2019 NPCR PUERTO RICO SUCCESS STORY

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Developing the Puerto Rico CLL & AML Profile

NATIONAL PROGRAM OF CANCER REGISTRIES
SUCCESS STORY

SUMMARY: Worldwide, leukemia remains one of the leading causes of cancer morbidities and mortality. Chronic lymphocytic leukemia (CLL) and acute myeloid leukemia (AML) are the most frequent types of leukemia among older age population. CLL is characterized by a heterogeneous clinical course. (1) In the past decades the use of markers for CLL patients have provided important disease prognosis information and they have stimulated development of more appropriate targeted therapies. (2) Meanwhile, AML is a highly heterogeneous disease; although cases can be stratified into favorable, intermediate and adverse-risk groups based on their cytogenetic profile, prognosis within these categories varies widely. (3) Although advances in the treatment of AML have led to significant improvements in outcomes for younger patients, prognosis in the elderly who account for most new cases remains poor. (4) Today, no study has evaluated the use and impact on these prognostic factors for CLL or AML in Puerto Rico (PR), a Hispanic aging population. Therefore, in partnership with an external entity, we are developing the infrastructure to assess the epidemiologic and clinical characteristics, treatment patterns, and outcomes of patients diagnosed with CLL and patients diagnosed with AML in PR. This is an ongoing project that we will conclude in 2020.

CHALLENGE: Over time, the PR Central Cancer Registry (PRCCR) has been improving its infrastructure to measure completeness and efficiently manage cancer data. Since 2004 the PRCCR has been increasing the electronic report from pathology laboratories. Currently, we have more than 65% of pathologies coming electronically. Another important part of this process was the development and implementation of the health insurance claims data through a collaborative agreement between the most important private and public health insurance companies in PR. More recently, the use of Electronic Medical Record (EMR) in the PRCCR provided important information related to treatment and drugs. The development and implementation of those systems have been essential for PRCCR to meet CDC's National Program of Cancer Registries' highest quality standards. Historically the PRCCR, as most of population-based registries, do not collect specific cancer treatment information, specific biomarkers, or other clinical information as cytogenetic tests or cancer-related biological and genetic markers, which limits the use of population-based registries to understand the disease and treatment outcomes. Nevertheless, data from PRCCR can be linked to different databases or expand the number of variables collected increasing its potential to address these questions. The existence of all of these elements and the need of having CLL and AML analytic data allowed PRCCR to make a partnership with an external entity to develop the CLL and AML profile.

SOLUTION: A multidisciplinary team in the areas of oncology, tumor registry, epidemiology, biostatistics, and informatics was established to create the PR CLL/AML Population-Based Registry. We started looking for available resources in PRCCR to evaluate the feasibility of the project. A sample of CLL and AML cases was selected to assess clinical history, flow cytometry's results, molecular and genetic testing, bone marrow biopsies, and blood tests. The team determined the variables to be included in the CLL/AML Population-Based Registry. The PRCCR database was changed in order to add new variables. The PR CLL/AML Population-Based Registry includes data from PRCCR's cancer database, pathologies database, EMR, and PRCCR Health Insurance Linkage Database (HILD). We developed a software to capture and manage new CLL- and AML-related variables with capabilities of data entry, editing, and linkage data from different sources. To document the database a data dictionary was prepared with the variables, its description, and format. We took advantage of existing reports coming from pathology laboratories. The cohort project includes CLL and AML cases for the period 2011-2015. To warrant the eligibility of cases for the project, some quality control (QC) procedures were implemented to correct, update, and complete ambiguous or more specific histologies, dates of last contact, dates of diagnosis, and other demographic, and clinical information. Meetings were held to perform quality control checks and to clarify doubts between IT, QC, and study personnel. The date of last contact of CLL and AML patients was updated using follow-up pathology reports, while patients' vital status was updated with information from the mortality files provided by the Demographic Registry of PR. A match between PR CLL/AML database and HILD is continuously performed to obtain the pattern of care of CLL and AML patients. Some cases require manual review to evaluate the potential true matches. For cases with missing or incomplete information an active follow-up will be performed through physicians, hospitals, and other reporting facilities. Additional information will be obtained from physicians' practices currently sending EMRs to the PRCCR.

