

Nurse specialists and out-of-hospital Emergency Care: analysis of a new advanced Emergency Medical Service unit in the Granada metropolitan area

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OBJECTIVE. To describe the introduction of an advanced care mobile health service staffed by nurses.

MATERIAL AND METHODS. Description of emergency calls attended by the service in the first 10 weeks of operation in the primary health care district of the metropolitan area of Granada, Spain. Variables analyzed were patient age, sex, reasons for calling for emergency care, level of priority, and resources applied.

RESULTS. The service attended 345 emergency calls, for a mean (SD) number of 4.86 (2.14) calls per day. One hundred thirty-eight patients (40%) were men, with a mean age of 74.52 (18.40) years. The mean age for women was 76.47 (16.91). The majority of calls corresponded to level 3 priority (63.3%). Two hundred forty-eight patients (78.9%) were discharged after care; 91 (36.69%) of the discharged patients were men, and 157 (63.30%) were women.

CONCLUSION. An advanced care mobile health service staffed by nurse specialists is useful for out-of-hospital care and substantially alleviates hospital caseloads.

Keywords: Emergency services, prehospital. Nurse specialists. Health resources.

Cuidados Avanzados de Enfermería en Urgencias Extrahospitalarias: análisis de implantación en el Distrito Sanitario Granada-Metropolitano

OBJETIVO. Describir la implementación de un Equipo Móvil de Cuidados Avanzados (EMCA) de enfermería.

MATERIAL Y MÉTODO. Estudio descriptivo de las asistencias atendidas por el EMCA del Distrito Sanitario de Atención Primaria Granada-Metropolitano, durante las 10 primeras semanas de funcionamiento. Variables analizadas: edad, sexo, motivo de la demanda, prioridad asistencial y recursos implicados en su resolución.

RESULTADOS. Hubo 345 avisos atendidos por el EMCA, con una media diaria de 4,86 (DE 2,14). Ciento treinta y ocho (40%) correspondieron a hombres, con una edad media de 74,52 años (DE 18,40), y de 76,47 años (DE 16,91) en mujeres. La prioridad de demanda 3 fue la más frecuente (63,3%). Tras la asistencia por el EMCA, de las 248 (78,9%) altas *in situ*, 91 (36,69%) correspondieron a hombres y 157 (63,30%) a mujeres.

CONCLUSIONES. El EMCA es una herramienta útil como recurso de atención extrahospitalaria, que alivia sustancialmente la presión asistencial hospitalaria.

Palabras clave: Cuidados en emergencia prehospitalaria. Enfermera de práctica avanzada. Recursos asistenciales.

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Introduction

Emergency and urgent care services must adapt to meet the demands of users. Resource management must face the challenge of providing coverage for high-priority patients while simultaneously having units capable of responding to less severe patients.

In Andalusia (Spain), the Advanced Coordination Teams (ACT) are urgent-care resources with their own service portfolio, capable of resolving urgent and emergency situations collaboratively with the physician at the Emergency and Urgent Care Coordination Center (ECC) or autonomously.¹

The Mobile Advanced Care Team (MACT), like the ECA, is staffed by an advanced practice nurse (APN) and an emergency medical technician (EMT), in an Advanced Life Support (ALS) vehicle, attending urgent or emergency situations and responding to the patient's acute needs.^{1,2}

In a demographic scenario characterized by population aging, there has been an increase in dependency levels as well as in the prevalence of chronic diseases, multimorbidity, and polypharmacy.²

In December 2020, in Granada—due to the care overload of the Mobile Teams of the Primary Care Emergency Services (PCES), intensified by the SARS-CoV-2 pandemic—the pilot program of an EMCA was launched, with the aim of relieving care pressure and providing attention to the most vulnerable population and those most in need during this health crisis. The aim of this study is to present the implementation experience and effectiveness of an EMCA.

Material and methods

We conducted a descriptive study of the first 10 weeks of operation of the EMCA of the Primary Care Health District Granada-Metropolitano (12/5/2020 to 2/13/2021 — 71 days), operating from 9:00 to 21:00 h.

