

1 **ABSTRACT**

2 **BACKGROUND**

3 Pharmacists-led medication review services are recognized as a key to medicines
4 management. Although some studies have identified the factors that hinder and facilitate its
5 implementation, there is a paucity of evidence of implementation studies in pharmacy
6 practice. The objective was to describe the implementation process of a Medication Review
7 with Follow-up service in a community pharmacy setting and evaluate its implementation
8 outcomes.

9

10 **METHODS**

11 An Implementation-effectiveness hybrid study was undertaken in a community pharmacy
12 setting. A pharmacist-led medication review with follow-up was the innovation to be
13 implemented. The implementation process was divided into four different phases;
14 exploration and adoption, program installation, initial implementation, and full operation
15 phase. A core set of implementation outcomes was measured, including penetration,
16 implementation costs, feasibility, fidelity, acceptability, appropriateness and efficiency. The
17 outcomes were evaluated using a mixed research methods approach.

18

19 **RESULTS**

20 The penetration rate of the service was 0.63 and the implementation costs were 57,359.67€.
21 There was a high retention-participation rate of patients, equal to 0.94. For every month of
22 service provision, there was a 1.27 increase in the number of patients requesting the service,
23 compared to the number of patients being offered the service. The service was provided
24 with a high fidelity and the time spent on service provision was 171.7 minutes per patient
25 (DE: 123.7). The average patient satisfaction with the service was 4.82 (SD: 0.39, scale 1-5),
26 and the acceptance rate of care plans by patients and general medical practitioners were

27 96.99% and 96.46 respectively. 408 negative outcomes associated with the use of
28 medications were identified during the study (3.09 per patient), of which 96.3% were
29 resolved. The average time per patient spent on service provision significantly decreased
30 along the 18 months of service provision ($p=0.001$).

31

32 **CONCLUSIONS**

33 According to international vision and policy, the provision of professional services should be
34 a priority for pharmacies and the health care systems. However, the implementation of
35 these innovations has been slower than desirable. This case report can assist individual
36 pharmacists and professional organisations interested in implementing evidence-based
37 services, by offering an example on how to approach the implementation process in a
38 systematic way.

39

40 **KEYWORDS**

41 Implementation, Implementation framework, implementation outcome, professional
42 pharmacy service, medication review, community pharmacy.

43

44 **Evaluation of the implementation process and outcomes of a professional pharmacy**
45 **service in a community pharmacy setting. A case report.**

46 **INTRODUCTION**

47 Medicines are the most frequent and cost-effective resource for treating chronic conditions.
48 They usually represent a high cost in national healthcare systems. Suboptimal use of
49 medications is usually associated with negative clinical outcomes and drug related problems
50 ¹. These events are a significant public health problem, due to their prevalence and negative
51 consequences. Community pharmacist-led medication review services have been proven to
52 be a possible solution to address this problem. They are recognized as a key element of
53 medicines management, as patient safety and healthcare costs are optimized ².

54 There is evidence that pharmacy-led medication review services are associated with positive
55 clinical, economic, and humanistic outcomes ³⁻⁶. However these benefits cannot accrue
56 unless there is an effective implementation of the service. In the case of pharmacy, as in
57 other parts of the health care system, there is a large gap between the development of new
58 health innovations and their incorporation to routine practice, mainly due to lack of
59 implementation programs and the use of evidence-based strategies. Their implementation
60 level is rarely defined or measured and its implementation success appears to be limited,
61 highlighting that further research is required to assist the process of professional services
62 implementation in pharmacy.

63 The discipline of implementation science has developed theories, models and frameworks
64 aimed at describing, understanding and evaluating the translation of evidence into practice.

List of abbreviations

MRF: Medication Review with Follow-up, GP: General Practitioner

65 Implementation process models are used to describe and/or guide the process of
66 implementation ⁷. They have been acknowledged as a key element to facilitate the
67 implementation of health innovations into practice ⁷, overcoming the current research to
68 service gap ⁸. Evaluation frameworks provide a structure for assessing implementation,
69 through the measurement of implementation outcomes. They have been defined as “*the*
70 *effects of deliberate and purposive actions to implement new treatments, practices, and*
71 *services*” ⁹. Implementation outcomes enable empirical assessment of the success of
72 strategies used to implement new interventions or services and to compare their
73 effectiveness. This allows an optimization of the service benefits, stimulates dissemination
74 of findings into other settings and promulgates sustainability. However, in most initiatives to
75 translate evidence-based interventions into real practice, implementation success is
76 assessed exclusively using data on clinical outcomes ⁹.

