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Poster Abstracts

1. **Investigation into Seizure Management Perceptions, Policies and Behaviors in Georgia Public Schools**

   Lisa Raman, Susan McCallum, Heather Bernard, Kushal Naik, Sara Kroening, Krista Lowe, Lynne Meadows (Georgia State, CHOA, Department of Public Health, Department of Education, Georgia Association of School Nurses)

   **Background:** Seizure is the third most common school emergency in the United States and is the most expensive chronic pediatric condition to treat. Children with epilepsy are at risk for prolonged seizures and may require rescue medications.

   **Problem:** Most schools do not have full time nurses and unlicensed personnel are not permitted to administer rescue medications. Seizure management policies, perceptions and behaviors are fragmented across school districts. A lack of knowledge and inter-organizational cooperation may impede efforts to reduce personal and economic burdens caused by delayed seizure management in schools.

   **Purpose:** The purpose of this investigation was to identify ways of improving seizure management in Georgia public schools so school staff can respond quickly to seizure related emergencies, promote safety, reduce emergency department (ED) visits and minimize personal and economic costs.

   **Methods:** Reviewed 350 school nurse surveys regarding needs to provide best care to students with epilepsy. Gathered family stories about their children’s experiences with seizure management in schools, compared school health policies regarding opportunities and barriers to seizure management. Reviewed and summarized all relevant scholarly literature on the topic.

   **Results:** The investigation revealed that school nurses are confident in their ability to manage seizures and train other personnel, but they need policies to support those activities; and they need detailed seizure action plans to help with seizure management in school children.

   **Discussion:** Seizure management in schools is fragmented, and because of that, children are enduring avoidable emergency room visits, physical, social and academic repercussions. Furthermore, families and many providers prefer rescue medications that can be given non-rectally. However, unlicensed staff cannot administer most rescue medications, and nurses are not always available. Increased knowledge of the implications of delayed treatment for seizures could lead to reallocation of resources.

2. **Using Machine Learning to Compare IRD Organ Transplant Survival to Waiting for a Non-IRD Organ**

   Ethan Mark, Pinar Keskinocak, David Goldsman, Brian M Gurbaxani, Joel Sokol (Georgia Tech)

   Over 20% of deceased organ donors are marked as increased risk for diseases transmission (IRD). These donors are labelled according to behavioral criteria by the CDC. Studies suggest that IRD organs are underutilized and can provide many lifesaving transplants. Using machine learning and simulation, we built organ transplant and waitlist survival models to compare the survival probabilities for a patient receiving an IRD organ vs. waiting for a non-IRD organ. Simulating 20,000 scenarios of typical organ transplant recipients and donors, we found that in 72.5% of scenarios, recipients have a higher 5-year predicted survival receiving the IRD organ than waiting, with average wait times. On average, recipients were found to have a 4.1% higher 5-year survival probability receiving the IRD organ with average wait times. Increased utilization of IRD organs can save many lives because thousands of people die on the organ transplant wait list due to the shortage of organs available for transplantation.
3. **Individual Time to Transplant Estimation in the Liver Allocation System**
Ana Estrada, Kamran Paynabar, Pinar Keskinocak, Joel Sokol (Georgia Tech)

From the moment a patient enters the waitlist for organ transplantation, the patient and the transplant team are faced with important decisions, such as medical treatment, or accepting/declining organ offers, depending on the quality. These complex decisions depend, in part, on the estimated wait time until transplantation. For liver transplantation, the United Network for Organ Sharing (UNOS) offers a liver transplant waiting list calculator. Given a patient transplant program, blood type, age and MELD score, UNOS provides the percentage of patients in the waitlist, with the same characteristics, that had a transplant in the past two years. This tool does not provide a wait time estimation; it only provides insights into the experience of similar patients in the past two years. Additionally, the scope is limited, as it does not consider relevant factors such as diagnosis, sex, race,.... In this project, we want the develop methods to predict the wait time for a liver transplantation, given the patient’s characteristics, and compare our estimates to those provided by UNOS.

4. **Pay-for-quality or Pay-for-selection? An Analysis of the Capitation Payment Models in Healthcare**
Zhaowei She, Turgay Ayer, Daniel Montanera (Georgia Tech, Georgia State)

Capitation payment models have been increasingly adopted by payers in U.S. healthcare markets during the past decade, as a remedy for fee-for-service (FFS) payment models. However, early empirical evidence found that Medicare Advantage (MA), the largest capitation program in the U.S., has been suffering from another kind of market failure: risk selection. While the existing literature attributes the observed risk selection in capitation programs primarily to imperfect estimation in risk adjustment, this paper discovers a new source of risk selection: Pay-for-Selection.

