

**ISPOR 2023, May 7-10, Boston, MA, USA**  
**Supplemental Materials – Z codes and Social Determinants of Health (SDoH)**

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**Poster Code:** EPH260

**Title:** Patient, Clinical, and Hospital Characteristics Associated with Use of Z Codes and Social Determinants of Health in a Large, U.S. Hospital-Based, All-Payer Database

**Session:** Poster Session 5

**Session Date/Time:** Wednesday, May 10, 2023 / 8:30 AM - 11:30 AM

**Presentation Time:** 9:00 AM - 10:00 AM

**Patient, Clinical, and Hospital Characteristics Associated with Use of Z Codes and Social Determinants of Health in a Large, U.S. Hospital-Based, All-Payer Database**

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**OBJECTIVES:** Beginning in 2015, Z codes were introduced in the ICD-10-CM diagnosis set that allow clinicians to document social determinants of health (SDoH) associated with health status. While Z codes have been integrated into EHRs—and despite the importance of documenting SDoH—Z codes have not been widely adopted by clinicians. The objectives of this study were to document utilization of Z codes across ten broad categories of SDoH and examine the association between patient, clinical, and hospital characteristics and SDoH categories.

**METHODS:** A descriptive analysis was used to examine Z code diagnoses among adult patients (ages 18+) who were discharged from 1,047 U.S. hospitals with an index visit between January 1, 2016 and December 31, 2021 in inpatient and outpatient settings, using a hospital-based, service level, all-payer, administrative database. All data were statistically de-identified and compliant with HIPAA.

**RESULTS:** Although use of Z codes was broadly represented across hospitals, overall use of Z codes by clinicians is low with only 4.6% of adults ( $n=5,406,175$ ) with evidence of any Z code across 117,766,033 patients. Compared to the patient population without Z codes ( $n=112,359,858$ ), patients with evidence of Z codes were significantly more likely (all  $\chi^2$   $p$  values  $< 0.0001$ ) to be male (52% vs 42%), younger (72% vs 63%  $< 60$  years), single (62% vs 47%), African American (18% vs 14%), and significantly less likely to have commercial insurance (25% vs 42%). The top three Z codes reported (and corresponding SDoH domains) in order were tobacco use (addictions,  $n=2.42$  million), homelessness (problems related to housing and economic circumstances,  $n=617,843$ ), and dietary counseling and surveillance (lifestyle behaviors,  $n=473,638$ ).

**CONCLUSIONS:** Understanding variation in utilization of Z codes across patient, clinical, and hospital characteristics can be useful for informing increased adoption of Z code use, given the important contribution of SDoH to health outcomes.

## CONFERENCE/VALUE IN HEALTH INFO

2023-05, ISPOR 2023, Boston, MA, USA

Value in Health, Volume 26, Issue 6, S2 (June 2023)

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**Poster Code:** EPH186

**Title:** What Do We Know about Utilization of Z Codes in the Pediatric Population? Exploring Variation in Z Code Use and Social Determinants of Health in a U.S. Hospital-Based, All-Payer Database

**Session:** Poster Session 4

**Session Date/Time:** Tuesday, May 9, 2023 / 3:15 PM - 6:45 PM

**Presentation Time:** 5:45 PM - 6:45 PM

**What Do We Know about Utilization of Z Codes in the Pediatric Population? Exploring Variation in Z Code Use and Social Determinants of Health in a U.S. Hospital-Based, All-Payer Database**

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**OBJECTIVES:** Social determinants of health (SDoH) are important nonmedical factors that can impact health outcomes. Despite the availability of Z codes to document SDoH, their use during patient encounters is very low, but can improve delivery of health care. There is a paucity of research on utilization of Z codes and only a handful of these studies have been conducted in the pediatric population (age <18 years). This study documented Z code use and examined the association between patient, clinical, and hospital characteristics and SDoH domains within a pediatric population.

**METHODS:** A descriptive analysis using a hospital-based, service level, all-payer, administrative database was conducted to examine Z code diagnoses among pediatric patients discharged from 1,023 U.S. hospitals with an index visit between January 2016 and December 2021. All data were statistically de-identified and compliant with HIPAA. Descriptive statistics and adjusted analyses were used to document differences across factors and their association with ten SDoH domains.