77 In Spain, medication review with follow-up (MRF) has been identified as one of the main
78 professional services to be provided by community pharmacists ¹⁰. However, its
79 implementation appears to be limited. Although some studies have identified the elements
80 that hinder and facilitate its implementation ¹¹, there is a paucity of evidence on
81 implementation studies in a community pharmacy setting. The objective of the present
82 study was to describe the implementation process of a MRF service in a community
83 pharmacy setting and to evaluate its implementation outcomes.

84 **MATERIAL AND METHODS**

85 **Study design**

86 This paper is part of a larger study that used an effectiveness-implementation hybrid
87 research design, which was intended to evaluate the effectiveness of both an intervention
88 and an implementation strategy ¹². The full study methodology and the effectiveness

89 outcomes of the medication review with follow-up service have been reported elsewhere ¹³.
90 In this paper, only implementation processes and outcomes are reported for a case report.

91 **Study setting**

92 The study was undertaken in a community pharmacy of the province of Gipuzkoa, Spain. The
93 pharmacy employing 4 pharmacists and 2 technicians was located next to a health care
94 centre.

95 **Description of the innovation**

96 A pharmacist-led medication review with follow-up (MRF) was the innovation to be
97 implemented ¹⁰. It is a professional pharmacy service aiming at detecting drug related
98 problems in order to prevent and solve negative outcomes associated with medications. The
99 service starts with the patient recruitment, which is followed by a first patient interview in
100 the pharmacy. The objective is to gather information about the clinical history and patients'
101 concerns about their diseases and medications. A comprehensive medication review is then
102 performed, and drug related problems and negative outcomes associated with medications
103 are identified. A care plan targeted at the problems identified is agreed with the patient and
104 other health care professionals if required. Finally, regular patient follow-up visits are
105 scheduled in order to assess progress, outcomes achieved and/or detect new drug related
106 problems ¹⁰ (Figure 1).

107 **Process model for the implementation of the innovation**

108 The implementation process was divided into four different phases following the framework
109 designed by Fixen *et al* ⁸. The first stage (exploration and adoption) involved the exploration
110 and analysis of the system and pharmacy environment for the implementation of the MRF
111 service, concluding with the pharmacy owner's decision to accept or reject it. The second

112 phase (program installation) involved the preparation of the pharmacy and service provider
113 to deliver the MRF service. The third stage, known as initial implementation, aimed to trial
114 the service provision to a small number of patients. The fourth stage, called full operation,
115 included the full implementation and the provision of the service to a pre-defined target
116 number of patients in the pharmacy. The model also considers a fifth stage, known as
117 sustainability, that involves the integration and continuance in service provision,
118 maintenance of the service environment, including the system capacity (support and
119 funding) and maintenance of results. However, due to the lack of external reimbursement
120 for service provision, this phase was not considered in this study.

121 **Framework used for the implementation evaluation**

122 The framework developed by Proctor *et al*⁹ was applied to evaluate the implementation
123 success of the service. It suggests the following core set of implementation outcomes:
124 penetration, implementation cost, feasibility, fidelity, acceptability and appropriateness.
125 Service implementation efficiency was also measured. The operational definition, method of
126 assessment, and implementation stage at which the evaluation took place for each outcome
127 is described in table 1. The outcomes were evaluated using a mixed research methods
128 approach.

129 **Statistical analysis**

130 Statistical analyses were performed using SPSS for Windows 18.0 (SPSS Inc, Chicago, Illinois,
131 USA). A p-value < 0.05 was considered to indicate statistical significance. Quantitative
132 variables were expressed as the mean (SD), and Student's t-test for paired samples was used
133 to compare them. A multivariate logistic regression analysis was performed to explore the
134 association between the study period and patient recruitment (service offering by the

135 pharmacist or service request by the patient). Time spent on service provision according to
136 the number of patients included was analysed using ANOVA.