All recorded demands during this period were considered, excluding only incomplete records for the study variables.

The variables collected were demographic (date, age, and sex), reason for the call classified according to the 26 categories proposed by López Alonso *et al.*,⁶⁻⁸ and care priority using the recommendation of the Andalusian Emergency and Urgent Care Plan (PAUE), with the following maximum response times: P1. Immediate care, P2. 15 minutes, P3. 60 minutes, P4. 100 minutes, P5. 120 minutes. Other variables included the resources involved in resolving the demand (RTU: urgent transport network to hospital; ECC: Emergency and Urgent Care Coordination Center; Nursing Unit; MACT: Mobile Advanced Care Team; PCES: Primary Care Emergency Services; ALS: Advanced

Life Support) and the resolution code [resolved on site, transfer to hospital by urgent transport network (UTN), cancelled by ECC, nursing resource, transfer to hospital by UTN, PCES, death, transfer to hospital by 061 or medicalized ALS, transfer to hospital by UTN COVID].

Data were provided anonymously by the ECC of the Primary Care District Granada-Metropolitano.

Variables were analyzed by grouping the sample by sex. Quantitative variables are expressed as mean and standard deviation, and qualitative variables as absolute and relative frequencies. GraphPad Prism version 6.04 for Windows (GraphPad Software, La Jolla, California, USA, www.graphpad.com) was used for statistical analysis.

Results

A total of 345 calls attended by the MACT were recorded, of which 21 were cancelled by the ECC. The daily mean was 4.86 (SD ± 2.14). There were 207 attendances to women (60%). The mean age of men was 74.52 years (SD ± 18.40), and that of women was 76.47 years (SD ± 16.91) (Table 1).

Most requests were classified as "Priority 3." Of the 127 attended men, 79 requests (62.20%) were categorized as priority 3, with a mean age of 76.51 years (SD ± 15.67), 25 (19.68%) as priority 2 with a mean age of 69.68 years (SD ± 24.81), and 23 (18.11%) as priority 4 with a mean age of 73.61 years (SD ± 19.53). Regarding the 197 attendances to women, 117 were priority 3 (59.39%) with a mean age of 77.64 years (SD ± 17.06), 3 (1.52%) were priority 1 with a mean age of 58.33 years (SD ± 39.07), 51 (25.88%) priority 2 with a mean age of 74.98 years (SD ± 16.20), and 26 (13.19%) priority 4 with a mean age of 76.69 years (SD ± 14.93) (Table 1).

Regarding the nature of the request, the most frequent categories were "Cervical-Dorsal-Lumbar-Sciatic pain" (8.98%), "Arthralgias, limb pain and others" (8.11%), "Wounds, ulcers, and other skin lesions" (8.11%), and "falls/contusions" (8.11%). When analyzed by sex, for "Arthralgias, limb pain and others," the number of attendances was similar in men, 13 (9.42%) with a mean age of 74.38 years (SD ± 19.36), and in women, 15 (7.24%) with a mean age of 73.67 years (SD ± 17.56). The same occurred for "Wounds, ulcers, and other skin lesions." The number of requests due to "Cervical-Dorsal-Lumbar-Sciatic pain" was also higher in women, 27 (13.04%) with a mean age of 72.52 years (SD ± 20.01) vs men, 4 (2.89%) with a mean age of 67.25 years (SD ± 19.03). This was also observed for "Fall/Contusion," 19 (9.17%) in women, as well as for "Oncologic pain and terminal patient," 10 (4.83%) (Table 2).

Table 1. Number and priority level of care requests

	N	(%)	Nulo	Mean Age (SD)	P1	P2	P3	P4	P5	Total
Men	138	40	11	74.52 (±18.40)	0	25	81	21	0	127
Women	207	60	10	76.47 (±16.91)	3	49	124	21	0	197
Total	345	100	21	-	3	74	205	42	0	324

P: priority; Age measured in years. SD: standard deviation.

