



2019-2021

# Developing a Mental Health Resource Road Map for Adams County Health & Human Services

Industrial & Systems Engineering 450: Senior Capstone  
University of Wisconsin-Madison



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## **1.0 Introduction**

### **1.1 Company Overview**

Adams County Department of Health and Human Services Department focuses on public health and offers many support services to the community. Their vision is *to be a leader as a supportive organization to advocate for preservation, health and well-being of the community* [1]. Their mission is to *provide services that enhance quality of life by focusing on prevention, safety, wellness and self-sufficiency* [1]. *In partnership, we provide a continuum of integrated services that empower by preserving and strengthening individuals, families and the community* [1].

### **1.2 Project Background and Motivation**

Adams County recently hired a new advanced practice nurse prescriber (APNP) into their Health and Human Services (HHS) Department. The APNP is certified to prescribe medications for consumers which makes her a valuable resource to the county as other mental health providers cannot. Due to the high demand of this service, the department needs to make decisions regarding which consumers can be treated internally and which need to be referred to external providers. Previously, the county only had the ability to treat adults, but the new APNP is qualified to serve children as well, which will create a massive influx in the number of consumers seeking services. The lack of a current standard method for determining which consumers to treat internally prevents the department from operating effectively. Upon completion of this project, the department will have the knowledge and tools to develop and maintain a manageable intake process.

### **1.3 Project Aim and Objectives**

The aim of this project is to improve Adams County's mental health treatment intake process in order to allow the department to operate efficiently enough to treat 100% of their potential care capacity. There are two major objectives that we focused on during this project. The first is to develop tools to support the HHS department in determining a threshold for what types of potential consumers they can serve. The second objective of this project is to streamline the overall intake process to reduce non value added time that the HHS team spends on intaking consumers.

### **1.4 Project Deliverables**

1. Project Charter Document: February 25th
2. Analysis of APNP's availability: March 2nd
  - a. This portion of the project determines the APNP's care capacity and provides a schedule that the APNP can follow to onboard consumers in a timely manner.
3. Current State Flow Mapping: March 16th
  - a. This flow map records Adams County's current state of the adult intake process.

4. Situation Analysis: March 19th
5. Child Consumer Criteria Priority Matrix: April 6th
  - a. Categorized and ranked list of which consumers should be treated internally. This tool was created using a pairwise matrix and has been critical in the development of the final deliverable of the priority score calculator
6. Priority Score Calculator: April 13th
  - a. Assigns a child a “priority score” based on weights determined in the Child Consumer Criteria Priority Matrix. This tool will be helpful to understand which children to prioritize if many referrals are received at once.
7. Presentation for Adams County Health & Human Services: April 27th
  - a. Present project and deliverables created throughout the semester to Adams County Health & Human Services management team.
8. Handoff Project Folder: May 5th
  - a. Training on how to use/modify deliverables to be used in Adams County Health & Human Services professional work.
  - b. Provide the clients with the complete project folder.

## **1.5 Project Activities and Milestones**

1. Data gathering and analysis of APNP availability: February 26th
2. Current state analysis to develop Child Intake Process Flow Map: March 9th
3. Brainstorming session with client team to distinguish consumer criteria: March 16th
4. Pairwise matrix workshop with client team to determine criteria rankings: March 23rd
5. Priority Score Calculator discussion with client team to make adjustments: March 30th
6. Discussion of handoff work package and plans for final presentation: April 6th
7. Present deliverable to management team: April 27th
8. Final client meeting. Implementing sustainability plans: May 5th

## 2.0 Current State Analysis and Findings

### 2.1 Purpose of Situation Analysis

The main purpose of the situation assessment is to describe Adams County's current state of their intake process for adult consumers. From the findings of the adult process current state analysis, we developed our first flowchart deliverable, the Intake Process Flow Map. Using this deliverable, along with its pain points, we hope to lay out the new referral process for children consumers that reduces inefficiencies for our client team.