137 **Ethical approval**

138 Approval for the study was given by the Ethics and Research Committee of the Virgen de las
139 Nieves University Hospital in Granada, Spain (Approval number 10/092). A written
140 information sheet was provided and informed consent was obtained from all participants.

141 **RESULTS**

142 **Implementation process of the innovation**

143 *Exploration and adoption phase (analysis of the system and pharmacy environment for the*
144 *implementation of the MRF service)*

145 An exploration of external and internal support was undertaken before the start of the
146 service implementation process. During this phase, a four-level analysis was performed to
147 identify and assess barriers and facilitators for practice change ¹⁴. For the purpose of this
148 study, barriers were considered as elements that hindered the implementation of the MRF
149 service whereas facilitators were considered as elements that could assist pharmacy and
150 pharmacists in overcoming barriers and that could act as independent enablers of change ¹⁴.

151 The first-level analysis was targeted at the external system of the pharmacy. It involved
152 semi-structured interviews with different stakeholders such as General Practitioners (GPs),
153 representatives of professional bodies, pharmacy practitioners and strategists. It allowed the
154 identification and prioritization of internal or external facilitators for the implementation of
155 the MRF service. Internal facilitators were described as those within control of pharmacists
156 and pharmacies, and could be modified to some extent to suit local needs. Changing the

157 pharmacy structure and adapting the internal organisation and management resources of
158 the pharmacy were identified as the most applicable ones. External facilitators were
159 described as those that existed at the organisational level and that were beyond the direct
160 control of the individual pharmacy, for example changing University curricula, coordinating
161 national leaders' messages, and modifying the pharmacy reimbursement system.

162 The second-level analysis was targeted at the local community and patients attending the
163 community pharmacy, in order to assess their expectations and satisfaction with the
164 professional pharmacy services. This assessment was undertaken in a random sample of 61
165 patients using a pre-designed questionnaire. Results showed that the most rated
166 expectation of care in the pharmacy was 'having queries and questions about health
167 problems addressed', and that patients valued 'seeking advice on health problems or
168 medicines from the pharmacist'¹⁵. Based on these results, it was assumed that local patients
169 would accept the MRF service if it was implemented since these were included in the MRF
170 service objectives.

171 The third and fourth-level analysis was targeted at the pharmacy as an organisation and at
172 the pharmacy staff. A systematic analysis of internal barriers hindering the implementation
173 of the MRF service was undertaken following the model proposed by Roberts A *et al*¹¹.
174 Current organisational culture of the pharmacy, lack of an internal implementation
175 champion, lack of priorities and goals, inappropriate layout (including the lack of a
176 counselling room), lack of appropriate technology and resources, and lack of bibliographic
177 resources and medicines-information support/assistance were identified as the major
178 barriers in the pharmacy as an organization.

179 At the pharmacy staff level, lack of leadership, lack of staff awareness on the relevance of
180 the service, lack of priority to implement the service, inadequate workflow, and lack of staff
181 training to provide the service were identified as the major barriers.

182 *Installation phase (preparation of the pharmacy and service provider to deliver the MRF*
183 *service)*

184 Based on the analysis undertaken in the exploration phase, the following changes were
185 incorporated during the program installation phase.

186 A. Changes in the pharmacy as an organisation:

187 Organisational culture of the pharmacy: there was a shift in its orientation from product
188 selling to patient care, aiming at achieving a high quality in the provision of professional
189 pharmacy services and improve the health of the community. Monthly staff meetings were
190 held with the objective of discussing and reinforcing the need of implementing professional
191 pharmacy services, including MRF.

192 Nomination of an internal champion: An internal champion was nominated to support and
193 drive the implementation of the MRF service, overcoming indifference or resistance that the
194 service could generate within the pharmacy ¹⁶.

195 Setting priorities and goals: clear expectations in regards to work performance and results of
196 the MRF service were set by the internal champion. The implementation of the service and
197 its provision to a pre-defined target population was set as a priority in the strategic vision of
198 the pharmacy. This was prioritised and balanced according to the other tasks undertaken in
199 the pharmacy.

