need for clinic staff to enter data into the EMR and to administer the questionnaire orally when the information is needed immediately, we have been evaluating administration using Interactive Voice Response (IVR) and online questionnaire administration. **Methods:** KP members were invited to participate in the IVR or the online pilot. Some IVR participants were asked to complete the Health Assessment prior to a scheduled Wellness Visit and others were invited to test the IVR system at a research facility. Those at the facility were observed and all participants were interviewed immediately after completing it. For the online pilot, members were emailed the survey link and asked to complete the Health Assessment. Once the Health Assessment was submitted, members were interviewed about their experience. **Results:** The majority (80%) of IVR participants reported that it took an acceptable amount of time to complete the Health Assessment. Two-thirds used a handheld telephone but still 75% reported it was “very easy” to respond to the survey. Nearly all could hear the questions clearly and understand the questions and response options. About 50% of members asked were willing to complete the Health Assessment online. All online participants found it easy to access and complete the Health Assessment using a link emailed to them. **Conclusions:** Both IVR and online surveys are viable options for administering a health assessment to senior members. Over half of the test respondents would prefer IVR over other modalities. Members who are comfortable with and have access to a computer in their home often prefer the online modality. Although high-tech modalities are feasible and preferable to a segment of the senior population, other modalities need to be available.

Keywords: Health Risk Assessment; Interactive Voice Response; Medicare
doi:10.3121/cmr.2013.1176.ps3-55

Virtual Data Warehouse

A4-1:

Evaluation of the Utilization-Based Population Denominators in the HMORN Context

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Background/Aims: Defining a population denominator is a major challenge in practice-based research. Because health plan membership is unknown, population denominators must be determined by alternate methods, e.g., healthcare utilization. Such an approach may introduce bias since the resulting population may only represent a small portion of individuals who are affiliated with a healthcare organization. Moreover, healthcare utilization is often confounded by demographic and socio-economic factors, potentially compounding bias in the population estimates. **Methods:** The majority of HMORN member organizations have health plans, whose enrollment information is captured in the Virtual Data Warehouse (VDW) Enrollment file. The health plan enrollment provides a well-defined population denominator. In order to participate in multi-site research, HMORN member organizations without health plans, such as Essentia Health (EH), need to determine an enrollment proxy. The purpose of this pilot study was to evaluate a utilization-based enrollment proxy algorithm. Four HMORN sites with Epic electronic medical records (three sites with and one site without standard VDW enrollment files) participated in the study. The utilization-based algorithm was applied in two steps: 1) creating the base table from Clarity (Epic) database; and 2) creating the utilization-based enrollment proxy using predetermined selection rules. **Results:** EH implementation of the enrollment proxy for years 2002-2012 contained 390,000 “enrollment” periods for 378,000 unique patients. The EH algorithm was applied to the data from the three sites with health plans; the resulting enrollment proxy files were compared to the standard enrollment files. Patient demographic data (age, sex) and place of residence categorized by rural-urban commuting area (RUCA) codes (urban, large rural, small/isolated rural), as well as race and socio-economic measures (Census file), were used to characterize the deviations between two population denominators. **Conclusions:** The results of this study will inform HMORN researchers about the comparability of the patient populations between standard health plan enrollment and the utilization-based proxy. This study will also evaluate patient characteristics

likely to affect utilization, and therefore, accuracy of the utilization-based proxy as a population denominator. It may also be useful for further development of the algorithm.

Keywords: Virtual Data Warehouse; Enrollment Proxy;
doi:10.3121/cmr.2013.1176.a4-1

A4-2:

Complex VDW Queries - So Easy, a PI Can Do It

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Background/Aims: GHRI has created a SAS program that takes all of its input from a configuration file. The configuration file is nothing more than a text file, formatted to easily convey the datasets, variables, and criteria necessary for data extraction. **Methods:** There are numerous benefits of this approach: (1) complex logic can be encapsulated in a single file; (2) extensive comments in the configuration file are allowed; (3) the program is “safe” for multi-site requests; (4) after review, the program does not need to be redistributed, only the configuration file needs to be distributed and reviewed for each request, and it cannot execute without the program that supports it; (5) summary-level datasets with sophisticated criteria can be created; and (6) current summary-level efforts prevent person-level analysis. **Results:** Here is how the program works: The configuration file consists of different sections. The first section tells the program which VDW datasets are to be used. Other sections create criteria for selection and analysis. For example, here are two criteria for diabetes identification.

```
# outpatient criteria
criteria_name=outpatient /
criteria_where=enctype not in (“IP”, “ER”) and (dx
in(‘357.2’, ‘366.41’, ‘362.01’, ‘362.02’, ‘362.03’, ‘362.04’, ‘362.05’, ‘362.06’,
‘362.07’, ‘648.83’) or
substr(dx,1,3) eq ‘250’) /
criteria_keys=dx dx_date /
criteria_data=dx dx_date /
criteria_sort=a /
# lab a1c criteria
criteria_name=lab_a1c /
criteria_where=test_type eq “HGBA1C” and input(result_c, 8.) gt 6.5 /
criteria_keys=test_type result_c lab_date /
criteria_data=test_type result_c lab_date /
criteria_sort=a /
```

Conclusions: Multiple criteria blocks can be assembled to create flags for each person in a cohort. The resulting summary-level dataset can then be used to make determinations based on the absence or presence of particular flags. The criteria blocks use simple boolean expressions and concentrate the “intelligence” of the analysis in one location.

Keywords: VDW; SAS

doi:10.3121/cmr.2013.1176.a4-2

A4-3:

Clarity Translation of Chemotherapy Infusion Data

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Background/Aims: The aim is to educate programmers on how to pull chemotherapy infusion data from Clarity. The data are complex, and it can be take a while to learn the Clarity Data model, which can be difficult to understand. At Kaiser Permanente Northern California (KPNC), we developed a smaller model and an easy-to-understand workflow of the data. We would like to share our learnings, including how to link treatment plans, orders, dispensing, and administration together; and our knowledge of how to find completed treatment plans, days and cycles. **Methods:** To demonstrate the method for pulling data, we will show a data diagram with linkages to the different Beacon Clarity tables and a sample SQL explaining some of the filters/business logic and why the linkage must be done a certain way. **Results:** We hope users will find the information from KPNC’s experience useful, and that by the end of the presentation, users will gain a better understanding of how to pull chemotherapy infusion data from Clarity. We

also hope to save other sites from having to spend as much time doing the initial analysis work that KPNC did. **Conclusions:** For KPNC, pulling chemotherapy infusion data was eye-opening. The complexity of the data was significant, particularly linking the data from the initial “planned” treatments to orders, episodes, flowsheets, dispensing, mixing the medications, and finally to what is administered. Often times treatment plans were changed along the way due to chemotherapy reaction or toxicity, and linking the data back to the original plan was therefore complicated. We will review what we learned in this process with other users, so that they may benefit from KPNC’s experience.

Keywords: Chemotherapy Data; Infusion Data

doi:10.3121/cmr.2013.1176.a4-3

A4-4:

Visualizing VDW Lab Results Data: Why You Should, and How You Can - Easily!

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Background/Aims: One of the most difficult tasks facing the VDW lab results file implementer is figuring out which records from local lab data should be included in their VDW file, and which should be left out. These decisions frequently hinge on neat points of clinical science that are often outside the expertise of the programmer. We will describe a set of graphics that implementers can use to shed light on these decisions, useful during implementation, and afterwards as indication of data quality and even as documentation. **Methods:** SAS’ new Statistical Graphics procedures allow unprecedented control and ease of use in the creation of descriptive graphs and charts. The ODS Graphics Designer utility, paired with the SGDESIGN procedure make it easy to create a single image composed of multiple different graphs, each of which can use its own dataset. These tools allowed us to create something of a “data report card” for each VDW test_type, depicting: (1) number of result records over time; (2) number of result values that are numeric vs. character, stratified by the local lab codes used; (3) distributions of numeric result values, by unit; (4) number of numeric result values, by unit and local lab code; (5) values of character results by local lab code. The report card is produced by a standard VDW program available from the author, which can be run at any VDW lab results-implementing site with access to SAS version 9.2 or greater. **Results:** The graphics produced by this program allow both implementers and end-users to evaluate at a glance, how cohesive the data from various different local codes are, how much data there is, how it waxes and wanes over time, whether the values are of the expected types, and whether units and character values are within valid values. Being able to depict all of this disparate information in a single, compact display allows users to glean insights that, for example, viewing series of larger graphs separately would not afford. **Conclusions:** The author has found this program an extremely useful tool in implementing VDW labs by quickly pinpointing misclassified local codes. Other sites surely will also. **Keywords:** Graphics; Laboratory; SAS

doi:10.3121/cmr.2013.1176.a4-4

PS3-10:

Patient of Two Professions: Medicine and Dentistry

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Background/Aims: The literature in both medicine and dentistry has increasingly focused on conditions relevant to both professions. However, research addressing these conditions is limited by the scope of available data, the size of their samples, and data sets that can be combined. The aim of this project is to create a Dental VDW using data from the three HMORN members that have both medical and dental data (i.e., Kaiser Permanente Northwest, Marshfield, and HealthPartners Institute). **Methods:** A team of investigators and VDW programmers was formed. Initial meetings, aimed at coming up with a common design that would accommodate the dental data from all three sites, were held. Each site has a different electronic dental record system and different ways of coding diagnoses and identifying risk.

The project has the further challenge that it was being built in anticipation of future projects and so does not have any project related funding. **Results:** Twelve content areas were identified. Of those, four of the tables have been designed and are having test data loaded into them. In order to simplify these early steps they are designed based on the VDW medical model. The existing ‘Demographics’ table will accommodate both medical and dental patients. ‘Dental Utilization’ will hold data common to all the procedures within an encounter and is very similar to the comparable VDW table. Where dental data starts to diverge from medical is the ‘Dental Diagnosis and Procedures’ table. This is because each dental procedure is related to a specific tooth and surface and can have its own diagnosis code. The ‘Provider’ table is similar to the medical VDW but with different provider specialties. **Conclusions:** The HMORN is working to create a Dental VDW within an existing Medical VDW that will support efforts to conduct research that crosses the divide that currently exists between medical and dental research. It will be a multi-directional system, allowing medical data within dental studies and dental data within medical studies.

Keywords: VDW; Medical VDW; Dental VDW

doi:10.3121/cmr.2013.1176.ps3-10

PS3-11:

Beyond General Equivalency Mappings (GEMs): Understanding the Implications of ICD 10 in Research

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Background/Aims: With the implementation of ICD 10 CM and ICD 10 PCS less than two years away, there are still unanswered questions as to how research teams will effectively translate or use ICD 10 codes in research. Approximately 84% of the ICD 10 codes have only approximate matches with 10% having multiple matches and only 5% have exact one-to-one matches between ICD 9 and ICD 10. With the number of codes increasing five-fold, this offers additional opportunities and risks when pulling data. **Methods:** Besides looking at the General Equivalency Mappings and other tools that are used to translate ICD 9 codes to ICD 10 codes, we will examine some common research areas where only approximate matches between ICD 9 and ICD 10 exist. We will also discuss how the finer level of detail that ICD 10 gives allows research teams to pinpoint exactly what type of asthma, Crohn’s disease, and diabetic retinopathy they wish to study without including some of the other cases that do not meet their research criteria. **Results:** There are significant ambiguities and irregularity in several common areas such as diabetes, mental health, asthma, and gastroenterology due to approximate, multiple, or combination matches. Even in the case of exact matches such as an old myocardial infarction where there is an exact match, the definition of when a myocardial infarction becomes “old” is different. **Conclusions:** ICD 10 offers a finer level of detail and a higher level of specificity, thereby allowing research teams to be more targeted when pulling data. On the other hand, research teams need to exercise caution when using GEMs and other tools to translate ICD 9 codes into ICD 10 codes and vice versa, especially if they are looking at data that overlaps the implementation date of October 1, 2014.

Keywords: ICD 10; Code; Coding

doi:10.3121/cmr.2013.1176.ps3-11

PS3-12:

VDW Dashboards to Assure the Quality and Stability of Monthly Updates: The Heart and Vascular Health (HVH) Study Experience

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Background/Aims: Since the 1980s, the HVH study, run at Group Health (GH) and University of Washington, has used computerized billing and hospital-discharge data to identify potential cases of myocardial infarction (MI). Recently, HVH adopted the local implementation of the VDW as a replacement for the legacy system. Monthly dashboards that compare the yields and subjects identified by the two systems were enacted to monitor the transition and assure comparable ascertainment over time. **Methods:**