Table 2. Reason for the request according to the 26 categories proposed by López Alonso *et al.* (2016, 2019, 2020)⁶⁻⁸

Reason for the request	Total		Men		Women	
	N (%)	N (%)	Age Mean (SD)	N (%)	Age Mean (SD)	
Hyper/Hypotension	14 (4.05)	6 (4.34)	77.50 ± 12.71	8 (3.86)	79.00 ± 11.26	
Social problem with or without associated disease	2 (0.57)	0	–	2 (0.96)	91.00 ± 1.41	
Urinary catheter: retention, obstruction, displacement	12 (3.47)	9 (6.52)	81.11 ± 9.39	3 (1.44)	60.00 ± 24.02	
Oncologic pain and terminal patient	13 (3.76)	3 (2.17)	75.33 ± 16.62	10 (4.83)	79.20 ± 16.90	
Hyper/Hypoglycemia	16 (4.63)	8 (5.79)	74.38 ± 15.89	8 (3.86)	75.50 ± 13.76	
NG tube: obstruction or accidental displacement	1 (0.28)	0	–	1 (0.48)	87.00	
Cervical-Dorsal-Lumbar-Sciatic pain	31 (8.98)	4 (2.89)	67.25 ± 19.03	27 (13.04)	72.52 ± 20.01	
Urinary infection, renal colic, genitourinary pain	9 (2.60)	4 (2.89)	82.50 ± 9.04	5 (2.41)	70.60 ± 23.32	
Arthralgias, limb pain and others	28 (8.11)	13 (9.42)	74.38 ± 19.36	15 (7.24)	73.67 ± 17.56	
Agitation/Somnolence/Altered consciousness	15 (4.34)	3 (2.17)	87.67 ± 11.06	12 (5.79)	68.67 ± 24.80	
Subcutaneous catheter insertion and other techniques	9 (2.60)	6 (4.34)	79.50 ± 13.71	3 (1.44)	66.67 ± 20.50	
Anxiety and depression	10 (2.89)	6 (4.34)	57.00 ± 15.09	4 (1.93)	68.75 ± 31.67	
Vomiting, diarrhea and others	18 (5.21)	7 (5.07)	75.57 ± 26.45	11 (5.31)	80.09 ± 12.96	
Hemorrhage: hematuria, epistaxis, others	12 (3.47)	7 (5.07)	85.57 ± 9.25	5 (2.41)	80.40 ± 10.16	
Scheduled care: wound care, injections and others	14 (4.05)	2 (1.44)	76.50 ± 9.19	12 (5.79)	79.08 ± 10.66	
Wounds, ulcers and other skin lesions	28 (8.11)	13 (9.42)	61.77 ± 32.86	15 (7.24)	82.67 ± 11.84	
Headache, neuralgia and ear pain	7 (2.02)	2 (1.44)	45.00 ± 24.04	5 (2.41)	66.20 ± 24.12	
Dizziness and vertigo	13 (3.76)	4 (2.89)	68.50 ± 12.12	9 (4.34)	77.44 ± 16.75	
Allergic pruritus and erythema	1 (0.28)	0	–	1 (0.48)	95.00	
Fall/Contusion	28 (8.11)	9 (6.52)	77.22 ± 13.94	19 (9.17)	83.05 ± 11.43	
Angina and arrhythmias (tachycardia and bradycardia)	6 (1.73)	2 (1.44)	76.00 ± 1.41	4 (1.93)	73.50 ± 5.97	
Dyspnea and hypoxia	8 (2.31)	3 (2.17)	75.33 ± 2.52	5 (2.41)	85.80 ± 7.32	
Abdominal pain	4 (1.15)	2 (1.44)	82.00 ± 8.49	2 (0.96)	74.00 ± 24.04	
COVID-19 symptoms/suspected	4 (1.15)	2 (1.44)	79.00 ± 21.21	2 (0.96)	67.00 ± 19.80	
Other mild conditions*	13 (3.76)	7 (5.07)	83.43 ± 8.92	6 (2.89)	79.33 ± 18.92	
Other moderate or severe conditions**	7 (2.02)	4 (2.89)	78.00 ± 16.08	3 (1.44)	77.00 ± 25.16	
Cancelled by ECC	21 (6.08)	11 (7.97)	71.40 ± 16.56	10 (4.83)	75 ± 15.05	
Total	345 (100)	138 (40)		207 (60)		