**RESULTS:** Only 1.4% ( $n=360,706$ ) of pediatric patients had evidence of any Z code. Compared to the pediatric population without Z codes ( $n=24,588,782$ ), patients with evidence of Z codes were significantly more likely (all  $\chi^2 p$  values < 0.0001) to be female (55% vs 49%), between the ages of 12-17 (52% vs 28%), African American (21% vs 16%), and to be on Medicaid (65% vs 50%). The top three Z codes reported were dietary counseling and surveillance ( $n=110,542$ ), other problems related to lifestyle ( $n=56,672$ ), and other specific counseling ( $n=48,441$ ). In the adjusted analysis, virtually all predictors were significantly associated with each of the SDoH domains to varying degrees, but most notably age, race, ethnicity, and payor type.

**CONCLUSIONS:** Because socioeconomic factors, physical environment, and health behaviors drive 80% of health outcomes, it is important to continue to encourage adoption of Z code use by clinicians across healthcare settings.

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*Z codes and social determinants of health*

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## ICD-10-CM Z codes by SDoH Domain

Source: <https://icd10cmtool.cdc.gov/?fy=FY2023>

### **Z55 Problems related to education and literacy**

- Z55.0 Illiteracy and low-level literacy
- Z55.1 Schooling unavailable and unattainable
- Z55.2 Failed school examinations
- Z55.3 Underachievement in school
- Z55.4 Educational maladjustment and discord with teachers and classmates
- Z55.5 Less than a high school diploma
- Z55.6 Problems related to health literacy
- Z55.8 Other problems related to education and literacy
- Z55.9 Problems related to education and literacy, unspecified

### **Z56 Problems related to employment and unemployment**

- Z56.0 Unemployment, unspecified
- Z56.1 Change of job
- Z56.2 Threat of job loss
- Z56.3 Stressful work schedule
- Z56.4 Discord with boss and workmates
- Z56.5 Uncongenial work environment
- Z56.6 Other physical and mental strain related to work
- Z56.8 Other problems related to employment
- Z56.81 Sexual harassment on the job
- Z56.82 Military deployment status
- Z56.89 Other problems related to employment
- Z56.9 Unspecified problems related to employment

### **Z57 Occupational exposure to risk factors**

- Z57.0 Occupational exposure to noise
- Z57.1 Occupational exposure to radiation
- Z57.2 Occupational exposure to dust
- Z57.3 Occupational exposure to other air contaminants
- Z57.31 Occupational exposure to environmental tobacco smoke
- Z57.39 Occupational exposure to other air contaminants
- Z57.4 Occupational exposure to toxic agents in agriculture
- Z57.5 Occupational exposure to toxic agents in other industries
- Z57.6 Occupational exposure to extreme temperature
- Z57.7 Occupational exposure to vibration
- Z57.8 Occupational exposure to other risk factors
- Z57.9 Occupational exposure to unspecified risk factor

### **Z58 Problems related to physical environment**

- Z58.6 Inadequate drinking-water supply
- Z58.8 Other problems related to physical environment
- Z58.81 Basic services unavailable in physical environment
- Z58.89 Other problems related to physical environment

### **Z59 Problems related to housing and economic circumstances**

- Z59.0 Homelessness
- Z59.00 Homelessness unspecified
- Z59.01 Sheltered homelessness
- Z59.02 Unsheltered homelessness
- Z59.1 Inadequate housing
- Z59.10 Inadequate housing, unspecified
- Z59.11 Inadequate housing environmental temperature
- Z59.12 Inadequate housing utilities
- Z59.19 Other inadequate housing
- Z59.2 Discord with neighbors, lodgers and landlord
- Z59.3 Problems related to living in residential institution
- Z59.4 Lack of adequate food
- Z59.41 Food insecurity
- Z59.48 Other specified lack of adequate food
- Z59.5 Extreme poverty
- Z59.6 Low income
- Z59.7 Insufficient social insurance and welfare support
- Z59.8 Other problems related to housing and economic circumstances
- Z59.81 Housing instability, housed
- Z59.811 Housing instability, housed, with risk of homelessness
- Z59.812 Housing instability, housed, homelessness in past 12 months
- Z59.819 Housing instability, housed unspecified
- Z59.82 Transportation insecurity
- Z59.86 Financial insecurity
- Z59.87 Material hardship due to limited financial resources, not elsewhere classified
- Z59.89 Other problems related to housing and economic circumstances
- Z59.9 Problem related to housing and economic circumstances, unspecified