5. **Value of Inventory Information in Allocating Flu Vaccines with Limited Supply**
Zihao Li, Pinar Keskinocak, Julie Swann (Georgia Tech, North Carolina State University)

To understand the value of information on vaccine inventory levels during an influenza pandemic, we propose a simulation study to compare vaccine allocation strategies using: (i) only population information (pro-rata, or population-based, PB), (ii) both population and vaccine inventory information (population and inventory-based, PIB). We adapt an agent-based simulation model to predict the spread of the disease both geographically and temporally. We study PB and PIB when uptake rates vary geographically. Compared to PB under reasonable scenarios, PIB reduces the infection attack rate from 23.4% to 22.4%, decreases the amount of leftover inventory from 827 to 152 thousand, and maintains or increases the percentage of vaccinated population. Our results indicate the need for greater vaccine inventory visibility in public health supply chains, especially when supply is limited, and uptake rates vary geographically. Such visibility has a potential to decrease the number of infections, help identify locations with low uptake rates and to motivate public awareness efforts.

6. **Replicating HIV Transmission Clusters in a U.S. HIV Agent-Based Model**
Anne Marie France, Yao-Hsuan Chen, Zihao Li (CDC)

To validate uncertain behavioral assumptions embedded in large-scale HIV agent-based models with objective HIV nucleotide sequence data collected from HIV molecular surveillance, we designed a network-clustering algorithm that can be implemented in any agent-based HIV models. The algorithm first creates an HIV molecular network, where a link between the connected pair of infected agents exists if their HIV genomic sequences are temporarily similar, among agents diagnosed with HIV. It then groups all agents with relatively recent HIV diagnosis times into transmission clusters in the same way as the national HIV molecular surveillance system. Information used in both steps of the algorithm includes agents’ infection time, diagnosis time, and the structures of their molecular and transmission networks. After implementing the algorithm in a published US national HIV agent-based model, we compared the model’s resultant network, as well as epidemiologic statistics collected at the beginning of 2017, with those of the latest national HIV molecular surveillance data. The algorithm partitions the model’s agents diagnosed within a
predefined “recent” time window into those who are outside any HIV-transmission clusters, inside an HIV-transmission cluster, and inside a prioritized HIV-transmission cluster. Among the network and epidemiologic metrics extracted for model validation, such as the distribution of cluster size, recent diagnosed cases, and diagnosis time delay, the one that was difficult to replicate in the existing model along with other metrics is the existence of a relatively-large transmission cluster. The lack of this large-size transmission cluster, which primarily consists of men who have sex with men (MSM), implies that risky behaviors of MSM previously simulated in the model may be underestimated compared with actual data. The knowledge obtained from pairing HIV agent-based models with near real-time HIV genomic sequence data can shed light on effective strategies for controlling HIV outbreaks and targeting HIV prevention intervention.

Yifan Wang, Pinar Keskinocak, Atul Vats (Georgia Tech, CHOA)

Introduction: UPE is a multi-factorial problem that leads to complications, higher cost and even death in pediatric care. There are literatures suggesting that UPE could be related to patient insufficiently sedated or non-standardized weaning protocol. The propose of this study was to focus on a medical surgical PICU population to help identify risk factors for UPE.

Methods: We adopted a retrospective study in the PICU of CHOA on Egleston campus. The study period is 60 months, from January 2013 to December 2017. Data we used are collected from UPE huddle data, and the download of EMR for all intubated patients including detailed information on sedation received. We used two sample T test and Mann-Kendall trend test for statistical analysis.

Results: During the studied period, a total of 1975 intubation data were collected. Among the total ventilation of 19804 days, 112 UPE cases are documented. The average UPE rate is 0.565 per 100 ventilation days. There have been two sedation medication practice changes since 2014, at January 2015 and July 2017 respectively. We divide our study period accordingly into three phases. Average UPE rate in three phases are 0.35, 0.78 and 0.46 per 100 ventilation days respectively. Specifically, UPE rate decreased from 1.38 cases/100 ventilation days, on average from January to June 2017, to 0.46 cases/100 ventilation days, on average from July 2017 to January 2018.