*"Other mild conditions" include respiratory secretions, hypothermia, hyperthermia, sweating, hiccups, edema, allergic reaction, foreign body in ear, urinary retention, inguinal hernia, swallowing problems.

**"Other moderate or severe conditions" include anuria, opioid intoxication, stroke, transient ischemic attack, hip fracture, unconsciousness, smoke inhalation, death.

Age measured in years. SD: standard deviation; NG tube: nasogastric tube; ECC: Emergency and Urgent Care Coordination Center. Authors' own work.

A total of 43.76% of the requests were resolved autonomously by the MACT, and 40.28% collaboratively with the ECC. The MACT attended and resolved more cases involving women, 89 (58.94%), than men, 62 (41.05%) (Table 3). After MACT care, completion of requested care in situ was also greater for women, 157 (63.30%), than for men, 91 (36.69%) (Table 4).

Discussion

Data from this study indicate that the MACT implemented in the Primary Care Health District Granada-Metropolitano is capable of resolving a high number of home-based urgent situations, either autonomously or in collaboration with the ECC medical team. In this regard, the competencies demonstrated by the nurse integrated in the MACT¹¹ are highlighted, as has been successfully shown in previous experiences in other countries.¹²⁻¹⁴

Currently, Spain has 59 official Advanced Life Support Nursing Units (ALSNU), with Catalonia being the pioneer, having 27 units in 1990. Since then, this service has been implemented in various autonomous communities such as the Canary Islands, Andalusia, the Basque Country, Castile-La Mancha, and Madrid,^{15,16} demonstrating the effectiveness of this resource and justifying its existence. Fur-

thermore, the development of ALSNU has been favored by Royal Decree 836/2012 of May 25, which established the use of type C ALS ambulances staffed by an emergency medical technician and a nurse.¹⁷

Discharge after MACT assistance occurred in situ for 36.69% of male users and 63.30% of female users. These percentages indicate that a large proportion of urgent home requests were resolved without the need for transport, suggesting the potential for reducing the burden on hospital emergency departments. Romero Cabrera *et al.*,¹⁸ in their work "Care of people with hypertension by emergency nurses at home," found an in situ resolution rate of 92.47%. Likewise, in their study, López Alonso *et al.*⁷ found an in situ resolution rate of 93.5%.

As limitations of this study, we must note that the sample is relatively small, as this is a recently implemented resource; the study is unicentric; there was no follow-up to assess repeat requests by the same patients for similar reasons in the short term; and an economic analysis to evaluate the efficiency of this care model was not conducted. Therefore, more studies with a larger patient sample, longer duration, and more MACT units are needed, as well as economic evaluations and, of course, assessment of user satisfaction. Despite these limitations, we can affirm that the out-of-hos-

Table 3. Resolution of the care request

Resolution of the request	Total		Men		Women	
	N (%)	N (%)	Age Mean (SD)	N (%)	Age Mean (SD)	
MACT	151 (43.76)	62 (41.05)	75.79 ± 20.33	89 (58.94)	79.37 ± 14.10	
MACT / 061	5 (1.44)	1 (20)	60	4 (80)	57.25 ± 27.87	
MACT / ECC	139 (40.28)	51 (36.69)	73.69 ± 17.91	88 (63.30)	74.99 ± 19.04	
MACT / PCES	26 (7.53)	11(42.30)	73.91 ± 12.75	15(57.69)	74.87 ± 13.96	
MACT / PCES / ECC	2 (0.57)	1 (50)	73	1 (50)	62	
Cancelled by ECC	21 (6.08)	11 (52.38)	71.4 ± 16.56	10 (47.61)	75 ± 15.05	
Death	1 (0.28)	1 (100)	76	0 (0)	-	
Total	345 (100)					

CCUE: Emergency and Urgent Care Coordination Center; MACT: Mobile Advanced Care Team; PCES: Primary Care Urgent Care Services; 061: Emergency Medical Service; Age measured in years. Authors' own work.

