# AI-Powered Intake Screening System for Residential Mental Health Treatment Centers

## Project Overview

This project involves developing an AI-powered conversational bot designed to handle initial intake screening calls for residential mental health treatment centers. The system will autonomously conduct screening interviews with potential patients, determine eligibility, check availability, and either admit patients, place them on a waitlist, or deny admission based on established criteria.

## User Journey

When a patient calls a treatment center:

1) The AI bot answers the call
2) Conducts a structured intake screening interview
3) Determines patient eligibility for the program
4) Checks real-time bed availability via backend integration
5) Provides immediate feedback on admission status (accept, waitlist, or deny)
6) Stores collected patient information in a database for future reference

## Implementation

- AI Conversational Agent
    - I will power the conversational bot Using Bland AI and their conversational pathways platform to guide the conversation flow throughout the call.
- Intake screening questions
    - I will create a synthetic procedure for screening that the bot will follow.
- Backend Integration
    - Availability System: Python-based API hosted on a Flask server
    - Database Integration: Firestore database for secure patient information storage
    - These two backend services will be integrated using Bland AI's webhook nodes

## Research Questions & Evaluation Criteria

The project aims to evaluate:

1) Conversational Robustness
    - How well the bot follows the screening script

- Ability to handle unexpected responses or interruptions
- Identification of failure points and assessment of fixability

2) User Experience Quality
   - Naturalness of conversation
   - Appropriate pacing and length
   - Overall patient satisfaction compared to human interactions
3) Information Accuracy
   - Correctness of captured patient data (names, contact information)
   - Accuracy of bed availability reporting
   - Reliability of stored and fetched information

**Evaluation Methods**

- Robustness Testing
  - Multiple test calls with deliberate attempts to deviate from expected conversation paths, observing how the bot reacts.
- User Experience Assessment
  - Comparative testing with friends following patient scripts, evaluating both AI and human-conducted screenings
- Accuracy Verification
  - Completion of standard intake processes and edge-case testing to identify potential information capture errors

**Literature review**

- **Intake Screening Protocol**
  - I will use the following source to guide the screening questions
    - https://pmc.ncbi.nlm.nih.gov/articles/PMC8038412/
  - The overall protocol will roughly follow this structure:

1) Patient Demographic and Contact Information
   - The intake will begin with basic demographic information to identify the patient and facilitate communication and care coordination. This includes collecting the patient's name, date of birth, contact information, etc.

2) Mental Health History
    - Assess current symptoms using standardized screening tools (e.g., PHQ-9 for depression, GAD-7 for anxiety, etc.)
    - Inquire about past mental health diagnoses and treatments
    - Explore family history of mental health conditions
3) Medical History and Medications
    - Ask about current physical health status and any ongoing medical conditions
    - Gather information on medications and allergies
4) Previous Treatment Experiences
    - Inquire about past mental health treatments, including therapy and medication
    - Assess the effectiveness of previous interventions
5) Insurance
    - Ask to provide their health insurance details.
6) Immediate Safety Risks (Self-Harm or Harm to Others)
    - Always screen for any immediate risk of harm – particularly suicidal thoughts or risk of violence. Providers will directly ask if the patient has had any thoughts of self-harm or suicide, or any history of suicide attempts, especially recent ones.
7) Motivation for Treatment
    - Determine their motivation level and why they are seeking help at this time.

- **Project Significance**
    - The reason for this case for the project is because it addresses several critical challenges in mental health treatment access:
        1) Reducing Waiting Time Barriers
            - Long waiting times for mental health services are a significant barrier to care, and implementing an AI-powered intake system can provide immediate screening and triage, potentially reducing waiting times for initial assessments.
            - https://pmc.ncbi.nlm.nih.gov/articles/PMC9526124/

2) Reducing Barriers to Treatment Entry and System-Level Challenges
    - Reducing stigma through non-judgmental AI interaction, reducing difficulty accessing services and workforce shortages by having 24/7 availability for initial screening.
    - https://horizonhealth.com/blog/overcoming-barriers-to-accessing-mental-health/

- **Evaluation Framework**
    - I will follow the methodology outlined in the following paper, which serves as another main resource for this project: https://nursing.jmir.org/2025/1/e63058. It allows for:
        - Extensive testing of AI provider chatbots without involving real patients or researchers
        - Help evaluate the overall experience of conversations
        - Check for correctness of stored/fetched information

**Challenges**

- Conversation Flow Management
    - Handling interruptions during information delivery
    - Finding optimal balance for information exchange length
    - Preventing repetition loops while ensuring complete information transfer
- Decision Criteria Development
    - Establishing clear, evidence-based criteria for admission decisions based on the screening
    - Creating appropriate rules for waitlist prioritization
- Confidentiality and Data Protection
    - Ensuring that clients are comfortable sharing sensitive information with an AI bot (empathy and tone of the bot, etc.)
    - https://pmc.ncbi.nlm.nih.gov/articles/PMC11447436/
    - Securely handle sensitive data

## Progress & Next Steps

- Completed:
    - Prototype development in Bland AI for basic information collection (name, phone number)
- Pending:
    1) Develop comprehensive intake screening conversation flow
    2) Implement full questionnaire in Bland AI
    3) Create Python backend for bed availability checking
    4) Develop database integration for patient information storage
    5) Conduct thorough testing across all evaluation dimensions

## Conversation Tree in BlandAI

- Exact text is not important as there are many changes that need to be done; this is just proof of the work being done.