### **Z60 Problems related to social environment**

- Z60.0 Problems of adjustment to life-cycle transitions
- Z60.2 Problems related to living alone
- Z60.3 Acculturation difficulty
- Z60.4 Social exclusion and rejection
- Z60.5 Target of (perceived) adverse discrimination and persecution
- Z60.8 Other problems related to social environment
- Z60.9 Problem related to social environment, unspecified

### **Z62 Problems related to upbringing**

- Z62.0 Inadequate parental supervision and control
- Z62.1 Parental overprotection
- Z62.2 Upbringing away from parents
- Z62.21 Child in welfare custody
- Z62.22 Institutional upbringing
- Z62.29 Other upbringing away from parents
- Z62.3 Hostility towards and scapegoating of child
- Z62.6 Inappropriate (excessive) parental pressure
- Z62.8 Other specified problems related to upbringing

- Z62.81 Personal history of abuse in childhood
- Z62.810 Personal history of physical and sexual abuse in childhood
- Z62.811 Personal history of psychological abuse in childhood
- Z62.812 Personal history of neglect in childhood
- Z62.813 Personal history of forced labor or sexual exploitation in childhood
- Z62.814 Personal history of child financial abuse
- Z62.815 Personal history of intimate partner abuse in childhood
- Z62.819 Personal history of unspecified abuse in childhood
- Z62.82 Parent-child conflict
- Z62.820 Parent-biological child conflict
- Z62.821 Parent-adopted child conflict
- Z62.822 Parent-foster child conflict
- Z62.89 Other specified problems related to upbringing
- Z62.890 Parent-child estrangement NEC
- Z62.891 Sibling rivalry
- Z62.898 Other specified problems related to upbringing
- Z62.9 Problem related to upbringing, unspecified

### **Z63 Other problems related to primary support group, including family circumstances**

- Z63.0 Problems in relationship with spouse or partner
- Z63.1 Problems in relationship with in-laws
- Z63.3 Absence of family member
- Z63.31 Absence of family member due to military deployment
- Z63.32 Other absence of family member
- Z63.4 Disappearance and death of family member
- Z63.5 Disruption of family by separation and divorce
- Z63.6 Dependent relative needing care at home
- Z63.7 Other stressful life events affecting family and household
- Z63.71 Stress on family due to return of family member from military deployment
- Z63.72 Alcoholism and drug addiction in family
- Z63.79 Other stressful life events affecting family and household
- Z63.8 Other specified problems related to primary support group
- Z63.9 Problem related to primary support group, unspecified

### **Z64 Problems related to certain psychosocial circumstances**

- Z64.0 Problems related to unwanted pregnancy
- Z64.1 Problems related to multiparity
- Z64.4 Discord with counselors

### **Z65 Problems related to other psychosocial circumstances**

- Z65.0 Conviction in civil and criminal proceedings without imprisonment
- Z65.1 Imprisonment and other incarceration
- Z65.2 Problems related to release from prison
- Z65.3 Problems related to other legal circumstances
- Z65.4 Victim of crime and terrorism
- Z65.5 Exposure to disaster, war and other hostilities
- Z65.8 Other specified problems related to psychosocial circumstances
- Z65.9 Problem related to unspecified psychosocial circumstances

**Z71 Persons encountering health services for other counseling and medical advice, not elsewhere classified**

- Z71.0 Person encountering health services to consult on behalf of another person
- Z71.1 Person with feared health complaint in whom no diagnosis is made
- Z71.2 Person consulting for explanation of examination or test findings
- Z71.3 Dietary counseling and surveillance
- Z71.4 Alcohol abuse counseling and surveillance
- Z71.41 Alcohol abuse counseling and surveillance of alcoholic
- Z71.42 Counseling for family member of alcoholic
- Z71.5 Drug abuse counseling and surveillance
- Z71.51 Drug abuse counseling and surveillance of drug abuser
- Z71.52 Counseling for family member of drug abuser
- Z71.6 Tobacco abuse counseling
- Z71.7 Human immunodeficiency virus [HIV] counseling
- Z71.8 Other specified counseling
- Z71.81 Spiritual or religious counseling
- Z71.82 Exercise counseling
- Z71.83 Encounter for nonprocreative genetic counseling
- Z71.84 Encounter for health counseling related to travel
- Z71.85 Encounter for immunization safety counseling
- Z71.87 Encounter for pediatric-to-adult transition counseling
- Z71.88 Encounter for counseling for socioeconomic factors
- Z71.89 Other specified counseling
- Z71.9 Counseling, unspecified