Conclusions: Our results showed that the UPE rate changes are statistically significant between phases. During the second phase, the UPE rate increase is associated with increasing usage of morphine, precedex and propofol and decreasing usage of hydromorphone, ketamine, and lorazepam (or benzo in total). During the third phase, the UPE decrease is associated with increasing usage of fentanyl (or narco in total) and precedex, and decreasing usage of ketamine.

8. Redesigning the Biocontainment Unit: Improving the Safety of Healthcare Workers during Doffing of High-Level Personal Protective Equipment
Maria Fernanda Wong Sala, Zorana Matic, Gabrielle Conrad Campiglia, Rachel A Dekom, Craig Marshall Zimring, Jennifer R DuBose (Georgia Tech)

The 2014 Ebola outbreak highlighted the challenge of ensuring the safety of healthcare workers (HCW) during doffing the personal protective equipment (PPE) in biocontainment unit (BCU). In this study, we tested the impact of environmental design changes on reducing the frequency of behaviors associated with increased risk of contamination during doffing of PPE.

In a high-fidelity BCU mock-up built in the SimTigrate Design Lab at Georgia Tech, we conducted 41 simulations, in 2 phases, with untrained college-level students (CLS), and later with trained HCWs. We tested hypothesized optimal doffing area spatial layouts and four different stabilization aids (stool, stability bar, horizontal bar, vertical bar). In phase one, 32 untrained CLSs were completing a task using 4 different stabilization aids in 4 different layouts with varying degrees of flexibility and space demarcation. We assessed their performance using NASA’s Task Load Index (TLX), Rapid Entire Body Assessment (REBA) and Rapid Upper Limb Assessment (RULA) and counted the frequency of risky behaviors.
In the second round of simulations we evaluated the performance of trained HCWs in the redesigned doffing area. To assess the effectiveness of design improvements in reducing the frequency of risky behaviors, we compared the results before and after the design alterations.

In the first phase, participants performed best when using the horizontal grab bar or stability bar. In the redesigned space, participants’ performance improved over 20% across all metrics in both layouts. The questionnaire responses confirmed these findings: two-thirds of the participants reported a preference for the more restricted layout with a fixed stabilization aid and that using color as a visual cue effectively communicates the proper location of tools and location to stand.

Using ergonomic principles and empirical guidelines, the built environment can reduce the frequency of risky behaviors and cognitive and physical burden for HCWs increasing their safety.

9. **Design Strategies for Biocontainment Units: Learning from Ebola Preparedness**
   Jennifer R. DuBose, Zorana Matic, Maria Fernanda Wong Sala (Georgia Tech)

During the 2014-2015 Ebola outbreak, ensuring healthcare worker (HCW) safety during the delivery of patient care, particularly preventing the acquisition of a potentially lethal infection emerged as a major challenge. Doffing of personal protective equipment (PPE) is a high-risk activity because of the potential of self-contamination, and little is known about the discrete design requirements that might reduce that risk in biocontainment units (BCU).

In this observational study, we analyzed a series of 41 simulated PPE doffing exercises in four state-designated Ebola treatment centers in Georgia, USA and documented interactions between HCWs and the built environment. While doffing, the HCWs are directed through the process by a trained observer (TO). It was observed that the environment frequently impeded good communication between the HCW and TO which is extremely important for maintaining safety. Different solutions for providing stability control had variable success. Finally, the configuration of the environment impacted HCW adherence to protocol and the occurrence of risky behaviors during doffing.

From a review of published literature, observation of the simulations, focus group discussions with the study participants, and analysis of the layouts of the BCUs, we identified five requirements the doffing area should accomplish to increase process safety: facilitating communication; signifying process; providing stabilization; nudging the safest choices; and, promoting situational awareness.

This study identified insufficiencies in the environment that allowed for the occurrence of behaviors that could potentially to self- and cross-contamination as well as requirements the built environment must achieve to support more desirable, safe behaviors that improve HCW safety. Doffing PPE requires extreme vigilance from TOs and cognitively fatigued HCWs but can be facilitated by the careful design. Simple, low-cost environmental design interventions can provide the structure that supports and improves HCW safety in BCUs and should be considered for implementation in both current and future BCUs.