200 Pharmacy layout: a new private counselling room was added to the layout of the pharmacy,
201 available for the provision of the MRF service.

202 Information technology: a new software program was specifically designed and incorporated
203 into the dispensing software. A new computer was bought. The objective was to monitor the
204 patient recruitment rate and register all the data derived from service provision and patient
205 follow-up.

206 Resources: New laboratory material was acquired to monitor clinical parameters of patients
207 receiving the service. This included the Siemens DCA Vantage Glycated Hemoglobin
208 Analyzer® (to measure HbA1c) and the Reflotron Plus® (a clinical chemistry system which
209 allowed the measurement of some clinical parameters, such as liver and pancreas enzymes,
210 metabolites, blood lipids, and glucose).

211 Bibliographic resources and medicines-information support: an agreement was achieved
212 with the drug Information centre of the local professional pharmacy association to service
213 the pharmacy providing evidence-based papers to support decision-making and in
214 addressing medicine related problems.

215 B. Changes in the pharmacy staff:

216 Lack of staff awareness on the relevance of the service: a pre-implementation staff meeting
217 was organised by the internal champion. The following concepts were covered: what the
218 MRF was, the objectives of the service and the target population, staff re-organisation of
219 activities during the implementation, the need to involve all pharmacy staff for successful
220 implementation, implementation benefits for the pharmacy, implementation benefits for
221 staff, implementation benefits for consumers, alignment with the new organisational culture
222 and pharmacy business strategy. Monthly meetings were held with the objective of

223 reinforcing those concepts and providing continuous feedback on the implementation
224 process and outcomes.

225 Leadership: The internal champion led the process of creating the organizational culture and
226 climate conducive to adoption of the service and took ownership of the process
227 implementation.

228 Workflow: The workflow of the pharmacy and the employees' roles were reorganized. One
229 pharmacist was nominated to be the service provider. Her work time was equally allocated
230 to service provision and dispensing, being released from any other duties in the pharmacy.
231 Every staff in the pharmacy was in charge of recruiting patients during the dispensing of
232 medications.

233 Staff training: The service provider was specifically trained to deliver the MRF service. She
234 was enrolled in a Master of Pharmacy for one year consisting of 60 credits, which covered
235 the following contents: clinical management of patients with chronic conditions, MRF
236 method, communication and interviewing skills, collaboration systems with other health
237 care providers, and documentation of the service.

238 *Initial implementation phase (experimenting with the MRF service prior to a full*
239 *implementation)*

240 The initial implementation phase involved the service provision to ten patients, which was
241 the goal set by the internal champion for this phase. This allowed an initial assessment of
242 the feasibility of providing the MRF service in the pharmacy and the suitability of all the
243 changes incorporated during the program installation phase. At this stage, the service
244 provider spent an average of 550.43 minutes per patient (min 427.53, max 798.34, includes
245 first patient interview and comprehensive medication review). Although the time invested

246 was considered to be high, the internal champion and the pharmacy staff jointly agreed to
247 keep on with the implementation process.

248 *Full operation phase (full implementation and integration of the service in the pharmacy)*

249 The full operation phase involved the service provision for at least one month to the target
250 number of patients, set by the internal champion. The target number of patients was
251 calculated based on the assumption that a full time pharmacist could provide the service to
252 237 patients a year. This was adjusted to 118 patients due to lack of external remuneration
253 for service provision and allocation of 50% of a pharmacist's time to the service. The full
254 operation phase was reached after 12 months of service provision. During this phase, the
255 internal champion monitored the patient recruitment ratio, fidelity of service provision,
256 pharmacy workflow, patient satisfaction, availability of resources and continuous training of
257 the service provider. Monthly staff meetings were organised in order to provide feedback
258 about the service implementation process and outcomes, and reinforce the concept of its
259 alignment with the new organisational culture of the pharmacy.

