

Data Mining using the Omaha System
Oral Health in Dakota Co.
Gyorgy J. Simon
Jeanne Pfeiffer
Laura L. Fitzsimmons
Karen A. Monsen

Oral Health

- Oral health is a window to overall health
 - Gum disease may allow bacteria to enter the bloodstream
 - Chronic periodontitis can contribute to cardiovascular disease
 - Gum disease have been linked to premature birth
- Few databases contain information about oral health
 - One of the 42 central concepts in the Omaha System

Oral Health in Dakota Co.

- Familial data for 6,425 clients
 - Problems, Signs and Symptoms, Interventions,
 - 1,781 (27.7%) have oral problems
 - Study period: 2009 – 2011
- Find patterns in clients that are predictive of oral health problems
 - Initially, patterns in oral health data
 - Patterns in mothers predictive of oral health problem in children
 - Successful interventions

Data Mining

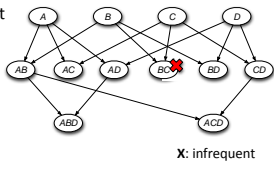
<i>Data Mining</i>	<i>Statistics</i>
Exploratory <ul style="list-style-type: none"> • Find novel, interesting patterns 	Confirmatory <ul style="list-style-type: none"> • Confirm hypothesis
Hypothesis generation <ul style="list-style-type: none"> • Large number of hypotheses • Filter down to a smaller set 	Hypothesis testing <ul style="list-style-type: none"> • Few hypotheses
No guarantees about results	Rigorous
Large number of predictors	Few, very relevant predictors

Association Rule Mining

- Origins from sales data
- *Items*: articles carried by a store
- *Transactions*: items in the same shopping cart
- *Itemsets*: sets of items
- *Goal*: find *all* itemsets that are frequently purchased together

Cart #	A	B	C	...	D
001	Y	Y	Y		Y
002	Y	Y	Y	Y	Y
003		Y	Y		
004	Y				
005	Y	Y	Y		

- *Support*: # of transactions the itemset *I* appeared in
 – Support(ABC)=3
- *Frequent*: an itemset *I* is frequent, if support(*I*)>minsup



X: infrequent

Application to Oral Health

- Items are problems
- Rows are patients

Method

- Create a binary matrix
 - columns are Problems
 - rows are clients
 - Entry indicates whether the particular client has had the particular Problem during the study period and received Intervention for it
- Extract all combinations of Problems that exist in at least 5 clients with oral health problem
 - 2,900 combinations were found

Summary

- Considering just Problems for individuals (as opposed to families) findings are consistent with use of evidence-based care plans that are in place and are being used in Dakota County
 - Demonstrates quality of PHN care/documentation
 - Suggests possible client types
 - May indicate evidence-based changes in PHN practice over time

Next Steps

- Select patients who have interventions for the Oral health
 - Consider family a unit (not a client)
 - Take signs/symptoms into account
 - Assess the effects of interventions
- Deidentification blinds us to dates
 - Temporal sequence of events is unclear

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