When the Domain Expert Has No Time and the LLM Developer Has No Clinical Expertise: Real-World Lessons from LLM Co-Design in a Safety-Net Hospital

Supplementary Material

Structured Summary Attributes

Category	Description	Validated
Reason for Admission	The primary reason for the patient's admission for the current hospital encounter	X
Reason for Consult	For social worker consult note types only, identify reason for the social work consult. If the consult is specified, identify if it should be classified as high priority by determining if it meets any of the following categories: Homeless and discharge ready, Jane/John Doe, Suffering from Abuse/neglect/self-neglect/safety, Need Family Located, Death and Dying Case, Major Life Changing Event	X
Patient's Contacts	Extraction of all contacts in a patient's support system where there is name and a phone number or email address. And any mentions of missing or minimal contacts or patient being socially isolated. Examples include mentions of: widowed, lives alone with no explict mention of family support, no family involved, no next of kin, family not reachable, no emergency contact list, expresses feelings of being alone or unsupported	X
Outpatient Therapies	Identify if the patient has health workers that come to the patient's home or are in a Skilled Nursing Facility (SNF) or a referral has been made to a SNF (not a recommendation). Examples include: Home health such as PT/OT/SLP/RN/ SW/ home health aide that come to the patient's home	X
Opiod Use	• Date of last use (if available) • Identify if the patient has a problematic pattern of opioid use (including fentanyl or heroin) leading to clinically significant impairment distress or the note mentions the patient has "regular opioid use over years" ir the note explicitly mentions the patient has OUD.(yes, no, unknown) • Identify if the patient has a problematic pattern of amphetamine-type substances, cocaine, methamphetamine, or other stimulant use leading to clinically significant impairment distress or the note mentions the patient has "regular meth use over years" or the note explicitly mentions the patient has StUD (yes, no, unknown) • Polysubstance Use Disorder (PSUD) - The note explicitly mentions the patient has or has had PSUD • Medication for Opioid Use Disorder (MOUD) - The note mentions the patient is on methadone or buprenorphine (i.e. suboxone, Brixadi, Sublocade). Abbreviations: bup (yes, no, unknown)	X
Safety	Extraction and summary of the patient's social needs and previous, current, and planned interventions for the following social needs: • Safety - Any form of abuse, domestic violence (DV), assault, sexual assault, being victim/perpetrator of violence, interpersonal violence, recurrent falls or unexplained injuries, or self neglect/ caregiver (manifest as an inability or unwillingness to perform essential self-care tasks, maintain personal hygiene, manage medical conditions)	X
Tobacco Use	Extraction and summary of the patient's social needs and previous, current, and planned interventions for the following social needs: • Tobacco Use - Any use of cigarettes, vaping, chewing tobacco, or other nicotine product	X
Housing	Extraction and summary of the patient's social needs and previous, current, and planned interventions for the following social needs: • Housing - Homelessness, housing instability, unsafe living conditions, or inability to afford housing	X

Immigration	Extraction and summary of the patient's social needs and previous, current, and planned interventions for the following social needs: • Immigration - Documentation concerns, deportation fears, language barriers, or immigration-related discrimination.	X
Food Insecurity	Extraction and summary of the patient's social needs and previous, current, and planned interventions for the following social needs: • Food Insecurity - Inability to access adequate food due to financial constraints or running out of food	X
Substance Use	Extraction and summary of the patient's social needs and previous, current, and planned interventions for the following social needs: • Substance Use - Use of illegal drugs, prescription drug misuse, or problematic controlled substance use (does not include alcohol)	X
Alcohol Use	Extraction and summary of the patient's social needs and previous, current, and planned interventions for the following social needs: • Alcohol Use - Excessive drinking, binge drinking, or alcohol-related problems affecting daily life	X
Mental Health	Extraction and summary of the patient's social needs and previous, current, and planned interventions for the following social needs: • Mental Health - Depression, anxiety, suicidal thoughts, or psychiatric symptoms impacting functioning.	X
Medical Equipment	Identify each piece of durable medical equipment the patient currently uses or requires. Examples include: mobility devices, wheelchairs, walkers, canes, crutches, Electric hospital bed, transfer lift with slings, Bedside commode, shower chair, tub bench, raised toilet seat with arms, grab bars, Home oxygen concentrator, portable Oxygen cylinders, nebulizer, CPAP or BiPAP unit, portable suction machine, Negative-pressure wound-vac pump, ambulatory,elastomeric infusion pump, IV pole (e.g., walker, wheelchair)	X
Activities of Daily Living	Identify any inability to perform ADLs (Activities of Daily Living) which refer to basic self care tasks bathing, dressing, toileting, grooming, eating.	X

Housing Situation	• Rent or Own - Individual has stable, independent housing with legal tenancy rights through rental agreement or property ownership. SROs (Single Room Occupancy - shared bathrooms and sometimes shared kitchens) if they do not have onsite • Rent Unit with Support Services Onsite - Subsidized or supportive housing with integrated services (case management, mental health, etc.) available within the building • Residential Treatment / Jail - will exit homeless • Living Outside (Street / Vehicle / Makeshift) - Street - Staying outdoors (on the street, sidewalk, doorway, park, freeway underpass). Vehicle - Staying in a car, van, bus, truck , RV, or similar vehicle. Makeshift - Staying in an enclosure or structure not authorized for habitation by building or housing codes (abandoned buildings) • Temporarily with Friend / Family - Unstable housing arrangement staying with others. • Stabilization Room / Hotel - Living in a hotel room and does not have tenancy rights • Shelter / Navigation Center - taying in a supervised public or private facility that provides temporary living conditions (e.g. homeless shelter or mission) • Permanent Supportive Housing - Residential Care Facility/Board and Care Facility. SROs if they do not have onsite services. • Residential Treatment / Jail - will exit housed • Unknown	
Inpatient Therapies	Identify explicit mentions of the patient in the following inpatient therapies or have consults (not a recommendation). (PT, OT, SLP often fall under ”Rehab” or ”Speech”): • Rehab • Speech • Nutrition • Language For each therapy mentioned: a. Confirm if there’s a consult for the therapy (yes, no, or unknown) b. Provide a brief summary of the patient’s therapy progress	
Severe Medical Conditions	Extraction and summary of medical conditions that require complex discharge planning, complicate transition of care, or may necessitate specialized care after discharge	
ED Visits and Psychiatric Visits	Summary of any recurring patterns for both ED visits and Psychiatric Visits	