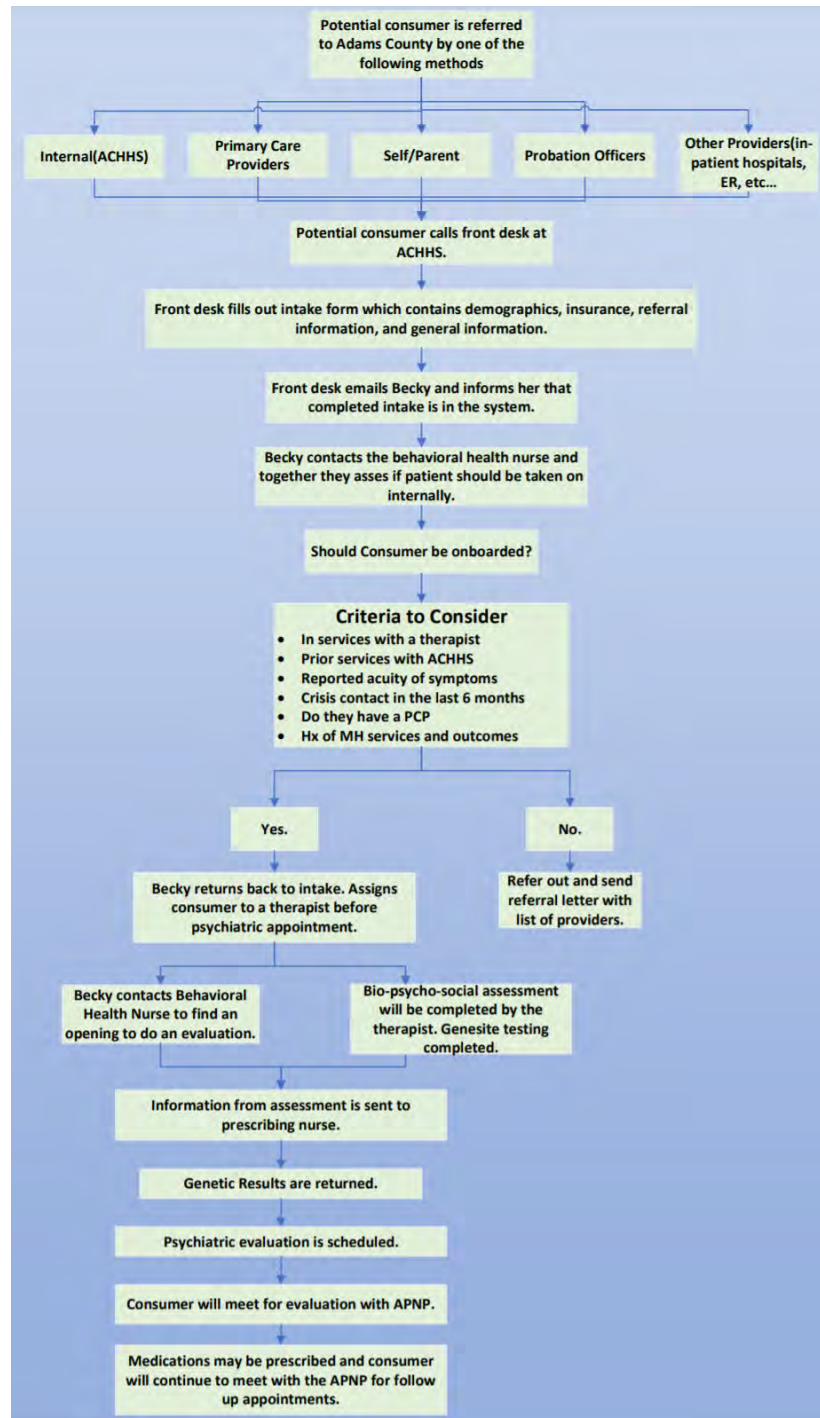
The second purpose of this assessment is to investigate the APNP's current availability for treating child consumers. This information was used to develop an APNP Intake Schedule. To achieve this, we utilized current constraints that exist such as time, intake load per week, and max capacity.

### 2.2 Intake Process Flow Maps

One of the main goals of our project was to streamline the intake process of new consumers in Adams County. To do so, we created Process Flow Maps to aid in the visualization and communication of these processes. The Intake Process Flow Maps depicted the current state of the adult intake process as well as a future state intake process for child consumers. To visualize and help reform this process, we used the PDCA methodology to create the Adult and Consumer Intake Process Flow Maps for Adams County Health & Human Services.

Starting in the *Plan* phase, we gathered information by completing a walkthrough during our first meeting with our clients. Due to restrictions that prevented us from meeting in person, our team verbally walked the current state process with the clients to understand each step. After we obtained this information, we entered the *Do* phase and were able to create the first iteration of the Intake Process Flow Map and presented it to our clients. We then took the feedback and entered the *Check* phase to update our map. We returned to the *Do* phase and shared the latest iteration, receiving more feedback. We *Checked* once more and used the latest feedback to create the final iteration. The Map was then in the *Act* stage to be used by the client and as a starting point for our team to develop the child Intake Process Flow Map.

We obtained the specifics clarified during those meetings by walking through the deliverable with Becky, who is the subject matter expert, step by step. She explained the specific staff member involvement, vocabulary clarifications, and overall organization of the process. Along with clarifying the current process, she commented on how this flow may be adjusted for the child intake process. These differences were noted and will be adjusted on the final Children Intake Process Flow Map deliverable. The current version of the Intake Process Flow Map is shown below.



**Figure 1: Adult Consumer Intake Process Flow Map**

Once our current state analysis of Adams County’s Intake process was completed, we were able to start modifying the process to fit child consumers, who are the main priority of this project for Adams County currently. We followed a similar process with PDCA to create this deliverable. We created this flow map, by again, doing walkthroughs with our subject matter expert, Becky.