RESULTS:

- The main objective of this biannual project is to assess the epidemiologic and clinical characteristics, treatment patterns, and outcomes of patients diagnosed with CLL/AML in PR. The results presented in this document correspond to the first phase that consists of the research, design, development, and implementation of the system to maintain CLL/AML database. Also, in this phase we performed preliminary analyses of the cases included in the CLL/AML profile.

- New variables to be collected include CBC results, physical examination, treatment modalities, and genetic tests to identify prognostic factors and mutations such as CD38, trisomy 12, 11q-, 13q-, 17p-, IgHV, TP53, ZAP-70, and Beta2, CEBPA, FLT3, CD33, C-Kit, IDH Gene 1 and 2, among others.

- Project-related stored procedures and views, including input and output parameters, were defined to satisfy system queries and transactions. A solution in Visual Studio was created to manage CLL/AML-related variables, integrating data from PRCCR's cancer database, EMR, Pathology Reports database, and PRCCR HILD.

- This new software allows a user to search and select specific CLL/AML-related terms. It integrates PRCCR databases in one single window so a user can see: PRCCR clinical and demographic information, pathology reports, pharmacy claims, treatment information, patient's comorbidities, among others. Currently, we are evaluating and validating CLL/AML pathology reports and determining prognostic factors, clinical variables, and CLL/AML-specific treatment modalities. The software was tested and has been used by the project Tumor Registrar.

- The CLL/AML database will be stored in a server with Windows Server 2012, using SQL Server 2016 as database management system. An example of how a case is analyzed in the CLL/AML Management System is displayed in Appendix A.

- The eligible cases for the project account for:

  ◊ 601 cases of CLL from the period 2011-2015: 46% of CLL cases were reported by physician offices, 37% by hospitals, 14% by radiation centers, and 3% by other reporting facilities.

  ◊ 588 cases of AML from the period 2011-2015: 82% of cases were reported by hospitals, 13% by physician offices, and 5% by other reporting facilities.

- The results of the QC checks achieved the reassignment of 35% of cases with non-specific histology (162 of 461). Unknown demographic information or partial dates were also reviewed and completed. In terms of the CLL/AML database design some tables, primary keys and some indexes were developed to support project-related data. Relations between tables were also defined.

- As part of the profile development, we built analytic matrixes to describe the incidence and mortality of leukemia and subtypes in PR and United States (by race). Statistics on preliminary results include:

  ◊ Age-adjusted incidence and mortality rates by sex and age for PR and USA

  ◊ Standardized rate ratios comparing rates of USA races with PR

  ◊ Joinpoint regression models to describe incidence and mortality trends

  ◊ Median age at diagnosis

  ◊ Observed survival analyses.

SUSTAINING SUCCESS: As part of this project, we will: 1) develop strategies to increase the CLL/AML case-reporting by physician offices and hospitals (our major sources of CLL/AML cases), increasing awareness of this condition and the importance of reporting to the PRCCR; 2) increase CLL- and AML-related research among Hispanic population, using and promoting a CLL/AML profile; 3) assess the pattern of care of CLL and AML in PR and compare it to the National Comprehensive Cancer Network (NCCN) guidelines; and 4) bring together a multidisciplinary team of epidemiologists, clinicians, health services researchers, and statisticians. This project will strengthen the collaboration between the PRCCR and an external entity to develop a unique and robust CLL and AML database of cancer registry data linked to insurance claims data in PR. The CLL/AML registry will expand the quantity and quality of data regularly collected by the PRCCR to include additional clinical, biologic, and genetic characteristics. The developed system will then serve as an invaluable component of monitoring and improving CLL- and AML-related health outcomes in PR and potentially expand to other cancer sites..