Table A1: A full list of structured attributes extracted from patient notes to create LLM generated summaries for clinical social workers. Validated attributes were evaluated against human annotations to measure the accuracy of the LLM extractions.

Experimental Details

Implmentation Details

All experiments were conducted using a PHI-compliant version of GPT-4o (OpenAI, 2024-08-06) accessed via API. Model hyperparameters were standardized across all experiments with a fixed seed value of 0 and temperature setting of 0, ensuring deterministic outputs with a single LLM extraction performed per patient, per attribute, per clinical note.

The experiments were run on r7i.2xlarge AWS EC2 machine with an Ubuntu operating system. The instance has 8 CPUs and 64 GBs of memory (no GPUs).

Example Prompts

Prompt1

You are a clinical social worker with 10 years of hospital experience in San Francisco. Your task is to analyze a series of social worker notes to generate a structured JSON summary of the patient for a clinical social worker. For all extracted information in the summary, include a citation with the note ID and an exact quote from the note that supports your evidence.

Instructions:

1. Review the notes and identify any mention of these specific social needs:
   - Interpersonal violence
   - Tobacco use
   - Housing
   - Immigration
   - Food insecurity
   - Substance use
   - Alcohol use
   - Mental health
2. For each identified social need, provide: a. A brief description of the social need (specific details about the patient's situation) b. A classification of the need's status (must be exactly one of: "resolved", "ongoing", "new") c. A priority level (must be exactly one of: "high", "medium", "low")
3. Extract actions corresponding to each identified need. Categorize actions as: a. Previous actions (completed): - Description of what was done - Start date (if available) - Outcome b. Current actions (in progress): - Description of what is being done - Start date (if available) c. Planned actions: - Description of what needs to be done
4. Identify the patient's current and past housing situation as one of these exact categories: - Rent or Own - Rent Unit with Support Services Onsite - Residential Treatment / Jail - will exit homeless - Living Outside (Street / Vehicle / Makeshift) - Temporarily with Friend / Family - Stabilization Room / Hotel / SRO - Shelter / Navigation Center - Permanent Supportive Housing - Residential Treatment / Jail - will exit housed - Unknown a. Provide a brief description of this patient's housing situation
5. Identify the reason for the social work consult and if it is a high, medium, or low priority consult High-priority consults include: - Homeless and discharge ready - Jane/John Doe - Suffering from Abuse/neglect/self-neglect/safety - Need family located
6. Identify the reason for the admission
7. Identify any diagnoses for the current encounter
8. Identify mentions of these therapies or consults: - Rehab - Speech - Nutrition - Language For each therapy mentioned: a. Confirm if there's a consult for the therapy (yes, no, or unknown) b. Provide a brief summary of the patient's therapy progress
9. Identify the patient's contacts: For each contact, provide name, phone number, and relation (if known)
10. Provide a brief description of the patient's support at home
11. If the patient has a history of substance use, identify the following: a. A brief temporal summary describing the patient's substance use b. Date of last use (if available) c. Whether patient is currently on methadone (yes, no, unknown)
12. Identify any severe medical conditions that could affect discharge, including diagnosis and date if available
13. Provide a brief description of any recurring patterns for ED visits
14. Provide a brief description of any recurring patterns for psychiatric hospitalizations
15. Identify any durable medical equipment (DME) the patient uses (e.g., walker, wheelchair) a. A brief description describing the reason for using this durable medical equipment

Prompt2

You are a highly experienced Clinical Social Worker. You have 10 years of specialized experience in inpatient hospital social work, adept at managing: - Discharge Home Arrangements (e.g., community case management, DME, home care, meal services) - Facility Transfers (e.g., psychiatric care, substance disorder treatment) - Transportation Logistics (e.g., wheelchair van, BLS ambulance, paratransit)

Your task is to analyze patient notes and extract key patient information into structured JSON format. Every extracted piece of information must include a citation with note ID and exact supporting quote.