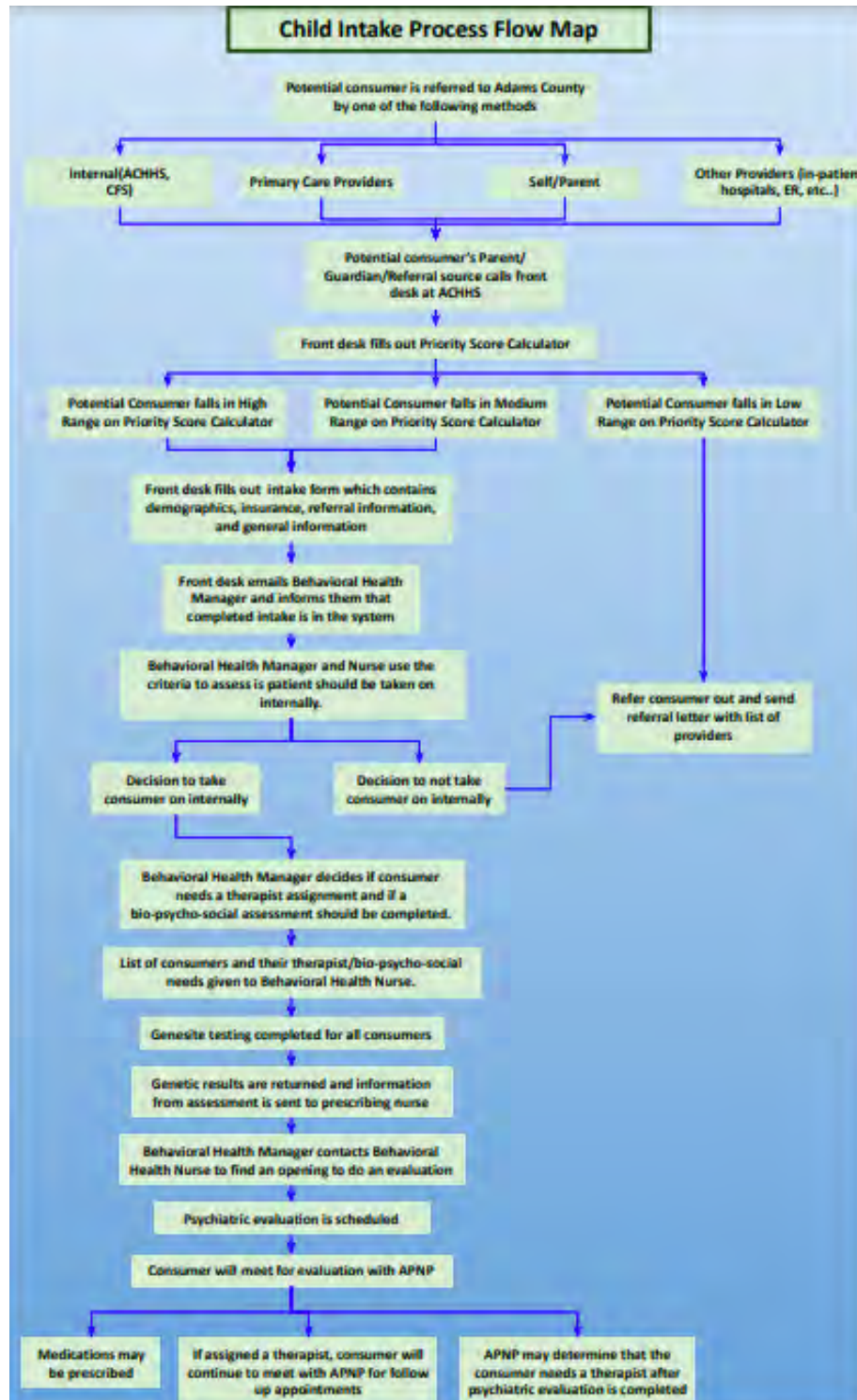


In the *Plan* phase, we did a walkthrough of what Becky initially thought the child intake process would look like and how it would differ. After we met with Becky, the *Do* phase began and we were able to create the first iteration of the Child Intake Process Flow Map and presented it to our clients. We came into this meeting with specific questions about how the referral process differed from adults, after reviewing the initial process flow Becky laid out. We learned that there are no Probation Officers for child consumers and that children can also be referred internally not only through Adams County HHS, but also Child Family Services(CFS). There were also differences in the required steps after a consumer is decided to be taken on. For children, not all will need a bio-psycho-social assessment, this differs from the adult intake process.

We then took the feedback and entered the *Check* phase and updated our map with all these newly discovered differences and incorporated our new Priority Score Calculator. The Priority Score Calculator will help Adams County determine which children should be taken on internally and is crucial to incorporate into the new Process Flow Map. To save Adams County time, we decided to modify the front desk role. Instead of just filling out an intake form for every interested consumer, the front desk will now fill out the priority score calculator and if the consumer falls in the medium to high range, then the intake form will be filled out. If they fall into the low range, they will automatically be referred out. This will save hours each week for Becky and the Behavioral Health Nurse time and in result saving money, by not having to analyze every child consumer that is referred to Adams County.

We returned to the *Do* phase and shared the latest iteration of the map. We discussed if the plan to use the Priority Score calculator in this step was adequate and she gave us a few minor critiques on the usage of it as well as a few of the other steps. We *Checked* once more and used the latest feedback to create the final iteration.

The Map is now in the *Act* stage and is ready to be used internally by Adams County HHS. It will also be used by Child and Family Services, Coordinated Services, Behavioral Health Divisions, school administration teams, and local health care systems so they can understand this process and criteria to better make their referrals. The new Child Intake Process Flow map is shown below.



**Figure 2: Child Consumer Intake Process Flow Map**



## 2.3 APNP Intake Schedule

One portion of the Intake Process Flow Map is scheduling a newly onboarded consumer. To begin scheduling additional consumers our team needed to perform a current state analysis to determine the APNP's care capacity and from there develop an intake schedule for her to follow. The goal of this deliverable is to accurately determine the current state of the APNP's treatment potential and use that to recommend long-term consumer intake plans.

We followed a PDCA cycle for developing this tool. In the Plan phase, we collected data during our meeting with the clients who compiled it from their database along with interviews with the APNP. This data included the current adult encounter time per month (4 weeks) which is 70 hours and the amount of available monthly encounter time which is 120 hours. Encounter time is described as direct consumer contacts such as initial appointments and follow-ups. By performing simple algebraic calculations our team concluded that the APNP has 12.5 hours of weekly available encounter time to utilize for children consumers.

Our client provided us information on the current state of their treatment plans. The typical treatment process is as follows; an initial intake appointment with a duration of 1.5 hours, followed by two bimonthly 30-minute check-in appointments, and lastly, recurring 30 minute monthly appointments indefinitely. The client team is certain that there will be exceptions to this process and our team ensured them that we would include a buffer in our analysis to account for that uncertainty which is described later in this report.