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CLL/AML Management System
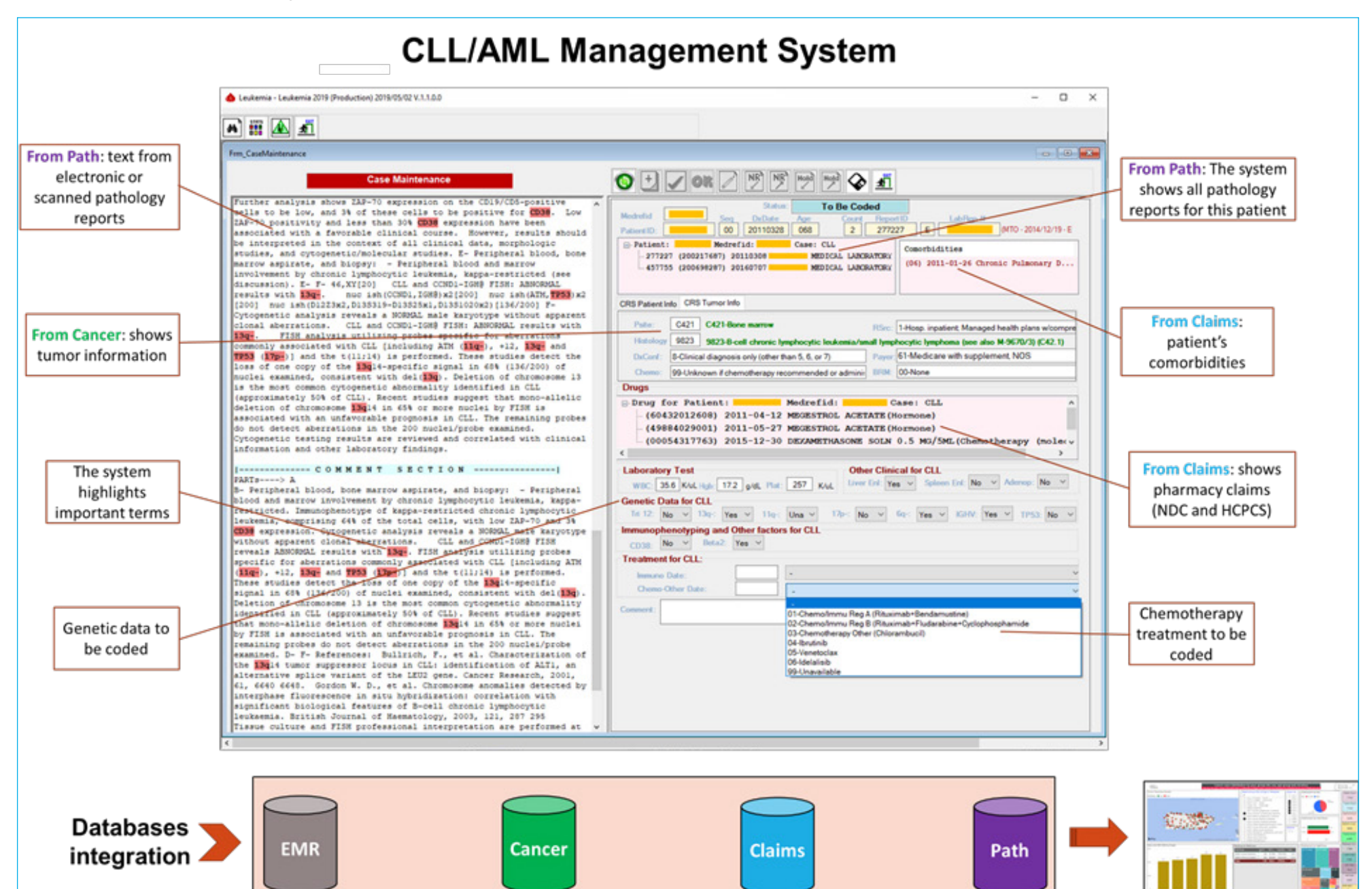
SUMMARY:

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