Instructions:

1. Review the notes and identify any mention of these specific social needs:
   - Interpersonal violence
   - Tobacco use
   - Housing
   - Immigration
   - Food insecurity

- Substance use
- Alcohol use
- Mental health

2. For each identified social need, provide: a. A brief description of the social need (specific details about the patient's situation) and include any temporal changes. b. A classification of the need's status (must be exactly one of: "resolved","ongoing", "new") c. A priority level (must be exactly one of: "high", "medium", "low")
3. Extract actions corresponding to each identified need. Categorize actions as: a. Previous actions (completed): - Description of what was done - Start date (if available) - Outcome b. Current actions (in progress): - Description of what is being done - Start date (if available) c. Planned actions: - Description of what needs to be done

   When extracting actions, look for interventions such as: - Mental Health: LSAT, MHRC, ADU, psychiatric holds/conservatorship - Substance Use: residential/outpatient SUD programs - Housing/Discharge: Home health (PT/OT/SLP/RN), IHSS caregivers, shelters, navigation centers, Medical Respite, Coordinated Entry (CE) assessments, SNF referrals, Board and Care/ALF/RCFE, ARU/ARF, LTACH
4. Identify the patient's current and past housing situation as one of these exact categories:
   - Rent or Own
   - Rent Unit with Support Services Onsite
   - Residential Treatment / Jail - will exit homeless
   - Living Outside (Street / Vehicle / Makeshift)
   - Temporarily with Friend / Family
   - Stabilization Room / Hotel / SRO
   - Shelter / Navigation Center
   - Permanent Supportive Housing
   - Residential Treatment / Jail - will exit housed
   - Unknown

   a. Provide a brief description of this patient's housing situation. Include information such as home infusions or caregivers. If the patient is in coordinate entry include the following information:
      - Accessing Coordinated Entry
        - Problem Solving Status
        - Housing Referral Status
        - Housing Navigation / Move-in
        - Housed (through HRS or outside)
      - Include information about Administrative Review, Reasonable Accommodation, Problem Solving funds, Housing Navigator outreach, or referral to PSH/RRH. Include information about start dates and outcomes
5. Identify if the social work consult is high priority. Answer yes if it is high priority otherwise answer no.

   High-priority consults include:
   - Homeless and discharge ready: Patients who are medically cleared for discharge but have no stable housing to return to. Includes shelter residents, those living in places not meant for habitation, those who cannot return to their previous housing.
   - Jane/John Doe: Patients whose identity cannot be verified or established. Includes unconscious patients without ID, those unable to communicate their identity, those providing unverifiable identifying information.
   - Suffering from Abuse/neglect/self-neglect/safety
     - Abuse: Evidence of physical, emotional, sexual, financial, or psychological harm by others
     - Neglect: Inadequate care by caregivers resulting in harm or risk
     - Self-Neglect: Patient's failure to meet their own basic needs, endangering health
     - Safety: Conditions that compromise patient safety at home or upon discharge
   - Need family located: Cases requiring identification and contact with family members or next of kin for purposes including medical decision-making, discharge planning, or providing critical medical updates
   - Death and Dying: Any mention that a patient has died, is actively dying or that clinicians/family are engaging in end-of-life planning (e.g., hospice enrollment, DNR discussions, comfort-focused care)
   - Major Life Changing Event: A sudden event that permanently alters the patient's daily functioning or psychosocial status and requires new resources/long-term planning. Includes new permanent disability, life-altering diagnosis, loss of primary caregiver or housing explicitly described as permanent), or other irreversible changes (e.g., limb amputation, newly paralyzed)

6. Identify the reason for the admission
7. Identify any diagnoses for the current encounter
8. Identify mentions of these therapies or consults: - Rehab - Speech - Nutrition - Language For each therapy mentioned (e.g., PT, OT, SLP often fall under "Rehab" or "Speech"): a. Confirm if there's a consult for the therapy (yes, no, or unknown) b. Provide a brief summary of the patient's therapy progress
9. Identify the patient's contacts: - For each contact, provide name, phone number, and relation (if known)
10. Provide a brief description of the patient's support at home
11. If the patient has a history of substance use, identify the following: a. A brief temporal summary describing the patient's substance use b. Date of last use (if available) c. Whether patient is currently on methadone (yes, no, unknown)
12. Identify any severe medical conditions that could affect discharge, including diagnosis and date if available
13. Provide a brief description of any recurring patterns for ED visits
14. Provide a brief description of any recurring patterns for psychiatric visits. Include if the patient typically presents or is referred to as "acute", "acute diversion" (e.g., ADU), "respite"
15. Identify any durable medical equipment (DME) the patient uses. Examples include: mobility devices, wheelchairs, walkers, canes, crutches Electric hospital bed, Hoyer/transfer lift with slings, Bedside commode, shower chair/tub bench, raised toilet seat with arms, grab bars Home oxygen concentrator, portable Oxygen cylinders, nebulizer, CPAP/BiPAP unit, portable suction machine, Negative-pressure wound-vac pump, ambulatory/elastomeric infusion pump, IV pole a. A brief description describing the reason for using this durable medical equipment

Prompt3

You are a clinical social worker with 10 years of hospital experience. Your task is to analyze clinical note(s) to generate a structured JSON summary of the patient for a clinical social worker. For all extracted information in the summary, include a citation with the note ID and an exact quote from the note that supports your evidence

- Discharge Home Arrangements (e.g., community case management, DME, home care, meal services)
- Facility Transfers (e.g., SNF referrals, psychiatric care, substance disorder treatment)

Instructions:

1. Review the notes and identify any mention of these specific social needs:
   - Safety - Any form of abuse, domestic violence (DV), assault, sexual assault, being victim/perpetrator of violence, interpersonal violence, recurrent falls or unexplained injuries, or self neglect/ caregiver
   - Tobacco use - Any use of cigarettes, vaping, chewing tobacco, or other nicotine product
   - Housing - Homelessness, housing instability, unsafe living conditions, or inability to afford housing
   - Immigration - Documentation concerns, deportation fears, language barriers, or immigration-related discrimination
   - Food insecurity - Inability to access adequate food due to financial constraints or running out of food
   - Substance use - Use of illegal drugs, prescription drug misuse, or problematic controlled substance use
   - Alcohol use - Excessive drinking, binge drinking, or alcohol-related problems affecting daily life
   - Mental health - Depression, anxiety, suicidal thoughts, or psychiatric symptoms impacting functioning
2. For each identified social need, provide:
   a. A brief description of the social need (specific details about the patient's situation)
   b. A classification of the need's status (must be exactly one of: "resolved" - Need was present but has been addressed and is no longer active, "ongoing" - Need continues to be present, "new" - Need has been newly identified in this encounter)
3. Extract actions corresponding to each identified need. Categorize actions as:
   a. Previous actions - Interventions (these should be not recommendations) that were implemented in the past - referrals, connections, or consults previously made:
      - Description of what was done
      - Start date (if available)
      - Outcome
   b. Current actions (in progress) - Interventions (these should be not recommendations) - referrals, connections, or consults that are actively in progress. A referral was put in or the patient is actively using that service currently made or in progress:
      - Description of what is being done
      - Start date (if available)
   c. Planned actions - Interventions (these should be not recommendations) that are scheduled or intended for the future - referrals, connections, or consults that will be made:

- Description of what needs to be done

When extracting actions, look for interventions such as (this is a nonexhaustive list):

- Mental Health: IMD facilities, LSAT, MHRC, ADU, psychiatric holds/conservatorship
- Substance Use: detox or withdrawal management referrals, residential/outpatient SUD programs, Addiction Care Team Patient Navigator
- Housing/Discharge: Home health (PT/OT/SLP/RN), shelters, navigation centers, Medical Respite, Coordinated Entry (CE) assessments, SNF referrals, Board & Care/ALF/RCFE, ARU/ARF, LTACH

4. Identify the patient's current housing situation as one of these exact categories:
   - Rent or Own - Individual has stable, independent housing with legal tenancy rights through rental agreement or property ownership. SROs (Single Room Occupancy - shared bathrooms and sometimes shared kitchens) if they do not have onsite
   - Rent Unit with Support Services Onsite - Subsidized or supportive housing with integrated services (case management, mental health, etc.) available within the building
   - Residential Treatment / Jail - will exit homeless - Individual currently in institutional setting who will have no housing upon discharge/release
   - Living Outside (Street / Vehicle / Makeshift) - Street - Staying outdoors (on the street, sidewalk, doorway, park, freeway underpass). Vehicle - Staying in a car, van, bus, truck, RV, or similar vehicle. Makeshift - Staying in an enclosure or structure not authorized for habitation by building or housing codes (abandoned buildings)
   - Temporarily with Friend / Family - Unstable housing arrangement staying with others
   - Stabilization Room / Hotel - Living in a hotel room and does not have tenancy rights
   - Shelter / Navigation Center - Staying in a supervised public or private facility that provides temporary living conditions (e.g. homeless shelter or mission)
   - Permanent Supportive Housing - Residential Care Facility/Board and Care Facility. SROs if they do not have onsite services
   - Residential Treatment / Jail - will exit housed - Individual in institutional setting who has secured housing arrangement upon discharge/release
   - Unknown

   a. Provide a brief description of this patient's housing situation
5. For social worker consult note types only, Identify the reason for the social work consult. Do not extract this information if the note is not a social work consult note type
6. Identify the reason for the admission
7. Outpatient Therapy and Home Health Services - Identify if the patient has health workers that come to the patient's home or are in a Skilled Nursing Facility (SNF) or a referral has been made to a SNF. Examples include: Home health such as PT/OT/SLP/RN/ SW/ home health aide that come to the patient's home or IHSS caregivers (not a family member)
8. Identify mentions of these inpatient therapies or consults (not a recommendation). (PT, OT, SLP often fall under "Rehab" or "Speech"):
   - Rehab
   - Speech
   - Nutrition
   - Language

   For each therapy mentioned:

   a. Confirm if there's a consult for the therapy (yes, no, or unknown)
   b. Provide a brief summary of the patient's therapy progress
9. Identify any references to a patient's contacts. Ex: any mention of friends, family, case workers:
   - For each contact, provide name, phone number, and relation (if known)
10. A brief description of missing or minimal contacts or patient being socially isolated. Examples include mentions of: widowed, lives alone, no family involved, no next of kin, family not reachable, no emergency contact list, expresses feelings of being alone or unsupported.

    Examples:

    - "The patient is widowed and lives alone."
    - "No family involved; the patient has no next of kin."

- "Family members are not reachable."
- "No emergency contact list available."
- "The patient expresses feelings of being alone or unsupported."

11. Identify any inability to perform ADLs (Activities of Daily Living) which refer to basic self care tasks bathing, dressing, toileting, grooming, eating.
    a. A brief description of the ADLs
12. Identify any Inability to perform IADLs (Instrumental Activities of Daily Living) which refer to more complex self care tasks. managing medications, using transportation, cooking, handling finances, shopping, housekeeping, managing appointments
    a. A brief description of the IADLs
13. If the patient has a history of substance use or is currently struggling with substance use, identify the following:
    a. A brief temporal summary describing the patient's substance use
    b. Date of last use (if available)
    c. Identify if the patient has a problematic pattern of opioid use (including fentanyl or heroin) leading to clinically significant impairment distress or the note mentions the patient has "regular opioid use over years" or the note explicitly mentions the patient has OUD (yes, no, unknown)
    d. Identify if the patient has a problematic pattern of amphetamine-type substances, cocaine, methamphetamine, or other stimulant use leading to clinically significant impairment distress or the note mentions the patient has "regular meth use over years" or the note explicitly mentions the patient has StUD (yes, no, unknown)
    e. Polysubstance Use Disorder (PSUD) - The note explicitly mentions the patient has or has had PSUD
    f. Medication for Opioid Use Disorder (MOUD) - The note mentions the patient is on methadone or buprenorphine (i.e. suboxone, Brixadi, Sublocade). Abbreviations: bup (yes, no, unknown)
14. Identify each piece of durable medical equipment the patient currently uses or requires. Examples include:
    - mobility devices, wheelchairs, walkers, canes, crutches
    - Electric hospital bed, Hoyer/transfer lift with slings, Bedside commode, shower chair/tub bench, raised toilet seat with arms, grab bars
    - Home oxygen concentrator, portable Oxygen cylinders, nebulizer, CPAP/BiPAP unit, portable suction machine
    - Negative-pressure wound-vac pump, ambulatory/elastomeric infusion pump, IV pole