Month	1				2				3			
Week	1	2	3	4	5	6	7	8	9	10	11	12
Consumer 1	1.5		0.5		0.5				0.5			
2	1.5		0.5		0.5				0.5			
3		1.5		0.5		0.5				0.5		
4		1.5		0.5		0.5				0.5		
5		1.5		0.5		0.5				0.5		
6			1.5		0.5		0.5				0.5	
7			1.5		0.5		0.5				0.5	
8				1.5		0.5		0.5				0.5
9				1.5		0.5		0.5				0.5
10				1.5		0.5		0.5				0.5

**Figure 3: Portion of 1 Alternative for APNP Schedule**

In the *Do* phase, we performed an analysis in excel. A small portion of the excel sheet for one intake alternative that we developed is shown above. We knew that we had to comply with the two constraints, 12.5 hours of encounter time and the structure of treatment plans while maximizing the maintainable care capacity. We were originally informed that it is reasonable to

expect that the APNP can intake 5 consumers per week, but the client team is concerned about APNP burnout, so they do not want to rush the intake process. To compensate for that concern our team decided that we would develop multiple intake plans to offer to our clients. To begin the analysis we simulated intaking 5 consumers per week for as many weeks as possible. In week 9 the schedule displayed the APNP at 7.5 hours of encounter time spent only on follow-up appointments from the consumers who were onboarded in weeks 1 through 8. This resulted in only being able to intake 3 consumers to stay below the 12.5-hour constraint and not the intended 5 consumers. The process of intaking the maximum number of consumers each week while staying below the 12.5-hour constraint continued, though most weeks only 2 or 3 could be onboarded because of the 1.5-hour initial appointment. Eventually, we ran out of space to intake any other consumers as the APNPs weekly encounter time leveled out at 11.5 hours per week. This was the end of the analysis for the 5 consumers per week intake plan but with a structure in mind for how to develop intake plans, we were comfortable moving on to create more with varying intake rates. We created plans with intake rates of 2, 3, and 4 consumers per week. The plans with the lower intake rate per week resulted in a longer duration to hit their maximum care capacity which is shown in Table 1. All plans reached the same maintainable care capacity of 92 consumers. The determination of and reasoning for that baseline is discussed below.

**Table 1: Intake Rate's Effect on Weeks to Reach Care Capacity**

<b>Intake Rate</b>	<b>Weeks to Reach Care Capacity</b>
5 consumers	44
4 consumers	46
3 consumers	49
2 consumers	60

After creating these intake schedules it was fairly easy to determine the baseline for her current maintainable care capacity. The APNP can serve 12.5 hours of encounter time each week. Looking beyond the weeks spent intaking consumers and focusing on only the weeks when all consumers were in their monthly follow-up appointment cycles we learned something very interesting that allowed us to determine the baseline of maintainable care capacity. Over a 4 week period, the APNP can serve 100 consumers if they are each only receiving a 30-minute appointment. 100 however is not the maintainable care capacity. It is essential to note that the initial intake appointment of a consumer is 1.5 hours. When the APNP is operating at an encounter rate of 11.5 hours per week or higher, no more consumers can be onboarded because their 1.5-hour intake appointment would break the 12.5-hour constraint. Using the same reasoning as above, but instead calculating for 11.5 hours of availability for 30-minute follow-up

appointments, it is easy to observe that the capacity is 92 consumers per month. This baseline value was confirmed in our analysis as every intake plan that we developed by hand reached a maintainable care capacity of 92 consumers and then could no longer fit any more consumers into the plan.

All plans include a buffer for future months to account for unexpected uncertainty. Once all consumers are in their monthly recurring checkups, the APNP is operating at a rate of 11.5 hours of encounter time per week. This is one hour less than her allotted amount. This buffer will be used when it is necessary to operate away from the intake plan that our group developed. Some examples of unpredictable events that will eventually occur include but are not limited to; a consumer no longer needing service, the addition of a new consumer that requires a 1.5-hour intake appointment, or consumers needing an urgent appointment due to a crisis.

To *Check* our deliverable, we met with our clients and discussed the alternatives and their priorities. The client team believes that a slower per-week intake rate is the best intake strategy for their group. They made this decision because this slower overall intake rate will not burn out the APNP. Burnout is a higher priority to them than the length of time it will take to reach the care capacity. We returned to the *Do* phase of PDCA with their feedback in mind to develop a new intake schedule. We created an intake schedule that alternates intaking 2 and 3 consumers each week. This intake plan takes 57 weeks to reach the 92 consumer care capacity.

In addition to the new rate, we modified the plan to have a designated “flex time” every other week. The client team felt that this period is important to include in case there is a consumer in crisis that must be seen immediately. By using this intake schedule as a guide, the client team can begin intaking consumers with a designated plan for how the intake process will proceed. The next steps for this tool will fall into the *Act* phase of PDCA where the client team will apply this intake schedule to start serving consumers.

### 3.0 System/Process Design and Evaluation

#### 3.1 Child Consumer Criteria Priority Matrix

One of the largest pain points in this project has been not knowing which child consumer to accept with the limited capacity of the APNP. The ethical dilemma of turning away consumers is not an easy burden to bear. How does one choose which consumers deserve care and which do not? This is an issue that Adams County HHS deals with currently and will deal with in an increased capacity once child consumers are onboarded. A goal of this project is to help Adams County HHS establish a set of criteria to follow when evaluating eligibility for onboarding consumers, in hopes to remove some of the emotional reasoning from decision making. The Child Consumer Criteria Priority Matrix was developed to meet that goal.

We followed a PDCA cycle for developing this tool. During the *Plan* phase, we held brainstorming sessions and had extensive conversations about the current pain points in the process and possible solutions. Our team's recommended approach to design this process and help Adams county quantify a challenging quality-based problem is to use a pairwise matrix. The pairwise matrix will allow us to rank consumer criteria in hopes of limiting the intake to prioritized consumers.

Moving into the *Do* phase, we first determined the necessary criteria for child consumers by holding brainstorming sessions with Adams County HHS Staff who are experts in this field.

