Implementation of a Childhood Lead Poisoning Prevention Program Data and Outcomes Management System based on the Omaha System: A Pre-Post Evaluation

Taffany Hwang, MSN, PNP-BC, MPH; Neysa Ernst, DNP, RN; Karen Monsen, PhD, RN, FAMIA, FNAP, FAAN

JOHNS HOPKINS SCHOOL of NURSING

Intro & Background

- Childhood lead poisoning is preventable, has immediate and long-term health sequelae. **Data is needed to evaluate the effectiveness of state's primary and secondary public health nursing (PHN) interventions**
- Most PHN documentation is free-text, incomplete, and data is impossible to retrieve for effectiveness analysis

Purpose & Aims

Purpose: to evaluate the evidence-based implementation of the Omaha System and its effect on improving nursing documentation

Aims: evaluate pre-/post- implementation records for:

1) Record completeness: whether documents included problems, signs/symptoms, interventions, and outcome status Knowledge, Behavior, Status (KBS) ratings
2) Demonstrated description of core program interventions using available data
3) Ability to perform secondary analysis for intervention effectiveness based on available KBS ratings

Methods

Design	• Pre-/ Post- implementation records evaluation • Pre- records: free-text data via manual data abstraction with rigorous inter-rater reliability with SME • Post- records: data reported directly from EHR
Setting	A county-administered Childhood Lead Poisoning Prevention Program in California, serving over 6000 cases annually
Sample & Sample Size	• Convenience sample of pre-/post- implementation records • 64 randomly selected pre-implementation free-text records • 137 post-implementation electronic records from 10/2022 - 02/2023 (N=201)
Ethical Reviews & Approval	Project received ethical review and approval from: • JHSON's PERC • State agency's IRB and other approval authorities as required

Intervention Procedures

Developed evidence-based intervention guideline
Guidelines developed based on the state protocol and Omaha System Guidelines with SME

Verified Interventions
Ensured inclusion of all typical interventions with PHN into guideline content

Multidiscipline Collaboration
Collaborated with software developer to incorporate the standardized language content into a customized EHR platform

Provision of training and ongoing consultation
Trained and supported PHNs on appropriate use of the Omaha System

Implemented EHR platform embedded with the Omaha System
PHN transitioned from free-text to using SL to document:
- Type of assessment (initial, interim, final)
- Problem(s) and related signs/symptoms
- Intervention(s)
- Patient outcome status (KBS) rating

Data Analysis

- *Aims 1-2:* Descriptive analyses of pre-and post-implementation nursing documentation.
- *Aim 3:* a one-tailed independent t-test, of post-implementation data, to evaluate effectiveness of interventions comparing initial to interim patient outcome (KBS) ratings

Results

- **84% of post-Implementation records were complete** compared to **33% for pre-implementation** (figure 1)
- For the first time, program can quantify and visualize core program interventions provided by PHNs (figure 2)

Figure 1 Percent Case with Complete Records

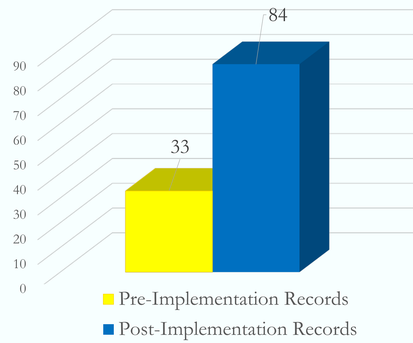
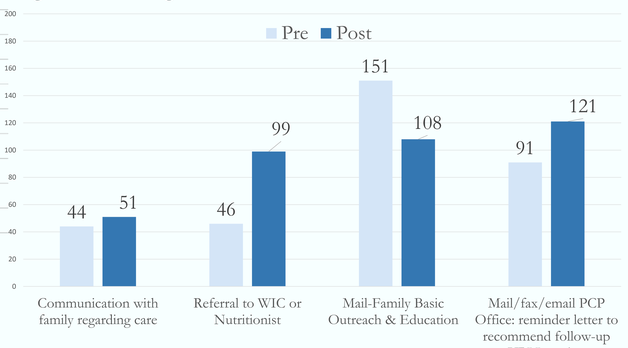


Figure 2: Core Program Interventions Visualized



- Mean score difference of initial and interim **Knowledge Rating** shows **improved patient's knowledge score with statistical significance**

Growth and development	Initial Rating	Interim Rating	Points improved
Mean Score	1.85	2.14	0.29
	t =2.605	**p-value**	**0.005**
Health care supervision	**Initial Rating**	**Interim Rating**	**Points improved**
Mean Score	1.96	2.44	0.48
	t = 3.997	**p-value**	**0.00005**
Nutrition	**Initial Rating**	**Interim Rating**	**Points improved**
Mean Score	1.97	2.2	0.23
	t = 1.980	**p-value**	**0.025**

Discussion & Future Implication

- PHN-generated data **illuminated the impact of their interventions** to reduce and prevent childhood lead poisoning
- Standardized data will **enable future studies in intervention effectiveness research** in childhood lead poisoning prevention programs
- **State agency evaluating best approach to expand this project to other counties, state-wide, based on lessons learned**