    (e.g., walker, wheelchair)
    a. A brief description describing the reason for using this durable medical equipment
15. Provide a brief description of any recurring patterns for ED visits
16. Provide a brief description of any recurring patterns for psychiatric visits. Include if the patient typically presents or is referred to as "acute", "acute diversion" (e.g., ADU), "respite"
17. Provide a brief description of the patient's support at home
18. Identify if this patient is high priority (yes, no, unknown) and provide your reasoning.

    High-priority patients include at least one of the following:
    - Homeless and discharge ready - Patients who are medically cleared for discharge but have no stable housing to return to. Includes shelter residents, those living in places not meant for habitation, those who cannot return to their previous housing.
    - Jane/John Doe - Patients whose identity cannot be verified or established. unconscious patients without ID, those unable to communicate their identity. those providing unverifiable identifying information.
    - Suffering from Abuse/neglect/self-neglect/safety - Abuse: Evidence of physical, emotional, sexual, financial, or psychological harm by others, Neglect: Inadequate care by caregivers resulting in harm or risk, Self-Neglect: Patient's failure to meet their own basic needs, endangering health, Safety: Conditions that compromise patient safety at home or upon discharge
    - Need family located - Cases requiring identification and contact with family members or next of kin for purposes including medical decision-making, discharge planning, or providing critical medical updates
    - Death and Dying - Any mention that a patient has died, is actively dying or that clinicians/family are engaging in end-of-life planning (e.g., hospice enrollment, DNR discussions, comfort-focused care)
    - Major Life Changing Event - A sudden event that permanently alters the patient's daily functioning or psychosocial status and requires new resources/long-term planning. Includes new permanent disability, life-altering diagnosis, loss of primary caregiver or housing explicitly described as permanent), or other irreversible changes (e.g., limb amputation, newly paralyzed)

Prompt4

Role. You are a clinical social worker with 10 years of hospital experience.

Task. Analyze clinical note(s) to generate a structured JSON summary of the patient for a clinical social worker. Do not make any leaps in logic; extract only the information clearly provided in the clinical notes. For every piece of extracted information in the summary,

1. include a citation with the note ID and a verbatim excerpt from the note that supports your evidence

If a quotation in the note falls under more than one category, include it in each relevant category. For instance, if the patient has a recent history of falls, it should be noted as both a current safety social need and a high priority case.

Area of Focus

- Discharge Home Arrangements (e.g., community case management, DME, home care, meal services)
- Facility Transfers (e.g., SNF referrals, psychiatric care, substance disorder treatment)

Instructions

1. Review the notes and identify any mention of these specific social needs:
   - Safety – Any indication of abuse, domestic conflict, assault, sexual assault, involvement in violence (as victim or perpetrator), repeated falls or unexplained injuries, or self-neglect (or neglect by a caregiver manifested as inability or unwillingness to perform essential self-care tasks including hygiene, medication management, etc.)
     Examples where the social needs category of "safety" should be annotated:
     - ...
     Examples where the social needs category of "safety" should not be assigned:
     - ...
   - Tobacco use – Any use of cigarettes, vaping devices, chewing tobacco, or other nicotine products
   - Housing – Instances of homelessness, housing instability, unsafe living conditions, or inability to afford stable housing
   - Immigration – Concerns regarding documentation, fears of deportation, language barriers, or discrimination related to immigration status
   - Food insecurity – Difficulty accessing sufficient food due to financial constraints or insufficient food supply
   - Substance use – Use of illegal drugs, misuse of prescription drugs, or problematic use of regulated substances
   - Alcohol use – Excessive consumption of alcohol, binge drinking, or alcohol-related issues affecting daily routines
   - Mental health – Depressive symptoms, anxiety, suicidal ideation, or psychiatric manifestations impacting daily functioning
     Examples of the social needs category "mental health" (non-exhaustive list):
     - Hallucinations (perceiving things that are not really present)
     - Delusions (firmly held false beliefs)
     - Pronounced mood swings (e.g., during manic or depressive episodes)
     - Paranoia or unfounded fears
     - Impaired insight or judgment
     - Bipolar Disorder
     - Schizophrenia
     - Post-Traumatic Stress Disorder (PTSD)
     - Obsessive-Compulsive Disorder (OCD)

     Examples where the social needs category "mental health" should not be noted:
     - ...
2. For each identified social need, provide:
   a. A brief description detailing the unique aspects of the social need (specifics about the patient's situation)
   b. A classification of the need's status, which must be exactly one of the following: "resolved" – the need existed but has been addressed and is no longer active; "ongoing" – the need continues to be present; "new" – the need has been newly identified in the current encounter

   Extract actions corresponding to each identified need. Categorize these actions as:

   a. Previous actions – Completed interventions (these should not be recommendations) such as past referrals, connections, or consults:
      - Description of what was done
      - Start date (if available)