Step 1: Determine Criteria
Age 7 -17
Parental consent
Acuity of symptoms (MH/Behavioral)
Enrolled in at least 2 or more HHS program
Crisis Contact in the last 6 months
CHIPS/JIPS status
At-risk of out of home placement
Currently in Adams County Foster Care/Kinship Care
Delinquency status
School discipline/IEP
Enrolled in CCS or CST
Truancy status
Open to BH - Crisis Program
Current/Hx of therapy involvement
Open to Children and Family Services

Figure 4: Screenshot of the Determined Criteria

Continuing the *Do* phase, we held a workshop with Kelly and Becky and completed the pairwise matrix by comparing each criteria to all of the others and deciding the more important criteria for preferred child consumers.

	Age 7 -17	Enrolled in at least 2 or more HHS program	Acuity of symptoms (MH/Behavioral)	Parental consent	Crisis Contact in the last 6 months	School discipline/IEP	Current/Hx of therapy involvement	Currently in Adams County Foster Care/Kinship Care	CHIPS/JIPS status	Delinquency status	Truancy status	At-risk of out of home placement	Open to Children and Family Services	Enrolled in CCS or CST	Open to BH - Crisis Program
Age 7 -17															
Enrolled in at least 2 or more HHS program															
Acuity of symptoms (MH/Behavioral)															
Parental consent															
Crisis Contact in the last 6 months															
School discipline/IEP															
Current/Hx of therapy involvement															
Currently in Adams County Foster Care/Kinship Care															
CHIPS/JIPS status															
Delinquency status															
Truancy status															
At-risk of out of home placement															
Open to Children and Family Services															
Enrolled in CCS or CST															
Open to BH - Crisis Program															

**Figure 5: Completed Child Consumer Criteria Priority Matrix**

After completing the pairwise matrix workshop, the criteria were able to be organized into a ranked and weighted list.

Step 7: Take sorted ranked criteria to prioritize patients			
	Number of Times Each Option Won Out	Percentage	Rank
Age 7 -17	15	12.50%	1
Parental consent	14	11.67%	2
Acuity of symptoms (MH/Behavioral)	13	10.83%	3
Enrolled in at least 2 or more HHS program	12	10.00%	4
Crisis Contact in the last 6 months	10	8.33%	5
CHIPS/JIPS status	9	7.50%	6
At-risk of out of home placement	9	7.50%	7
Currently in Adams County Foster Care/Kinship Care	8	6.67%	8
Delinquency status	7	5.83%	9
School discipline/IEP	6	5.00%	10
Enrolled in CCS or CST	5	4.17%	11
Truancy status	4	3.33%	12
Open to BH - Crisis Program	4	3.33%	13
Current/Hx of therapy involvement	2	1.67%	14
Open to Children and Family Services	2	1.67%	15
Total Points	120		

**Figure 6: Ranked and Weighted List of Criteria**

The *Check* phase primarily consisted of our client team checking with their staff to see if they had different opinions on the determined criteria and how it was prioritized. It was relayed back to us that the staff was on board but had one concern about the flexibility of the tool. We then considered heavily that these criteria originally set and discussed with team members are subject to change. It became a priority in the design process to make sure that this deliverable was flexible and easy to change. We assured this by using software that our client was familiar with and training in Adams County HHS employees to be able to edit this document when changes arise.

Lastly, the *Act* phase consists of the implementation plan for this tool. The Child Consumer Criteria Priority Matrix will be used internally by the Adams County HHS team to adjust when changes arise. Also, it is exciting to note that Adams County HHS staff have vocalized to us that they expect to use a pairwise matrix for some other projects, i.e. truancy referrals and other voluntary service requests because of its ability to rank quality-based characteristics.

### **3.2 Priority Score Calculator**

After creating the Child Consumer Criteria Priority Matrix, we wanted to create a tool that could be used as an application of the weighting of required and preferred criteria. To do so, we followed a PDCA cycle to develop a user-friendly tool we call the Priority Score Calculator. Our client can use the Priority Score Calculator to help our client determine which children to prioritize for onboarding, especially when many referrals are received at once. We already knew we wanted to develop a tool that would automatically assign a “priority score” to each child. So in the *Plan* phase, we brainstormed different platforms that we could build the tool in. We considered using a google form but ended up deciding that using google sheets would be the most intuitive platform.

In the *Do* phase, we built the tool in excel and fine-tuned it as we went. Each criteria has a weight number that was determined in the Child Consumer Criteria Priority Matrix. The user types an ‘x’ a blue box if a child satisfies the respective criteria. The tool then automatically sums up the weights of all the criteria that a child satisfies. This sum is the “priority score” assigned to that child (see Figure 1). A child with a priority score of 100 has the highest priority, and a child with a priority score of 0 has the lowest priority. Say, for example, a group of 5 children are all referred to at once. The Priority Score Calculator calculates a priority score for each child. Their respective priority scores are 50, 67, 92, 41, and 33. If there are only 3 children that can be onboarded that week, determined by the APNP Intake Schedule (see *APNP Intake Schedule*), then the children with priority scores 92, 67, and 50 are selected to be onboarded.





### 3.3 Evaluation of Design

In order to assess the “goodness” of our design, we laid out some goals our project had sought to accomplish. These goals were determined alongside Kelly and Becky keeping in mind the needs of Adams County Health and Human Services to begin onboarding child consumers. In the table below, we have laid out the goals determined, if it was met and how it was met.