10. **Designing Diabetes Screening and Care Systems**
    Doug Bodner, Shivani Patel, Mohammed Ali, Megha Shah, Parth Jikar (Emory, Georgia Tech)

Diabetes (Type 2) is a major public health concern in the United States, and access to screening and high-quality care is characterized by a variety of disparities that prevent certain populations from receiving proven interventions. The central question driving this research is “What type of screening and treatment systems and system capacities would need to be in place to mitigate disparities in access and uptake of proven diabetes interventions?” We investigate this question by using a systems science approach to study how best to allocate capacities to different elements of the care system. Existing systems science approaches have created a variety of models to study the effectiveness of different interventions at the population level, but these assume that the interventions are available on demand when needed. We use agent-based simulation to model gaps in delivery in order to suggest improvements in configuring resource allocation so that needed treatments are in fact available across socio-demographic subgroups and the socioeconomic spectrum. In this presentation, we describe the initial phase of the research, which
focuses on modeling individual characteristics, behavior and health states; provider networks, capabilities and costs; family and social network influencers of behavior; community resources and influences; and how these elements interact to generate health outcomes, costs and disparities.

11. Decision Support Tool for Patients in the Prenatal Space
Akane Fujimoto Wakabayashi, Pinar Keskinocak, Turgay Ayer, Jia Yan, Kalyan Pasupathy, Santiago Romero-Brufau, Mustafa Sir, Myra Wick, Lars Nielsen, Laura Rust (Georgia Tech, Mayo Clinic)

During pregnancy, expectant parents have the option to test for common chromosomal aneuploidies in the baby such as Down Syndrome. In the past, maternal age during pregnancy and medical history were the only indicators to assess the risk of having an affected pregnancy. Currently, there are multiple screening and diagnostic tests that use blood, ultrasound, and other biomarkers, with high sensitivity and specificity.

Given the nature of prenatal testing, decisions made in this space are heavily based on the personal belief and values of the parents and are known to be emotionally charged and difficult. While some parents may prefer to learn beforehand that their baby could have a chromosomal disorder, others prefer not to. In this research, we present a decision support tool designed to improve the user’s understanding of prenatal testing to facilitate decision-making. The tool includes a visualization section of the user’s risk profile pre- and post-screening test (if applicable). Additionally, the tool allows users to reflect on the different outcomes of having a diagnostic test and it offers decision support using the patients’ preferences and risk profile. The tool aims to increase the user’s understanding of prenatal screening and to reduce decisional conflict.

12. Variation in Living Donor Kidney Transplantation and the Impact of Medicaid Expansion
Taylor Melanson, Stephen Pastan, Rachel Patzer (Emory)

Living donor kidney transplant (LDKTx) is the preferred treatment for end-stage renal disease (ESRD). Medicaid Expansion increased insurance coverage and this influx of insured patients may impact kidney transplantation. In this study we describe variation in LDKTx rates and estimate the impact that Medicaid expansion had on patients’ likelihood of receiving a LDKTx.

Using United Network for Organ Sharing (UNOS) and United States Renal Data System data we describe variation in LDKTx and examine factors associated with rates of LDKTx among waitlisted patients in 2016. We graphed LDKTx rates at the transplant center-level and the UNOS regional-level. We examined transplant center factors that may drive differences in LDKTx using ordinary least squares. We use both difference-in-difference and ordinary least squares analyses to examine the impact of Medicaid Expansion on LDKTx rates.

The distribution of LDKTx rates suggests that while most centers performed relatively low rates of LDKTx, some centers vastly outperform others (Range: 0-19.3% of waitlisted patients in 2016). LDKTx rates in Early states declined ~ 0.2 percentage points after expansion, while Late states declined ~0.3 percentage points (both relative to Never states). When we examine the likelihood of receiving a LDKTx at the patient level we find that expansion is associated with a decrease in the likelihood of LDKTx within the first year of 2.3 percentage points (p<0.001). There exists considerable variation in LDKTx rates at the transplant center and regional levels, suggesting that initiatives to encourage living donation may be beneficial. After Medicaid Expansion, rates of LDKTx decreased. Medicaid expansion increased insurance coverage, but did not improve access to LDKTx, meaning that insurance is perhaps necessary, but not sufficient, to provide access to optimal treatment. The significant variation seen across transplant centers is concerning as we work towards equitable treatment for patients across the nation.