- Outcome

b. Current actions (in progress) – Active interventions (not recommendations) including referrals, connections, or consults that are currently underway:
   - Description of what is being done
   - Start date (if available)

c. Planned actions – Scheduled or intended future interventions (again, not recommendations) including those yet to be initiated:
   - Description of what needs to be done

When picking out actions, search for interventions such as (this is a partial list):

- For Mental Health: placement in IMD facilities, LSAT, MHRC, ADU, psychiatric holds/conservatorship
- For Substance Use: referrals for detox or withdrawal services, residential/outpatient SUD programs
- For Housing/Discharge: interventions such as Home Health (PT/OT/SLP/RN), shelters, navigation centers, Medical Respite care, Coordinated Entry (CE) assessments, SNF referrals, Board & Care/ALF/RCFE placements, ARU/ARF, or LTACH care

3. Identify the patient's current housing situation according to one of the following exact categories:
   - Rent or Own – The individual has stable, independent housing with legal tenancy rights confirmed via a rental agreement or property ownership. SROs (Single Room Occupancy with shared bathrooms and sometimes shared kitchens) are acceptable if onsite services are not provided.
   - Rent Unit with Support Services Onsite – Housing under a subsidized or supportive model where integrated services (such as case management or mental health support) are available in the same building.
   - Residential Treatment / Jail - will exit homeless – The individual is currently in an institutional setting and is expected to have no housing after discharge or release.
   - Living Outside (Street / Vehicle / Makeshift) –
   - Street – Living outdoors (e.g., on the street, sidewalk, doorway, park, or freeway underpass).
   - Vehicle – Living in a car, van, bus, truck, RV, or similar vehicle.
   - Makeshift – Residing in an enclosure or structure not approved for habitation by building or housing codes (e.g., an abandoned building).
   - Temporarily with Friend / Family – An unstable housing situation where the individual is staying with others.
   - Stabilization Room / Hotel – Living in a hotel room without formal tenancy rights.
   - Shelter / Navigation Center – Currently residing in a supervised temporary facility (such as a homeless shelter or mission).
   - Permanent Supportive Housing – Residing within a residential care or board and care facility. SROs are acceptable if there are no onsite services.
   - Residential Treatment / Jail - will exit housed – The individual is in an institutional setting but has arranged for housing upon discharge or release.
   - Unknown

   a. Provide a concise description of the patient's housing situation.

4. For social work consult note types only, determine the reason for the social work consult if it is explicitly stated or if it clearly indicates "Reason for SW…". If the consult reason is ambiguous or the note does not pertain to a social work consult, do not extract this information.

   Examples where the reason for the social worker consult should be recorded:

   - ...

   Examples where the consult reason should not be annotated:

   - ...

5. Identify the reason for the admission and the diagnosis for the current encounter.
6. Outpatient Therapy and Home Health Services – Determine if the patient benefits from at-home services by health workers (or is in a Skilled Nursing Facility) or if a SNF referral has been made (this should not be a recommendation). Examples include services provided by PT/OT/SLP/RN/home health aides or IHSS caregivers (not family members).

   Examples where Outpatient Therapy and home health services should be annotated:

   - ...

   Examples where Outpatient Therapy and home health services should not be noted:

   - ...

7. Identify explicit references to the patient receiving or having consults in the following inpatient therapies (not recommendations):
   - Rehab
   - Speech
   - Nutrition
   - Language

   For each therapy mentioned:

   a. Indicate whether there is a consult for the therapy (yes, no, or unknown)
   b. Provide a brief summary of the patient's progress in that specific therapy

   Examples where Inpatient Therapy should be annotated:

   - ...

   Examples where Inpatient Therapy should not be annotated:

   - ...
8. Identify any mentions of the patient's contacts. For example, any reference to friends, family members, or case workers:
   - ...
9. Provide a brief summary of any evidence indicating the patient has few or minimal contacts, or appears socially isolated. Examples include indications such as being widowed, living alone without clear family support, lack of a next of kin, unavailability of emergency contacts, or expressions of feeling alone or unsupported.

   Examples where minimal contacts should be annotated:

   - ...
10. Identify any difficulties the patient has in performing ADLs (Activities of Daily Living) such as bathing, dressing, toileting, grooming, or eating.
    a. Provide a brief description detailing the issues with ADLs
11. Identify any challenges the patient faces when performing IADLs (Instrumental Activities of Daily Living) which include more complex tasks like managing medications, using transportation, cooking, handling finances, shopping, housekeeping, or managing appointments.
    a. Provide a brief description detailing the issues with IADLs
12. If the patient has a history of substance use or is currently struggling with it, identify the following:
    a. A brief timeline summarizing the patient's substance use history
    b. Date of the last substance use (if available)
    c. Indicate whether the patient exhibits a problematic pattern of opioid use (including fentanyl or heroin) that results in clinically significant impairment or distress, or if the note mentions consistent long-term opioid use, or explicitly identifies the patient as having OUD (yes, no, unknown)
    d. Indicate whether the patient shows a problematic pattern of using amphetamine-type substances, cocaine, methamphetamine, or other stimulants leading to clinically significant impairment or distress, or if the note mentions chronic methamphetamine use or explicitly identifies the condition as StUD (yes, no, unknown)
    e. Polysubstance Use Disorder (PSUD) – Note if the patient is explicitly stated to have or to have had PSUD
    f. Medication for Opioid Use Disorder (MOUD) – Note if the patient is on methadone, buprenorphine (e.g., Suboxone, Brixadi, Sublocade); indicate with "yes", "no", or "unknown"
13. Identify each piece of durable medical equipment (DME) the patient currently utilizes or requires. Examples include items such as mobility devices, wheelchairs, walkers, canes, crutches, electric hospital beds, Hoyer/transfer lifts with slings, bedside commodes, shower chairs/tub benches, raised toilet seats with arms, grab bars, home oxygen concentrators, portable oxygen cylinders, nebulizers, CPAP/BiPAP units, portable suction machines, negative-pressure wound-vac pumps, ambulatory/elastomeric infusion pumps, IV poles (or similar devices)
    a. Provide a concise explanation for the usage of each piece of DME
14. Provide a short summary of any recurring patterns in the patient's ED visits
15. Provide a brief summary of any recurring patterns in the patient's psychiatric visits. Include whether the patient typically presents as "acute", as an "acute diversion" (e.g., ADU), or for "respite" care
16. Provide a summary of the support system available to the patient at home

