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BACKGROUND

The Electronic Health Record (EHR) Incentive Payment Programs (IPPs), also known as Promoting Interoperability and Meaningful Use Programs, have helped central cancer registries acquire cancer case information in the Health Level 7 (HL7) Clinical Document Architecture (CDA) format from ambulatory health care providers that might otherwise go unreported. The HL7 CDA cancer case reports require testing, conversion, and linkage in order to determine the meaningfulness of the cancer case reports to a central cancer registry in terms of identifying missing cases.

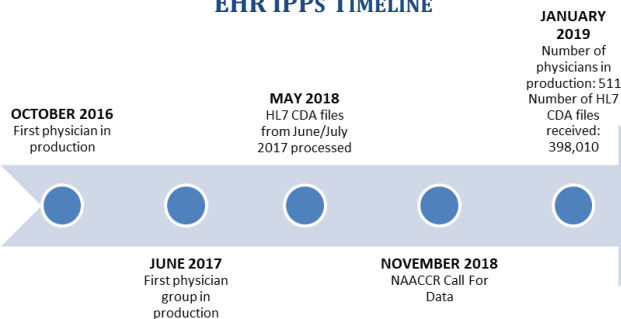
PURPOSE

Determine the value realized and cost associated with collecting cancer case information from ambulatory providers participating in cancer case reporting under the EHR Incentive Programs using the CDC's Registry Plus™ software suite.

METHODS

In order to evaluate the value realized and cost associated with collecting cancer case information from ambulatory providers participating in the EHR IPPs, the Tennessee Cancer Registry (TCR) validated and imported cancer case reports received in the HL7 CDA format from June through July 2017 and used them in this analysis. Cancer case reports with non-critical errors were imported into eMaRC Plus v5.3 prior to the analysis. Cancer case reports with critical level errors identified during validation with CDA Validation Plus were excluded from the analysis. Link Plus was used to link an export of the cancer case reports from eMaRC Plus to the TCR data repository based on social security number, name, sex, race, cancer primary site, and diagnosis date. For the purposes of this study, cost was defined as the average time spent to abstract a cancer case and value realized was defined as the number of new cancer cases obtained for a given diagnostic year after linkage with the TCR's data repository.

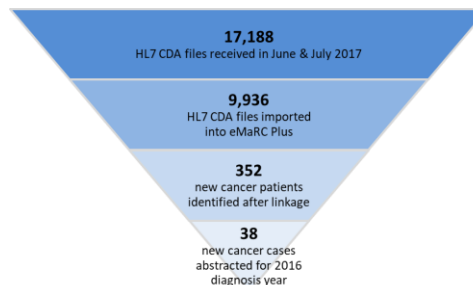
EHR IPPS TIMELINE



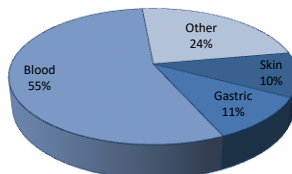
RESULTS

A total of 17,188 cancer case reports were received by the TCR in June and July of 2017 and were used in this analysis. CDA Validation Plus was used to validate all 17,188 cancer case reports in approximately thirteen hours and identified 7,252 cases with critical errors. eMaRC Plus was used to import and parse 9,936 cases with non-critical errors over the course of five days. Then, an export of the cases from eMaRC Plus was linked with the TCR's data repository using Link Plus to identify any missing cases. On average, CDA Validation Plus tested and validated 22 cancer cases per minute, while eMaRC Plus imported and parsed 1.5 cancer cases per minute. It should be noted the size of cancer case reports in the HL7 CDA format range from 30KBs to 22,950KBs. To put this into perspective, the standard file size of a single NAACCR fixed width record is 22.5KBs.

The TCR identified 752 HL7 CDA cancer case reports containing 352 new cancer patients, which represented 307 new individual cancer patients after incorporating the cases received from all other Tennessee facilities. Of these new cases, more than half (183 cases) contained diagnoses for 2015, 2016, or 2017. As a result, two TCR staff members abstracted 38 new cancer cases for the 2016 diagnostic year. On average it took TCR staff forty minutes to abstract a cancer case received in the HL7 CDA format. It should be noted, it takes, on average, thirty-five minutes to abstract a cancer case from an electronic pathology report and an hour to abstract a cancer case from partial records submitted by Ambulatory Surgical Treatment Centers (ASTCs). Approximately 76.3% of the new cancer cases received in the HL7 CDA format contained diagnoses for blood, gastric, or skin cancers. The remainder of the cases contained diagnoses for breast, soft tissue, lung, or unknown cancers.



NEW CANCER CASES BY PRIMARY SITE 2016 DIAGNOSIS YEAR



DISCUSSION

Our results confirm cancer case reporting under the EHR IPPs has boosted the potential for identifying missing cancer cases in Tennessee, particularly for cancer types historically diagnosed outside of the hospital setting. While there is apparent value in the cancer cases received in the HL7 CDA format, the value is not yet fully realizable due to the reporting lag in cancer surveillance, the lack of quality measures not included in this study, and limited resources dedicated to the EHR IPPs activities. The results of this study also confirm that it is quicker, on average, to abstract a cancer case from a cancer case report in the HL7 CDA format than it is to abstract a cancer case from a partial NAACCR record submitted by an ASTC.

One subject that remains to be explored is how to maximize the efficiency of identifying potential missing cases from the EHR IPPs cancer case reporting process. It would be beneficial to explore the design of the cancer case reporting process, specifically the linkage step. After linkage with the TCR database only 752 of the 9,936 cancer case reports imported into eMaRC Plus contained missing cases. Given the rate of importing HL7 CDA cancer case reports in eMaRC Plus, there appears to be potential to minimize the overall time spent processing these files by identifying missing cases before validating the case reports in CDA Validation Plus and importing them into eMaRC Plus. To identify only value-added cases before processing them in CDA Validation Plus and eMaRC Plus, requires extensive knowledge of the HL7 CDA format and software with the capability to parse hierarchical information from a .xml file.

Another topic that should be explored is when to begin processing HL7 CDA cancer case reports and abstracting the cancer case information. For the purposes of this study the HL7 CDA cancer case reports were tested, imported, and linked in May 2018; however, the cases were not abstracted until November 2018. During that time several of the cases initially identified as missing were submitted from other Tennessee facilities. It takes a considerable amount of time to abstract these cases and more missing cases are expected to be identified for the 2017 diagnosis year and beyond. Therefore, it is important to identify the most appropriate time to process and incorporate the HL7 CDA cancer case reports into the cancer registry's data repository.

CONCLUSION

It is important to evaluate informatics concerning cancer case reports in the HL7 CDA format to identify areas of improvement that can lead to more efficient case ascertainment for central cancer registries. Future studies should aim to measure the quality of cancer case reports in the HL7 CDA format. Furthermore, future projects concerning cancer case reports should focus on minimizing the number of non-value added cases requiring processing by the CDC's Registry Plus™ software suite.

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