retesting to demonstrate seroconversion.[45] Children are not routinely screened for HBV susceptibility,[46] and research suggests that HBV vaccination induces immunologic memory for HBV, resulting in ongoing protection even after the antibody declines.[47] The laboratory screening in this study resulted in a 54% reimmunization rate, highlighting potential unnecessary immunizations after laboratory testing.

Chlamydia and gonorrhea testing is recommended by the AAP[17] and the CDC[18] for sexually active adolescent girls and high-risk sexually active adolescent boys. The rate of 6.6% for *Chlamydia* and 0.7% for gonorrhea among youth 12 years and older is higher than the general population.[48] The study county reports 313 per 100 000 people diagnosed with gonorrhea (US average is 101) and 796 per 100 000 people diagnosed with *Chlamydia* (US average is 426),[41] indicating increased prevalence in the community. Screening for sexually transmitted infections at the time of entry into foster care is particularly important because adolescents are not routinely receiving recommended annual sexually transmitted infection screening,[48–50] are often

disconnected from primary care,[7] and have more high-risk sexual behaviors.[17,51]

Routine screening is generally accepted when screening tools are sensitive and specific and early detection improves outcomes. Screening program costs must be reasonable in relation to anticipated benefits.[11] Although we are unable to provide a cost-benefit analysis for each screening test, we were able to provide a cost-identification analysis using published Medicaid payment rates applied to the existing literature on screening and treatment costs of infectious diseases. Examples of higher-yield and lower-yield screens illustrate how clinicians can use this study's results to inform their clinical decisions on screening. Screening 581 foster youth for *Chlamydia* resulted in Medicaid payments summing $27 336; 39 positive cases were identified, resulting in $700 for each positive case. Diagnosis and treatment of *Chlamydia* in an office visit is estimated to cost $109.[52] Untreated, *Chlamydia* can result in pelvic inflammatory disorder, ectopic pregnancy, and infertility. Pelvic inflammatory disorder treatment costs range from $701 if diagnosed and treated in the outpatient setting to $1382 if treated in the emergency department,[53] suggesting that the cost associated with diagnosing and treating *Chlamydia* in this sample is less than the cost of failing to diagnose and treat infection. By comparison, the payment was $9730 per case of latent TB identified in this sample, and latent TB treatment cost is estimated between $236 and $1841,[54] resulting in a total estimate of $14 000 per case of latent TB or $126 000 for the 9 cases identified. Of individuals with untreated latent TB, ~10% develop active TB.[54] If the 9 latent TB cases went untreated, we would anticipate 1 could develop active TB. The cost of treating 1 active TB case ($13 247[54]) would still be less than the cost of routine screening. More targeted screening of TB could be fiscally appropriate.

This study of foster youth from 1 county in Ohio may not be generalizable to other foster care populations. Rates of infectious disease are sufficiently low, so it is not a surprise that no cases were identified. Across socioeconomic indicators, this county is slightly more impoverished than the general US population.[55] The county has the highest sexually transmitted infection rate in the state, and county level data suggest that most conditions (with the exception of TB) are overrepresented in this county compared with national averages.[41] Findings should be cautiously applied to communities with differing infection prevalence. Further, this study included foster youth for whom the FCC received a referral from the child welfare agency. However, 11.4% of referrals were not seen in the clinic, primarily because of unsuccessful contact and failure to attend visits. Infection rates may be higher in those youth. These limitations may impact generalizability for the highest-risk foster youth. It is difficult to directly compare cost, charges, and payments; these data represent estimates only.

CONCLUSIONS

The yield of laboratory screening in this sample of youth entering foster care was low and costly. Targeted screening may be more beneficial for youth entering foster care. High-impact screening may include lead levels for children <6 years old, hemoglobin screens, sexually transmitted infection testing in children 12 years and older, and HBV testing if determining potential failure to seroconvert is needed. Targeted infection screening should take local prevalence rates and other clinical indications into account. Replicating this work with other foster care populations and developing an algorithm for targeted screening are important areas for future research.

ABBREVIATIONS

AAP: American Academy of Pediatrics
CDC: Centers for Disease Control and Prevention
EHR: electronic health record
FCC: Foster Care Clinic
HBV: hepatitis B virus
HCV: hepatitis C virus
HepBSAb: hepatitis B surface antibody
PCR: polymerase chain reaction
PPD: purified protein derivative
TB: tuberculosis

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