17. Determine whether this patient is high priority (yes, no, unknown) and justify your reasoning.
    High-priority patients include those with at least one of the following:
    - Homeless and discharge ready – Patients who are medically stable for discharge but lack stable housing. This includes shelter residents, those living in unapproved dwellings, or those unable to return to previous housing.
    - Jane/John Doe – Patients whose identity has not been verified or established. This includes unconscious patients lacking identification or those unable to communicate accurate identifying information.
    - Suffering from Abuse/Neglect/Self-Neglect/Safety Concerns – Cases where there is evidence of physical, emotional, sexual, financial, or psychological harm, inadequate caregiver attention resulting in harm or risk, self-neglect leading to failure in meeting basic needs, or overall conditions that compromise safety upon discharge or at home.
    - Need family located – Situations that require identifying and contacting family members or next of kin for purposes such as medical decision-making, discharge planning, or critical medical updates.
    - Death and Dying – Any mention that the patient has expired, is actively dying, or that discussions of end-of-life planning (e.g., hospice enrollment, DNR orders, comfort care) are underway.
    - Major Life Changing Event – An abrupt occurrence that permanently alters the patient's daily functioning or psychosocial status and necessitates new or long-term planning. This may include a newly acquired permanent disability, life-changing diagnosis, loss of a primary caregiver, or housing explicitly described as permanently altered (e.g., limb amputation, sudden paralysis)

Note: In-context learning examples have been excluded to protect patient health information privacy

Example LLM-as-a-judge Prompt

Your task is to assess answers for a question based on provided patient note(s) and provide your reasoning. Evaluate each answer using the three criteria below:

1. Accuracy - Does the answer correctly and comprehensively address all the questions, using precise and factual clinical information from the source note(s)?
    - "Yes" if: The answer clearly addresses all aspects of the question, is factually accurate, complete, and fully supported by information from the patient notes. Note: If the answer states "no information found" and there truly is no relevant information in the notes, this is considered accurate for all questions
    - "No" if: The answer fails to respond to the core prompt, contains significant factual errors, omits critical information, or misrepresents details from the notes.
2. Relevance - How relevant is all the cited content from the clinical note(s) for the correct answer?
    - Score 1 (Low): The cited information is not relevant to the correct answer.
    - Score 2 (Moderate): Some of the cited information is partially relevant to the correct answer.
    - Score 3 (High): All the cited information is fully relevant and directly supports the correct answer.
3. Fluency - How well is the answer presented in terms of clarity, structure, conciseness, and use of appropriate, professional clinical language?
    - Score 1 (Low): The text is disorganized, confusing, uses inappropriate terminology, or is excessively wordy, making it difficult to understand.
    - Score 2 (Moderate): The text is generally clear but may have some issues with structure, conciseness, or professional language.
    - Score 3 (High): The text is well-structured, concise, easy-to-understand, and uses appropriate professional language for clinical documentation.

Patient Note(s):
...

Question: Identify any inability to perform ADLs (Activities of Daily Living): basic self care tasks bathing, dressing, toileting, grooming, eating. a. A brief description of the ADLs

For each criterion, think through your reasoning systematically before providing your final assessment.

Additional Results

	Concordance difference (95% CI)	p-value
Alcohol Use	0.26 (0.174, 0.351)	$< .001$
Medical Equipment	0.08 (0.026, 0.135)	0.004
Food Insecurity	-0.01 (-0.030, 0.010)	0.320
Housing	0.18 (0.090, 0.274)	$< .001$
Immigration	0.06 (0.013, 0.108)	0.014
Mental Health	0.38 (0.060, 0.243)	$< .001$
Patient Contacts	0.21 (0.125, 0.299)	$< .001$
Safety	0.06 (-0.029, 0.150)	0.181
Tobacco Use	0.26 (0.170, 0.355)	$< .001$
Reason for Consult	0.38 (0.321, 0.527)	$< .001$
Substance Use	0.20 (0.099, 0.305)	$< .001$
Outpatient Therapy	0.39 (0.288, 0.500)	$< .001$
Opiod Use	0.82 (-0.033, 0.154)	0.202

Table A2: Difference in concordance between LLM application's extractions and LLM judge, where positive differences means an increase in concordance from *Prompt1* to *Prompt4*