13. Georgia Tech Applied Bioinformatics Laboratory (ABiL): Converting Genome Sequence Data to Clinically Actionable Knowledge
Lavanya Rishishwar (Georgia Tech)

Effective healthcare delivery is increasingly relying on genome sequence-enabled approaches to precision medicine, whereby medical treatments are tailored to individuals (or populations) based on their distinct genetic profiles. Genomic approaches to healthcare generate massive amounts
of sequence data, which need to be converted into actionable medical knowledge in real time. The Georgia Tech Bioinformatics Graduate Program recently established the Applied Bioinformatics Laboratory (ABiL - http://abil.ihrc.com/) in partnership with the local consulting company IHRC, Inc. to provide bioinformatics solutions to clinical genomic data analysis challenges. ABiL offers a wide range of bioinformatics services aimed at transforming raw genome sequence data (information) into clinically actionable knowledge. ABiL scientists work collaboratively with partners from the medical, government, non-profit, and industry sectors to provide custom-designed and turn-key solutions for a variety of data analysis challenges. Our services include end-to-end project management including conception, planning and execution. ABiL team members also deliver a series of hands-on instructional modules that can be used for continuing medical education (CME) and training in bioinformatics. Course content is delivered in small group settings via an active-learning instructional model; individualized expert consultation in bioinformatics is also available.

14. Informatics-based Literature Mining for Predictive Medicine: Personalizing Chronic Myeloid Leukemia Therapy
Nidhi Mehra, Anish Bikmal, Prahathisthree Mohanavelu, Mira Mutnick, Cassie Mitchell (Georgia Tech)

Often many therapies are available for certain diseases. For example, there are a number of tyrosine kinase inhibitors (TKIs) available as chemotherapeutic agents to treat Chronic Myeloid Leukemia (CML). However, even therapies within the same class have varying therapeutic efficacy and side effects that are, in large part, due to the heterogeneity within a patient population. The ability to identify the most effective therapy that best suits a patient’s individual needs, history, and lifestyle is critical for successful patient compliance and, ultimately, disease control. We propose a new method for mining and “quilting” patient research, cohort, and clinical trials. Using this aggregated data, we build predictive medicine models that consider a multitude of relationships and patterns to select the best therapeutic agent given a patient’s individual characteristics. Our method, which involves text mining and machine learning, is able to help select the best individualized treatment in order to assist in patient and clinician decision-making. Resulting predictive medicine models also can be used to identify new or under-studied relationships that could drive new etiological targets or improved therapies. We present a case study with Chronic Myeloid Leukemia (CML) where all of the PubMed literature is used to develop a personalized TKI selection model for CML. It correctly identified and confirmed pertinent side effects for specific drugs that clinicians need to be aware of when considering each CML patient’s prior medical history. The long-term goal is to not only solidify the CML model and others like it, but also develop in-clinic application platforms where such models can be run “live” with ease for on-the-spot clinical decision making.

15. Facilitating Automated and Unbiased Literature Review on Biomedical Concept Relationships in a Heterogeneous Information Network
Andrew Sedler, Breanna Lee, Cassie Mitchell (Georgia Tech)

Most scientists know that building a mental model of a given subject area, especially in healthcare & medicine, takes a considerable investment of time and resources. Even after this model has been constructed, it is subject to the various cognitive biases and heuristics that the human brain uses to make judgements when it can’t possibly know all of the facts. The mental model must also be constantly updated by pouring through relatively few papers out of the unending stream of new literature. The biomedical field is notoriously interconnected due to its inherent complexity, making it difficult for an individual to see the complete context of a research question even after a lifetime of study. While this problem is unlikely to disappear, we can supplement our individual associative machines with the collective intelligence stored in the scientific literature. In this work, we have created software that queries a modified version of the Semantic Medline graph database from the National Library of Medicine (30+ million article abstracts). It computes several metapath-based features from the patterns and frequencies of node and edge types, and uses these to vectorize the concepts of interest. We demonstrate the utility of our approach by clustering and ranking the interventions and risk factors associated with impaired cognition as a first step to increasing the interactivity and accessibility of this body of knowledge for identifying therapeutic targets for intractable disease like Alzheimer’s, frontotemporal dementia, and others.
16. Optimizing Insurance Guidelines for Medical Devices: A case study of Bi-level positive airway pressure and Amyotrophic Lateral Sclerosis
Nishad Khamankar, Leila Bond, Paularny Ganguly, Nolan Mallet, Cassie Mitchell (Georgia Tech)