Table 4. Resources involved in resolving the demand

Disposition at discharge	Total		Men		Women	
	N (%)	N (%)	Age Mean (SD)	N (%)	Age Mean (SD)	
Discharged in situ	248 (71.88)	91 (36.69)	76 ± 16.93	157 (63.30)	77.11 ± 16.92	
UTN – Hospital	56 (16.23)	28 (50)	70.50 ± 23.92	28 (50)	76.93 ± 15.08	
Cancelled by ECC	21 (6.08)	11 (52.38)	71.40 ± 16.56	10 (47.61)	75 ± 15.05	
NU	1 (0.28)	1 (100)	69	0 (0)	-	
UTN – MACT – Hospital	7 (2.02)	1 (14.28)	73	6 (85.71)	73.33 ± 19.38	
PCES	5 (1.44)	3 (60)	72.33 ± 18.50	2 (40)	74 ± 12.73	
Death	1 (0.28)	1 (100)	76	0 (0)	-	
ALS – Hospital	5 (1.44)	1 (20)	60	4 (80)	57.25 ± 27.87	
UTN COVID – Hospital	1 (0.28)	1 (100)	94	0 (0)	-	
Total	345 (100)					

UTN: Urgent hospital transport network; ECC: Emergency and Urgent Care Coordination Center; NU: Nursing Unit; MACT: Mobile Advanced Care Team; PCES: Primary Care Emergency Services; ALS: Advanced Life Support; Age measured in years. Authors' own work.

hospital care provided by the MACT is of great value in addressing and responding to a wide variety of requests and constitutes an effective tool for urgent out-of-hospital care.

The MACT is a resource that provides an efficient and satisfactory response to a significant portion of the urgent home care demand.^{19,20}

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REFERENCES

- López Serrato M, Lafuente Robles N, Casado Mora MI, Bocanegra Pérez A, de Castro García S, García del Águila J. Equipos de cuidados avanzados. [monografía en Internet] Sevilla. Consejería de salud. Empresa pública de emergencias sanitarias, 2018 (Accessed 30 May 2023). Available at: https://www.sspa.juntadeandalucia.es/servicioandaluzdesalud/sites/default/files/sinfiles/wsas-media-mediafile_sasdocumento/2019/desa_eqmovcuid.pdf
- Fernández Nátera A, Sánchez González AM, Tibos F, Paz León UJ, Martínez García AI, Lupiáñez Castillo J, et al. Plan de mejora de los servicios de urgencias de atención primaria del servicio sanitario público andaluz. [monografía en Internet] Sevilla. Servicio Andaluz de Salud. 2018. (Accessed 30 May 2023). Available at: https://www.sspa.juntadeandalucia.es/servicioandaluzdesalud/sites/default/files/sinfiles/wsas-media-mediafile_sasdocumento/2019/plan_mejora_serv_urg_sept_2018.pdf
- Sharma S, Rafferty AM, Boiko O. The role and contribution of nurses to patient flow management in acute hospitals: A systematic review of mixed methods studies. *Int J Nurs Stud.* 2020;110:103709.
- Schober M, Affara F. International council of nurses: Advanced nursing practice. Oxford: Wiley- Blackwell; 2006.
- Heinen M, van Oostveen C, Peters J, Vermeulen H, Huis, A. An integrative review of leadership competencies and attributes in advanced nursing practice. *J Adv Nurs.* 2019;75:2378-92.
- López Alonso SR, Martín Caravante S, Rivero Sánchez C, Linares Rodríguez C, García González JA, Martínez García AI. Casuística, farmacología y juicio clínico de la enfermera de urgencias a domicilio. *Index Enferm.* 2016;25:9-13.
- López Alonso SR, Linares Rodríguez C, Martín Caravante S, Martínez García AI. Asistencia urgente domiciliaria a personas con problemas crónicos de salud por la enfermera de cuidados avanzados. *Gerokomos.* 2019;30:108-12.
- López Alonso SR, Rivero Sánchez C, Martín Caravante S, Martínez García AI, Linares Rodríguez C. Práctica avanzada de la enfermera en urgencias extrahospitalarias y comparación con la casuística atendida por equipos con médicos. *Index Enferm.* 2020;29:127-31.
- Instituto Nacional de Estadística [www.ine.es] Madrid: Instituto Nacional de Estadística 2021. Actualizada 2021. INE base / Mujeres y hombres. Evolución de la esperanza de vida al nacimiento por periodo y sexo (1991-2020). Brecha de género. Spain. (Accessed 30 May 2023). Available at: https://www.ine.es/jaxi/Datos.htm?path=/t00/mujeres_hombres/tablas_1/10/&file=d01001.px
- Boman E, Duvaland E, Gaarde K, Leary A, Rauhala A, Fagerström L. Implementation of advanced practice nursing for minor orthopedic injuries in the emergency care context: A non-inferiority study. *Int J Nurs Stud.* 2021;118:103910.