**Table 2: Assessment of the goodness of our design.**

<b>Goal</b>	<b>Was it met?</b>	<b>How?</b>
Understand current process and agency needs	Yes	APNP Intake Schedule
Determine APNP availability	Yes	APNP Intake Schedule
Ensuring the onboarding process is within the constraints of the APNP's availability	Yes	APNP Intake Schedule
Organize materials to allow transparency across the organization	Yes	Child Intake Process Flow Map
Layout child consumer workflow process	Yes	Child Intake Process Flow Map
Develop a strategy to help staff limit child consumer influx	Yes	Child Consumer Criteria Priority Matrix/ Priority Score Calculator
Develop a tool with a flexible/efficient design	Yes	Child Consumer Criteria Priority Matrix/ Priority Score Calculator
Develop a tool to help staff rank preferred child consumer criteria and prioritize child consumers	Yes	Child Consumer Criteria Priority Matrix/ Priority Score Calculator
Complete training of the tool to allow for future updating	Yes	Client Presentation/Handoff Work Package

### 3.4 Evaluation of Alternative Designs

We believe that our designs for scheduling the APNP and prioritizing children to onboard are the best solutions to solve the initial problem statement when compared to alternative design options.

Our solution for APNP scheduling is the most flexible and manageable. Our solution alternates between onboarding groups of two and three children every other week, with that third meeting serving as a “flex” meeting that is built in just in case a child needs an emergency crisis meeting with the APNP. One alternative solution could have been to onboard four or more children in one week, which was something that the APNP wanted at first. This solution isn’t as good because it could overwhelm the APNP to take on that many children at once, which was one of our main goals to avoid with the schedule. Another alternative solution may have been to leave out that third flex meeting every other week. This solution isn’t as good because it does not accommodate emergency crisis meetings that our client expects to need relatively often.

**Table 3: Comparing APNP Schedule Design Alternatives.** The APNP Schedule selected meets the goals established to assess the goodness of design. See the goals established in Section 3.3. Note the alternatives do not meet all of the goals.

Goal	Was the goal met by each design?		
	APNP Intake Schedule Selected	Alternative APNP Intake Schedule: Onboard four or more children in one week	Alternative APNP Intake Schedule: No “flex” meeting
Understand current process and agency needs	Yes	Yes	No. doesn’t understand agency needs for emergency crisis meetings.
Determine APNP availability	Yes	Yes	Yes
Ensuring the onboarding process is within the constraints of the APNP’s availability	Yes	No. APNP could become overwhelmed taking on that many children at once	No. APNP would become overwhelmed trying to manage taking in an emergency crisis meeting without allocated time

Another design that we feel is important to evaluate is our solution for prioritizing potential consumers. Our solution limits bias and is standardized. It assigns a child a priority score based on weights for each criteria determined by the Child Consumer Criteria Priority Matrix. If many

referrals are received at once but there is limited capacity, children with the highest priority scores are chosen to be onboarded. An alternative solution may have been to base the decision of which children to onboard on a first-come-first-serve basis. This isn't as good because it does not prioritize the most acute and severe cases. Another alternative solution may have been to base the decision on a conversation between the behavioral health staff. This isn't as good because decisions could be biased and may differ on a case-by-case basis if swayed by emotion or the way information about a child is communicated or presented. Also, those conversations could add non-value-added time to the process workflow.

**Table 4: Comparing Design Alternatives for Priority Scoring.** The Child Consumer Criteria Priority Matrix and the Priority Score Calculator meet the goals established to assess the goodness of design. See the goals established in Section 3.3. Note the alternatives do not meet all of the goals.

Goal	Was the goal met by each design?		
	Child Consumer Criteria Priority Matrix/ Priority Score Calculator	Alternative first-come-first-serve model	Alternative conversations between behavioral health staff (current state)
Develop a strategy to help staff limit child consumer influx	Yes	No. There would be no control on the influx of child consumers)	Yes
Develop a tool with a flexible/efficient design	Yes	No. Not flexible.	No. Inefficient and would take up a lot of health staff's time.
Develop a tool to help staff rank preferred child consumer criteria and prioritize child consumers	Yes	No: No tool developed.	No: No tool developed.

### 3.5 Consideration of Engineering Standards

As described by The National Standards Policy Advisory Committee, Engineering Standards are *"A prescribed set of rules, conditions, or requirements concerning definitions of terms; classification of components; specification of materials, performance, or operations; delineation of procedures; or measurement of quantity and quality in describing materials, products, systems, services, or practices."* These standards play a crucial role in business practices and

have many benefits including safety, quality, interchangeability of parts or systems, and consistency in products and processes across international borders.

Our project is more unconventional than others in the sense that we did not have typical engineering-based standards to guide us, but as we are in the Healthcare and Public Service industry, we referred to the National Association for Healthcare and Quality's Code of Ethics for Healthcare Quality Professionals and Code of Conduct as standards for our project.

Two areas within this standard are a commitment to using data analytics and commitment to performance and process improvement [5]. It states that healthcare professionals should be, “engaged in the work of data analytics, follow best practices for data management, and statistical practice” [5]. By creating the priority score calculator, we were able to quantify consumer needs in a way Adams county hadn't been able to and use data to drive decisions.

It also states that healthcare quality professionals should be “engaged in the work of performance improvement” [5]. We achieved this not only through the development of our deliverables initially but also by making them flexible and applicable to other areas to further improve their processes once we are gone.

While the Adams County Health and Human Services department is not ISO 9001 certified, elements of these standards can also be applied to our project goals and outcomes. As stated in clause 7.1.6 of ISO 9001:2015, “The organization shall determine the knowledge necessary for the operation of its process and to achieve conformity of products and services”[2]. With our project, we outlined the resources needed to create a smooth and efficient intake process, the flowchart, the APNP scheduling, the Child Consumer Criteria Priority Matrix, and the Priority Score calculator.

