Supplementary materials

Appendix 1. English version of the survey questionnaire.
This appendix presents the English translation of the original questionnaire, which was developed and administered in Italian. The translation was performed for reporting purposes, with minor adaptations to improve clarity and readability while preserving the original meaning of the items.
In the original survey, responses were collected using predefined options implemented as drop-down menus in an electronic spreadsheet (Excel format). In this appendix, response formats are explicitly reported for each item.
The questionnaire is here reported in full to ensure transparency and reproducibility.

Section 1 - Ward characteristics

Q.1 – Ward Name (*free-text response*)

Q.2 – Head of the ward (*free-text response*)

Q.3 – Department (*free-text response*)

Q.4 – Is this an academic (university-affiliated) unit? (*yes/no*)

Q.5 – Where is the ward located (building, floor)? (*free-text response*)

Section 2 - Scientific activity

Q.6 – What is the main focus of your ward's research and scientific activity? (*free-text response*)

Q.7 – Do you consider the scientific activity of your ward to be strongly aligned with its clinical activity? (*yes/no*)

Q.8 – How many researchers are there in your ward? (*numeric response*)

Q.9 – How many professors are there in your ward? (*numeric response*)

Section 3 – Clinical activity and available resources

All items in this section were assessed using a 5-point Likert scale (1=never, 2=in most cases no, 3=in approximately half of cases, 4=in most cases yes, 5=always).

Q.10 – Do you consider that your team has expertise in managing specific high-complexity patient groups?

Q.11 – If yes, do you consider that all the necessary diagnostic resources are available during hospitalization for these patients?

Q.12 – Do you consider that you have easy and timely access to resources not available within your ward (e.g., diagnostic services, specialist consultations) for managing these patients?

Q.13 – Do you have outpatient pathways available for patients with conditions in which your team has greater expertise?

Q.14 – Do you consider that the availability of outpatient clinics and day-hospital services dedicated to certain conditions may facilitate early discharge of these patients?

Section 4 – Perceived appropriateness of ED admissions

Q.15 to Q.20 were assessed using a 5-point Likert scale (1=never, 2=in most cases no, 3=in approximately half of cases, 4=in most cases yes, 5=always).

Q.15 – In your opinion, do admissions from the Emergency Department align with the clinical and scientific activity of your ward?

Q.16 – How often do patients admitted from the Emergency Department to your ward require specialist competencies not available within your ward?

Q.17 – How often is your ward able to independently provide the diagnostic and therapeutic resources required for patients admitted from the Emergency Department?

Q.18 – How often do patients admitted from the Emergency Department to your ward require diagnostic resources that are difficult to access within your ward?

Q.19 – How often do you have to transfer patients admitted from the Emergency Department to other wards due to inappropriate admission and related management challenges?

Q.20 - Do you perceive that patients admitted from the Emergency Department who are not appropriate for your ward are associated with:

- longer hospital length of stay
- increased in-hospital complications
- increased infectious complications
- increased mortality
- resource waste
- secondary transfers to other wards

Q.21 – Based on the analysis of Emergency Department admissions to your ward in 2023, the ten most frequent admission diagnoses are listed below. Do you consider these diagnoses appropriate for admission to your ward?

- ICD-9 macro-category n.1
- …
- ICD-9 macro-category n.10

Items were assessed using a 3-point Likert scale (1=no, 2=partially, 3=yes) for each diagnosis.

Q.22 – In your opinion, which five conditions would be the most appropriate for your ward in terms of diagnostic and therapeutic possibilities and expertise? (*free-text response*)

Q.23 – Based on the preliminary analysis of 2023 DRG data, the ten most frequently treated conditions in your ward are listed below. Do you consider this consistent with your ward's clinical activity?

- DRG n.1
- …
- DRG n.10

Items were assessed using a 3-point Likert scale (1=no, 2=partially, 3=yes) for each diagnosis.

Q.24 – In your opinion, would improved appropriateness of Emergency Department admissions to your ward be associated with the following outcomes? (*Yes/No*)

- Reduced hospital length of stay
- Improved quality of patient care
- Optimization of hospital resources
- Higher discharge rates
- Increased bed availability for the ED and potential boarding reduction
- Improved quality of work for the ward clinical team

Q.25 – For what reasons? (*Yes/No*)

- Availability of internal diagnostic resources
- Post-discharge outpatient pathways managed by the ward
- Staff skill mix
- Alignment with the ward's scientific activity

Section 5 – Perceptions regarding ED boarding

Q.26 – Are you familiar with the term "boarding" in the context of Emergency Departments? (*Yes/No*)

Q.27 – Do you consider boarding and overcrowding to be issues related to the Emergency Department only or to the hospital system as a whole? (*ED-only issue/hospital-wide issue*)

Q.28 – How often do you receive patients who have spent several hours or days boarding in the Emergency Department? (5-point Likert scale: *1=no, never; 2=rarely, 3=yes, sometimes; 4=yes, often; 5= yes, always*)

Q.29 – Do you perceive that patients who spend several hours boarding in the Emergency Department have worse clinical outcomes during hospitalization? (3-point Likert scale: *1=no, never; 2=partially, 3=yes*)

Appendix 2. Supplementary Table 1. Ward-level comparison between overall perceived alignment and diagnosis-specific appropriateness.

This table presents ward-level assessments of the appropriateness of ED admissions across the ten most frequent ICD-9 macro-categories. Appropriateness was rated using a 3-point scale (yes, partially, no). For each ward, the number of diagnoses classified as appropriate, partially appropriate, or not appropriate is reported (maximum 10 per ward).

Overall alignment between ED admissions and the ward clinical profile was assessed using a 5-point Likert scale (1 = never, 5 = always). Aggregate results are presented as median and interquartile range (IQR) for overall alignment, and as absolute frequencies and percentages for diagnosis-specific appropriateness (160 evaluations: 16 wards × 10 diagnoses).

Wards are anonymized to preserve confidentiality.

Ward	Overall alignment	ICD-9 specific appropriateness		
	5-point Likert	Yes n/10	Partially n/10	No n/10
Ward 1	3	8	2	0
Ward 2	3	5	2	3
Ward 3	2	10	0	0

Ward 4	3	9	1	0
Ward 5	3	9	1	0
Ward 6	2	5	5	0
Ward 7	4	7	2	1
Ward 8	4	6	3	1
Ward 9	2	8	2	0
Ward 10	4	4	6	0
Ward 11	3	6	4	0
Ward 12	4	7	3	0
Ward 13	3	2	4	4
Ward 14	3	5	5	0
Ward 15	4	8	2	0
Ward 16	4	3	2	5
	Median (IQR)	Yes N/160 (%)	Partially N/160 (%)	No N/160 (%)
Overall (aggregate data)	3 (3-4)	102/160 (63.8%)	44/160 (27.5%)	14/160 (8.7%)