11. Fawdon H, Adams J Advanced clinical practitioner role in the emergency department. *Nursing Standard*. 2013;28:48-51.
12. Nilsson J, Johansson S, Nordström G, Wilde-Larsson B. Development and validation of the ambulance nurse competence scale. *J Emerg Nurs*. 2020;46:34-43.
13. Wihlborg J, Edgren G, Johansson A, Sivberg B. The desired competency of Swedish ambulance nurse according to the professionals-A Delphi study. *Int Emerg Nurs*. 2014;22:127-33.
14. Van Schauppen H, Bierens J. Understanding the prehospital physician controversy. Step 1: Comparing competencies of ambulance nurses and prehospital physicians. *Europeans J Emerg Nurs*. 2011;18(6).
15. Perejón Martín E, López Alonso SR, Inurria Salcedo R, Martín Martín R. Estado del conocimiento sobre el Soporte Vital Avanzado Enfermero en Spain según la red social Twitter. *Index Enferm*. 2021;30:189-92.
16. Calles Domínguez C, Borrella Romero A, Durán Parra, AE, Bravo Tejedor I, Parrón Parra M. Soporte vital avanzado enfermero ¿una realidad? *Emergencias*. 2017;29:209-10.
17. Real Decreto 836/2012 de 15 de Mayo. Boletín Oficial del Estado núm. 137, de 8 de junio de 2012, páginas 41589 a 41595. BOE-A-2012-7655. (Accessed 9 March 2023). Available at: <https://www.boe.es/eli/es/rd/2012/05/25/836>
18. Romero Cabrera C, López Alonso SR, Sánchez Rivero C, Martín Caravante S, Linares Rodríguez C. Atención a personas con HTA por la enfermera de urgencias a domicilio. *Enferm En Cardiol Rev Científica E Inf Asoc Esp Enferm En Cardiol*. 2021;83:16-21.
19. Williams K. Advanced practitioners in emergency care: a literature review. *Emerg Nurse*. 2017;25:36-41.
20. Instituto Español de Investigación Enfermera y Consejo General de Enfermería de Spain. Actuación de la Enfermera/o en el ámbito de los cuidados en situaciones de Urgencias y Emergencias. 1.ª ed. 2020. (Accessed 9 March 2023). Available at: <https://www.consejogeneralenfermeria.org/profesion/competencias-enfermeras/send/70-competencias-enfermeras/1392-actuacion-de-la-enfermera-o-en-el-ambito-de-los-cuidados-en-situaciones-de-urgencias-y-emergencias>