Many times expensive interventions are often not covered early enough in a patient's disease progression. This results in delayed treatment that decreases patient survival, increases complications, and ultimately increases healthcare costs long-term. As an example, bi-level positive airway pressure (Bi-PAP) is a non-invasive respiratory intervention used to help Amyotrophic Lateral Sclerosis patients breathe. Normally, Bi-PAP is declined by insurance until a patient's respiratory capacity (e.g., % predicted forced vital capacity or FVC) is 50% of normal. Here we perform one of the largest retrospective cohort studies to date showing that earlier access to Bi-PAP when a patient's %predicted FVC > 80 can nearly double survival. Moreover, there is a positive synergy between Bi-PAP and another intervention, cough assist—a device used to help ALS patients clear secretions. Use of these two devices dramatically increases ALS patient survival, but to receive conferred benefit, the devices must be used earlier in the disease course before precipitous drop in respiratory function. This case study illustrates how data-enabled optimization of interventions can help improve insurance costs and improve patient survival and quality of life. Our results illustrate the need to change current insurance guidelines for Bi-PAP and cough assist to enable earlier access to these necessary interventions for ALS patients.

17. An Agent-Based Simulation for Guinea Worm Infections in Dogs: Testing Hypotheses to Explain Seasonality
Tyler Perini, Pinar Keskinocak, Julie Swann (Georgia Tech, North Carolina State University)

One of the recently found obstacles to eradicating the Guinea Worm parasite in Chad and other endemic African countries is the prevention of infections in dog hosts, which far outnumber the dwindling amount of human infections. We present the first agent-based simulation that models transmission between a (shared) water source and a large population of dogs, which function independently as agents on a day-to-day basis. The simulation also incorporates (1) a sigmoidal infectivity function, which has few parameters to calibrate, (2) seasonality of infectivity, as seen in empirical data of dog infections, and (3) two currently employed interventions at reported coverage levels. By calibrating the infectivity parameters for several different hypothetical environmental factors, we experiment with potential explanations for the seasonality of infections; the results indicate that a combination of temperature and rainfall can explain this phenomenon. Furthermore, by also calibrating the environmental factors (as parameters), there is additional support for a steady decrease in infectivity over the summer months. The results of the simulation not only inform the research community on transmission dynamics of the Guinea Worm parasite, but it also informs eradication program managers on the peak season to apply interventions. In addition, this tool can be used to forecast the effectiveness of potential intervention schemes, in order to inform program managers of the combination of interventions that is most likely to lead to eradication.

18. Team-NEEDS based analysis of primary-care clinics
Fatemeh Motamed Rastegar, Jennifer DuBose, Craig Zimring (Georgia Tech)

Evidence-based design is based on the proposition that specific designs and design strategies can lead to better organizational and individual outcomes. This is best accomplished using a method that allows designers, researchers and end-users to collaborate effectively and clarifies which design characteristics are most likely to achieve these outcomes. In this paper we present a method we have developed to translate user needs into spatial requirements against which designs can be evaluated. Using our 'functional scenario' method we are able to discern design strategies that support organizational goals which can then be included in design guidelines and used to evaluate future projects. We provide an example of how this method was used to evaluate the design of an ambulatory care team room, but the ‘functional scenario’ method has broad applicability to other building types.
19. Home Health Care Routing and Scheduling with Consistency in Patient-Aide Assignments
Seyma Guven-Kocak, Aliza Heching, Pinar Keskinocak, Alejandro Toriello (Georgia Tech)

This work addresses a real-world home health care routing and scheduling problem (HHCRSP) faced by a home care agency in the United States. In home health care scheduling, there is a desire to retain consistency with respect to the home health aide servicing each patient; this consistency is referred to as "continuity of care". To address this preference for continuity of care, we propose a rolling horizon approach to the routing and scheduling problem and introduce the consistent home health care routing and scheduling problem (Con-HHCRSP). We present two different constructive methods to solve HHCRSP on a daily basis: an integer programming-based method with approximations and a variant of a petal heuristic. We present adjustments on these methods to address Con-HHCRSP, where the goal is to be able to quantify and control the deviation of the new schedule suggested each day from the existing schedule in place, so that some of the existing assignments may be retained in the new schedule that is produced. We discuss the performance and computational efficiency of these methods.