	Cohen's Kappa (95% CI)			**Gwet's AC1 (95% CI)**		
Category	**Inter-annotator**	**LLM app vs annotator**	**LLM judge vs annotator**	**Inter-annotator**	**LLM app vs annotator**	**LLM judge vs annotator**
Alcohol Use	0.00 (0.00, 0.00)	0.64 (0.11, 0.90)	0.03 (-0.06, 0.15)	0.93 (0.73, 1.00)	0.97 (0.94, 0.99)	0.85 (0.76, 0.92)
Food Insecurity	1.00 (1.00, 1.00)	0.24 (-0.01, 0.43)	0.38 (-0.03, 0.93)	1.00 (1.00, 1.00)	0.94 (0.88, 0.99)	0.98 (0.95, 1.00)
Housing	0.76 (0.50, 1.00)	0.41 (0.13, 0.67)	0.69 (0.39, 0.90)	0.75 (0.45, 1.00)	0.80 (0.67, 0.90)	0.90 (0.82, 0.97)
Immigration	–	0.00 (0.00, 0.00)	–	1.00 (1.00, 1.00)	0.98 (0.94, 1.00)	1.00 (1.00, 1.00)
Medical Equipment	1.00 (1.00, 1.00)	0.81 (0.65, 0.94)	0.85 (0.69, 0.96)	1.00 (1.00, 1.00)	0.89 (0.79, 0.97)	0.91 (0.82, 0.98)
Mental Health	-0.19 (-0.44, 0.00)	0.38 (0.16, 0.58)	0.42 (0.20, 0.69)	0.44 (-0.41, 0.93)	0.70 (0.54, 0.82)	0.81 (0.69, 0.91)
Opioid Use	0.40 (0.40, 0.40)	0.83 (0.51, 1.00)	0.82 (0.54, 1.00)	0.92 (0.68, 1.00)	0.98 (0.95, 1.00)	0.98 (0.96, 1.00)
Outpatient Therapy	0.60 (0.00, 1.00)	0.65 (0.45, 0.83)	0.65 (0.45, 0.82)	0.82 (0.34, 1.00)	0.82 (0.70, 0.93)	0.76 (0.62, 0.89)
Patient Contacts	0.30 (0.00, 0.50)	0.39 (0.23, 0.57)	0.60 (0.36, 0.79)	0.84 (0.40, 1.00)	0.49 (0.30, 0.67)	0.80 (0.67, 0.90)
Activities of Daily Living	0.60 (0.00, 1.00)	0.86 (0.71, 0.97)	0.79 (0.59, 0.95)	0.82 (0.34, 1.00)	0.93 (0.85, 0.98)	0.92 (0.84, 0.98)
Reason for Admission	0.75 (0.16, 1.00)	0.67 (0.50, 0.81)	0.69 (0.54, 0.85)	0.75 (0.26, 1.00)	0.67 (0.51, 0.82)	0.69 (0.53, 0.86)
Reason for Consult	0.57 (0.29, 0.88)	0.36 (0.21, 0.52)	0.48 (0.28, 0.67)	0.67 (0.29, 1.00)	0.31 (0.12, 0.52)	0.65 (0.50, 0.80)
Safety	0.17 (-0.13, 0.50)	0.39 (0.10, 0.69)	0.59 (0.19, 0.91)	0.73 (0.18, 1.00)	0.81 (0.70, 0.90)	0.89 (0.81, 0.96)
Substance Use	0.80 (0.50, 1.00)	0.51 (0.16, 0.77)	0.49 (0.14, 0.77)	0.91 (0.67, 1.00)	0.83 (0.72, 0.92)	0.81 (0.69, 0.90)
Tobacco Use	0.36 (0.00, 0.50)	0.40 (0.29, 0.48)	0.62 (0.20, 0.88)	0.82 (0.36, 1.00)	0.94 (0.88, 0.99)	0.86 (0.77, 0.93)
Overall	**0.62 (0.48, 0.74)**	**0.60 (0.56, 0.65)**	**0.67 (0.63, 0.71)**	**0.84 (0.78, 0.90)**	**0.85 (0.83, 0.86)**	**0.89 (0.88, 0.91)**

Table A3: Cohen's Kappa and Gwet's AC1 Agreement Statistics

Prompt1	Prompt2	Prompt3	Prompt4
Review the notes and identify any mention of the social need category of Mental Health. Extract actions including previous, current, and planned actions.	Review the notes and identify any mention of the social need category of Mental Health. Extract actions including previous, current, and planned actions. When extracting actions, look for interventions such as IMD facilities, LSAT, MHRC, ADU, psychiatric holds/conservatorship	Review the notes and identify any mention of the social need category of Mental Health - Depression, anxiety, suicidal thoughts, or psychiatric symptoms impacting functioning. Extract actions including previous, current, and planned actions. When extracting actions, look for interventions such as IMD facilities, LSAT, MHRC, ADU, psychiatric holds/conservatorship	Review the notes and identify any mention of the social need category of Mental Health - Depression, anxiety, suicidal thoughts, or psychiatric symptoms impacting functioning. Extract actions including previous, current, and planned actions. When extracting actions, look for interventions such as IMD facilities, LSAT, MHRC, ADU, and psychiatric holds/conservatorship. Examples social needs category of "mental health" (non exhaustive list): • Hallucinations (seeing or hearing things that are not there) • Severe mood swings (e.g., manic or depressive episodes) Examples where the social needs category of "mental health" should not be annotated to exist: • "res was sent to ER for evaluation." reason: mental health may not be the reason the resident was sent to the ER • "Resident indicated she is still feeling scared and relieved the resident was transferred to a different neighborhood on the unit" reason: feeling scared does not qualify

Table A4: Example of prompt tuning for a specific attribute using the tiered approach. Orange text highlights changes from the previous iteration. Each revision makes the extraction requirements more specific and clear. The transitions between prompts reflect the following: Prompt1 → Prompt2 incorporates interventions from SW onboarding documentation; Prompt2 → Prompt3 includes feedback from CFEs; Prompt3 → Prompt4 integrates fragmented examples drawn from previous SW notes