We also can connect Clause 6.2, Quality objectives, and planning to achieve them, to our project[2]. Some elements in this clause include establishing quality objectives and planning to achieve them. These elements also guided our work when planning our objectives. We needed to ensure they would be measurable(priority score calculator), be relevant to the conformity of products and services and to the enhancement of customer satisfaction(onboarding children to increase customer satisfaction), be communicated(streamlining processes across the department with flowchart), establishing who will be responsible and when will the objectives be complete(assigning portion of the flowchart to respective team member and the 57-week onboarding plan).

Another overall objective communicated through many ISO 9001 clauses is the need for continual improvement to increase quality[2]. This goal can be achieved with the creation and hand-off of our deliverables. These deliverables were created with the intent of improving their

child intake process. Along the way, we recognized that these deliverables had to be made so they could be adaptable when changes arise and even applied to other areas of Adams County HHS. With our work, Adams county will be able to implement this new project to increase their current efficiency and will have the tools to continually improve and adapt to meet customer satisfaction.

### **3.6 Consideration of Engineering Ethics**

Engineering ethics was an important consideration for our team throughout the duration of our project. The project serves real clients who will use the findings and tools that we have developed in their workplace each day. Our team needed to operate ethically to create the potential for actual impact. In the early weeks of this semester, we defined engineering ethics as *being honest, keeping promises, doing our job well, and not stealing*[3]. Throughout the semester we have kept those ideas at the forefront of our decision-making.

One example of a situation where we had to act ethically occurred very early on in the semester. In one of our initial meetings, we were discussing the project scope with our client. The idea of creating a web-based tool that potential consumers could use to check if they are eligible for service through the County came up in conversation. This idea was very exciting to our clients, and our team as well. We really wanted to make it work but we also were aware of two large constraints that would make the idea out of scope for our project. The first was simply the time constraint of the project. We had just over two months to run an entire project to completion and this tool itself would take multiple iterations and testing which could be a two-month-long project on its own. The second constraint was that our team's technical skills specifically around coding were not advanced enough to develop the tool as discussed. We knew that we would not be able to *keep this promise* and that the best decision was *to be honest* with our clients from the beginning to build strong relationships. We were confident that we made the right decision after we explained the constraints to them. They were very understanding and still extremely excited about the portions of the scope that we believed was feasible to complete during this project.

Making the ethical decision to *be honest* with our clients paid off when we delivered a project that the clients were extremely satisfied with. They feel confident in the tools we have created and confident in their ability to adapt the tools as needed, which is a large portion of our sustainability plan which is discussed in section 4.

### **3.7 Recommended Design: People, Process and Technology Perspectives**

Our recommendation to the department would be to utilize the tools we have created for them. This includes using the Intake Process Flow Map and following the steps to maintain an efficient process. The Priority Score Calculator should be used to calculate the scores for potential consumers to onboard the patients with the most acute symptoms. And lastly,



the Pairwise Matrix to prioritize the criteria and be able to quantify other projects internally. The training tools should be utilized as needed to help understand the tools and processes.

The people of HHS were at the forefront of our decision-making when we were working through this project. We had their priorities in mind when creating the tools. The front desk has a greater understanding of the correct information to collect. This will improve the workflow down the line, specifically the Behavioral Manager's, and decrease their workload to create a more balanced flow among the department. The APNP also has a scheduled onboarding plan all the way until she reaches capacity which will maintain ease of her work.

Our team intentionally developed this new design to maximize the number of children to onboard and improve HHS's overall intake process. The Prioritization Matrix allows the department to weigh potential criteria for the calculator. The Priority Score Calculator makes the process much more efficient as the decision-making between potential consumers is backed with data ranking them, reducing the time that was previously spent discussing this decision. The Onboarding Schedule was created to optimize the number of consumers that the APNP can onboard.

In terms of the technology used in our design, the tools were given in a google drive folder shared with our clients, later relayed to the entire department through their own google drive shared folder. These tools were created to be adaptable, with training and tutorial videos for each one to allow the clients to innovate independently, adjusting as they see fit. Over time, they can all be refined for an even greater improvement within the department.

### **3.8 Cost/Benefit Justification and Business Case for Proposed Design and Possible Impact**

As this project deals with factors that are difficult to value monetarily, research was necessary to help create a business case. For the purposes of this project, conservative values were used to estimate the total financial benefit.

There are three main financial factors, alongside many others deemed less significant, that contribute to the overall benefit that the department will see over the long term. These are the treatment and onboarding of consumers, the reduction in non-value added activity, and an increase in employee satisfaction.

The greatest benefit observed is related to the onboarding and treatment of the consumers. Several studies have investigated the effects that mental health treatment can have on children throughout their life. In the United States, mental, emotional, and behavioral disorders in children cost \$247 billion annually in mental health and health services, lost productivity, crime, etc.[4]. Preventative interventions result in reduced crime, lower substance abuse, improved

educational outcomes, decrease in teen pregnancy, reduction in suicide attempts, lower child abuse, and reduced domestic violence among other things [4]. This does not include any monetary increase in the quality of life. The present value of these benefits ranged from \$10,000/child to \$200,000/child [4]. For the purposes of our project, benefits of \$12,000/child were used by choosing the conservative number and factoring in a small amount for the improvement in quality of life. When onboarding the first 92 consumers, which takes 57 weeks, this will result in minimum savings of \$1,104,000 for the greater community.

By streamlining the process and reducing the amount of time spent on non-value-added activities, there are further potential cost savings. This includes activities such as asking the wrong questions to potential consumers, asking questions that don't contribute to a decision about a consumer, and wasted time on discussions regarding whether a potential consumer is a good fit. We estimate that there will be time savings from a few hours to a handful of hours each week from our project. Time will be saved on the department side as well as for the clients, who will not waste time answering unnecessary questions and giving unnecessary information. As a conservative choice, three hours a week will be considered, which over 57 weeks and a rate of \$30/hour, this will save at least \$5100 and \$5000 every year thereafter.