**Z72 Problems related to lifestyle**

- Z72.0 Tobacco use
- Z72.3 Lack of physical exercise
- Z72.4 Inappropriate diet and eating habits
- Z72.5 High risk sexual behavior
- Z72.51 High risk heterosexual behavior
- Z72.52 High risk homosexual behavior
- Z72.53 High risk bisexual behavior
- Z72.6 Gambling and betting
- Z72.8 Other problems related to lifestyle
- Z72.81 Antisocial behavior
- Z72.810 Child and adolescent antisocial behavior
- Z72.811 Adult antisocial behavior
- Z72.82 Problems related to sleep
- Z72.820 Sleep deprivation
- Z72.821 Inadequate sleep hygiene
- Z72.823 Risk of suffocation (smothering) under another while sleeping
- Z72.89 Other problems related to lifestyle
- Z72.9 Problem related to lifestyle, unspecified

**Z73 Problems related to life management difficulty**

- Z73.0 Burn-out
- Z73.1 Type A behavior pattern
- Z73.2 Lack of relaxation and leisure
- Z73.3 Stress, not elsewhere classified
- Z73.4 Inadequate social skills, not elsewhere classified

- Z73.5 Social role conflict, not elsewhere classified
- Z73.6 Limitation of activities due to disability
- Z73.8 Other problems related to life management difficulty
- Z73.81 Behavioral insomnia of childhood
- Z73.810 Behavioral insomnia of childhood, sleep-onset association type
- Z73.811 Behavioral insomnia of childhood, limit setting type
- Z73.812 Behavioral insomnia of childhood, combined type
- Z73.819 Behavioral insomnia of childhood, unspecified type
- Z73.82 Dual sensory impairment
- Z73.89 Other problems related to life management difficulty
- Z73.9 Problem related to life management difficulty, unspecified

SDoH Domain	Top 3 Z Codes Reported - Adults *		
	#1	#2	#3
<b>Problems related to education and literacy</b>	Z55.9 - Problems related to education and literacy, unspecified	Z55.0 - Illiteracy and low-level literacy	Z55.8 - Other problems related to education and literacy
<b>Problems related to employment and unemployment</b>	Z56.0 - Unemployment, unspecified	Z56.6 - Other physical and mental strain related to work	Z56.9 - Unspecified problems related to employment
<b>Occupational exposure to risk factors</b>	Z57.8 - Occupational exposure to other risk factors	Z57.5 - Occupational exposure to toxic agents in other industries	Z57.2 - Occupational exposure to dust
<b>Problems related to housing and economic circumstances</b>	Z59.0 - Homelessness	Z59.9 - Problem related to housing and economic circumstances	Z59.8 - Other problems related to housing and economic circumstances
<b>Problems related to social environment</b>	Z60.2 - Problems related to living alone	Z60.9 - Problem related to social environment, unspecified	Z60.8 - Other problems related to social environment
<b>Problems related to upbringing</b>	Z62.810 - Personal history of physical and sexual abuse in childhood	Z62.811 - Personal history of psychological abuse in childhood	Z62.820 - Parent-biological child conflict
<b>Addictions (Alcohol, Drug, Gambling, and Tobacco Use)</b>	Z72.0 - Tobacco use	Z71.6 - Tobacco abuse counseling	Z71.41 - Alcohol abuse counseling and surveillance of alcoholic



SDoH Domain	Top 3 Z Codes Reported - Adults *		
	#1	#2	#3
<b>Lifestyle Behaviors (Diet, Exercise, Sleep, Stress)</b>	Z71.3 - Dietary counseling and surveillance	Z72.89 - Other problems related to lifestyle	Z71.82 - Exercise counseling
<b>Family Discord</b>	Z63.4 - Disappearance and death of family member	Z63.8 - Other specified problems related to primary support group	Z63.0 - Problems in relationship with spouse or partner
<b>Other SDoH</b>	Z71.89 - Other specified counseling	Z65.3 - Problems related to other legal circumstances	Z65.8 - Other specified problems related to psychosocial circumstances

\* Includes Premier member hospitals reporting on patients 18 years and older with an index visit between Jan 1, 2016 and Dec 31 2021