Employee satisfaction will also save the county money. With our improvements implemented, we hope that the team finds their work more straightforward and organized, leading to a lower turnover rate among the employees. Just a 10% reduction in the turnover rate could result in savings of up to \$4500 in the first 57 weeks from the onboarding and training. All of the necessary training material is much more consolidated and understandable due to our handoff folder. With all of those things considered, we expected that there will continue to be \$4500/year of savings thereafter.

There is zero monetary investment from implementing this process as our work was done for free and all required software is free for all users. In conclusion, in the first 57 weeks, a low estimate of present value savings is \$1,113,600 and a recurring \$12,000/child onboarded after that. After the first 57 weeks, we also expect an additional \$10,000/year from the other two sources mentioned above.

### **3.9 Results of Implementation to Client Team**

Our presentation with the clients and the HHS management team occurred on April 27th. During our presentation, we walked through the timeline of our project, the tools that we have created, as well as the process of implementation. The clients were able to ask questions about the tools that we presented and clarify portions that may have been complex or confusing. The client team communicated their excitement for using the tools we have created for them and proceeded to spend the next week looking through them and preparing follow-up questions.

A follow-up meeting occurred a week after the final presentation to the client team. We proceeded to walk through the pairwise matrix one more time to make sure there was a complete understanding of the tool. The client team told us that they understood the tools and reiterated their appreciation for our team and that they are excited to begin using the process and tools we delivered to them. Becky and Kelly told us that they were amazed at our ability to quantify humans and people processes. They also said that we were truly able to create something that has changed their jobs forever, with something they haven't seen through their decades in the industry.

## **4.0 Recommendations and Implementation**

### **4.1 Summary of Findings, Recommendations, and Business Case**

When we first began working with Adams County a few months ago, we found that their existing process was extremely inefficient. On top of that, the department was adding a new APNP and planning to expand their current clientele to include child consumers. Despite this massive restructuring of the department, the team had no plans for how to best implement it.

To achieve the goals that Adams County set out for us, we recommend following the flow map that we have laid out for them to streamline the process. When following the Intake Process Flow Map the team will utilize the priority score calculator with the criteria that was elected through the Child Consumer Criteria Priority Matrix to onboard the children that need the care the most.

The process and the use of tools that we are recommending require zero monetary investment and will result in instant savings. In terms of present value, the amount of money that the implementation of our recommendations will save is upwards of \$1.1 million. On top of that, employee satisfaction, as well as a greater understanding for families with potential consumers, adds to that monetary value.

### **4.2 Implementation**

The *APNP Intake Schedule* will be used to schedule out and begin onboarding child consumers. The *Child Intake Process Flow Map* will be primarily used between the Support Services team, Behavioral Health Manager, Nurse, and APNP. It will also be a visual tool for Adams County HHS's Children and Family Services, Coordinated Services, School Administration Teams, Behavioral Health divisions and will be shared with key stakeholders at our local health care systems, Gundersen and Aspirus, so they understand the process and criteria. The *Child Consumer Criteria Priority Matrix* will be used internally by the management team and they expect to use it for other projects. The *Priority Score Calculator* will be used by the Support Services team and also the Behavioral Health Manager, Nurse, and APNP. The tool will be introduced to staff who often make referrals for their awareness and understanding of the process.

They will train staff through divisional meetings and monthly lunch and learn platforms, tailoring the training to the division staff and what information is necessary for their Behavioral Health system involvement. They plan on storing the deliverables in a Google Folder so the entire department has access to viewing the tools.

Our deliverables will be implemented within Adams County HHS immediately. Adams County HHS intends to begin onboarding children within the first 30 days of receiving the final deliverables, by June 2021.

### **4.3 Sustainability**

It would be naive to think the needs of Adams County HHS will not change over time. Because of this, we made sure all of our deliverables were easy to understand and adaptable, to ensure sustainability. We used software that was familiar to our client, Google Sheets, for most of our deliverables. We also created a handoff folder for the Adams County HHS staff to receive at the end of the project. This will allow for a simple transition as the student team leaves the project at the end of this semester. The handoff folder includes the APNP Intake Schedule, Child Intake Process Flow Map, Child Consumer Criteria Priority Matrix, Priority Score Calculator, and written and video instructions on how to use and adapt the deliverables for each of them.

### **4.4 Risk Mitigation**

As there is with any proposition, there are many risks that could occur with the implementation of a new system. Among the many, these are the three riskiest that we concentrated on.

The first is the hesitation of the team to ask questions to us if they are confused. To mitigate this, we have a final training session on May 4th with the team to pass over training videos and answer final questions.

The second risk is an overload of potential consumers that fit the required criteria. We have acknowledged the expectation that no implementation goes perfectly. Our mitigation for this risk is that our clients feel prepared to be able to adjust the eligibility requirements on the fly without needing our team to support them.

The last risk would be overloading the APNP. The APNP is persistent that she can handle many consumers, and while we admire her enthusiasm, there is the risk of her being overwhelmed. Because of this, we have developed training for the team to be able to adjust the intake rate and be able to increase or reduce the number of consumers being onboarded each week.

The department is planning to meet 3 months into the implementation of our work to reassess and make adjustments to mitigate any large problems before they continue with the remaining 45 weeks of onboarding.

## 5.0 References

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# About UniverCity Year



UniverCity Year is a three-phase partnership between UW-Madison and communities in Wisconsin. The concept is simple. The community partner identifies projects that would benefit from UW-Madison expertise. Faculty from across the university incorporate these projects into their courses, and UniverCity Year staff provide administrative support to ensure the collaboration's success. The results are powerful. Partners receive big ideas and feasible recommendations that spark momentum towards a more sustainable, livable, and resilient future. Join us as we create **better places together.**