SDoH Domain	Top 3 Z Codes Reported - Children*		
	#1	#2	#3
<b>Problems related to education and literacy</b>	Z55.8 - Other problems related to education and literacy	Z55.9 - Problems related to education and literacy, unspecified	Z55.3 - Underachievement in school
<b>Problems related to employment and unemployment</b>	Z56.0 - Unemployment, unspecified	Z56.6 - Other physical and mental strain related to work	Z56.9 - Unspecified problems related to employment
<b>Occupational exposure to risk factors</b>	Z57.31 - Occupational exposure to environmental tobacco smoke	Z57.5 - Occupational exposure to toxic agents in other industries	Z57.8 - Occupational exposure to other risk factors
<b>Problems related to housing and economic circumstances</b>	Z59.0 - Homelessness	Z59.4 - Lack of adequate food and safe drinking water	Z59.8 - Other problems related to housing and economic circumstances
<b>Problems related to social environment</b>	Z60.9 - Problem related to social environment, unspecified	Z60.8 - Other problems related to social environment	Z60.4 - Social exclusion and rejection



SDoH Domain	Top 3 Z Codes Reported - Children*		
	#1	#2	#3
<b>Problems related to upbringing</b>	Z62.810 - Personal history of physical and sexual abuse in childhood	Z62.21 - Child in welfare custody	Z62.820 - Parent-biological child conflict
<b>Addictions (Alcohol, Drug, Gambling, and Tobacco Use)</b>	Z72.0 - Tobacco use	Z71.6 - Tobacco abuse counseling	Z63.72 - Alcoholism and drug addiction in family
<b>Lifestyle Behaviors (Diet, Exercise, Sleep, Stress)</b>	Z71.3 - Dietary counseling and surveillance	Z71.82 - Exercise counseling	Z72.89 - Other problems related to lifestyle
<b>Family Discord</b>	Z63.8 - Other specified problems related to primary support group	Z63.9 - Problem related to primary support group, unspecified	Z63.4 - Disappearance and death of family member
<b>Other SDoH</b>	Z71.89 - Other specified counseling	Z65.8 - Other specified problems related to psychosocial circumstances	Z65.3 - Problems related to other legal circumstances

\* Includes Premier member hospitals reporting on patients <18 years of age with an index visit between Jan 1, 2016 and Dec 31 2021

Overall Ranking for Visits - Adults	ICD-10 CODE	SDoH Domain	ICD-10 Code Description
1	Z72.0	Addictions (Alcohol, Drug, Gambling, and Tobacco Use)	Tobacco use
2	Z59.0	Problems related to housing and economic circumstances	Homelessness
3	Z71.3	Lifestyle Behaviors (Diet, Exercise, Sleep, Stress)	Dietary counseling and surveillance
4	Z71.6	Addictions (Alcohol, Drug, Gambling, and Tobacco Use)	Tobacco abuse counseling
5	Z72.89	Lifestyle Behaviors (Diet, Exercise, Sleep, Stress)	Other problems related to lifestyle
6	Z71.89	Other SDoH	Other specified counseling
7	Z56.0	Problems related to employment and unemployment	Unemployment, unspecified
8	Z60.2	Problems related to social environment	Problems related to living alone

9	Z62.810	Problems related to upbringing	Personal history of physical and sexual abuse in childhood
10	Z63.4	Family Discord	Disappearance and death of family member

Overall Ranking for Visits - Children	ICD-10 CODE	SDoH Domain	ICD-10 Code Description
1	Z71.3	Lifestyle Behaviors (Diet, Exercise, Sleep, Stress)	Dietary counseling and surveillance
2	Z72.89	Lifestyle Behaviors (Diet, Exercise, Sleep, Stress)	Other problems related to lifestyle
3	Z71.89	Other SDoH	Other specified counseling
4	Z62.810	Problems related to upbringing	Personal history of physical and sexual abuse in childhood
5	Z62.811	Problems related to upbringing	Personal history of psychological abuse in childhood
6	Z62.820	Problems related to upbringing	Parent-biological child conflict
7	Z72.0	Addictions (Alcohol, Drug, Gambling, and Tobacco Use)	Tobacco use
8	Z63.4	Family Discord	Disappearance and death of family member
9	Z71.82	Lifestyle Behaviors (Diet, Exercise, Sleep, Stress)	Exercise counseling
10	Z65.3	Other SDoH	Problems related to other legal circumstances