260 **Implementation evaluation outcomes**

261 *Penetration (Understood as the integration of the MRF service within the pharmacy and its*
262 *subsystems):*

263 The total number of eligible patients was estimated to be equal to 211 taking into account
264 the following data: (A) the average number of patients per pharmacy in Spain is 1272 ¹⁷, (B)
265 the number of patients attending emergency departments is 576 per 1000 habitants ^{18,19}, (C)
266 35.7% of the emergency unit visits are caused by negative outcomes related to medicines ²⁰,
267 (D) 81% of them are preventable ²⁰. During the full operation phase, 132 patients received
268 the service for 18 months. The penetration rate was therefore 0.625.

269 *Implementation costs:*

270 The implementation costs from the pharmacy perspective were estimated to be 27,550€ for
271 the installation phase and 57,359.67€ for the initial implementation and full operation
272 phase. A detailed description of implementation costs can be found in table 2.

273 *Feasibility:*

274 • *Patient recruitment and retention-participation rate*

275 Initially, 140 patients were recruited. However, two of them withdrew and six died. 132
276 patients received the service, which implied a high retention-participation rate of 0.94.

277 • *Service offering by the pharmacy/service request by the patient ratio*

278 For every month of service provision, there was a 1.27 increase in the number of patients
279 requesting the service, compared to the number of patients being offered the service
280 (IC95%: 1.14-1.43; $p < 0.001$). The largest change was observed after eight months of patient
281 recruitment, since the service-request rate was five times higher to the service-offering rate
282 (IC95%: 1,29-19,44; $p = 0,020$) (Figure 2).

283 *Fidelity:*

284 The number of times that each stage of the MRF service was undertaken is reported in table
285 3. During the study, 132 patient interviews, 1112 comprehensive medication reviews and
286 2213 care plan and follow-up visits were undertaken. MRF visits patients made to the
287 pharmacy was 2213 (average 16.8; SD:12.5). The time spent on service provision during the
288 study period was 2288 for the first interview stage, 53786.6 minutes for the
289 comprehensive medication review stage and 22668.2 minutes for the care plan and follow-

290 up visits. The time spent in each of the MRF stages and its average per patient is reported in
291 table 3.

292 *Acceptability*

- 293 • Service acceptability by patients:

294 The results for the patient satisfaction questionnaire can be found in table 4. The item with
295 the highest score was “I would keep on visiting my pharmacist to have my medication
296 managed” [with an average of 4.98 (0.15)], followed by “I am satisfied with the service
297 provided” [4.82 (0.39)] and “I would recommend my relatives and friends to request this
298 service from my pharmacist” [4.80 (0.45)]. The item “I would ask my GP to keep on
299 collaborating with my pharmacist in regards to my medications and health problems” got
300 the lowest average score [3.36 (0.75)].

301 In terms of patient’s acceptability rate of the care plans, 622 interventions aimed at
302 addressing drug-related problems were provided during the implementation program; 266
303 (36.32%) were targeted at the patient, of which 258 were accepted representing an
304 acceptability rate of 97%.

- 305 • Service acceptability by physicians:

306 Of the 622 interventions provided, 396 (63.76%) were targeted at the physician with 382
307 accepted, representing an intervention acceptability rate of 96%.

308 *Appropriateness*

- 309 • Appropriateness for the pharmacy:

310 Based on the two following criteria the service was considered appropriate for
311 implementation: (a) In Spain, the MRF service is one of three services defined in the Spanish
312 National Strategic Consensus for implementation of professional pharmacy services¹⁰, (b) At
313 an international level, it has been recognized that there is an imperative need to shift
314 pharmacist's focus away from dispensing medicines towards providing professional services.

315 • Appropriateness for the local community and consumers:

316 408 negative outcomes associated with the use of medications were identified during the
317 study (3.09 per patient). Considering that 96.32% of them were resolved at the end of the
318 follow-up period through the provision of the MRF service, it was considered appropriate for
319 the local community. The full effectiveness results of the service have been reported
320 elsewhere¹³.

321 *Service implementation efficiency*

322 The average time per patient spent on service provision for the different stages of the MRF
323 service significantly decreased along the whole operation phase for each patient ($p=0.001$)
324 (Figure 3). For example, the average time spent per patient for the first patient interview
325 was 23 minutes. This number constantly decreased for the follow-up visits down to 14
326 minutes (month 18). No significant differences were found on the time spent on service
327 provision between different patients during the same period of the follow-up ($p=0.495$). A
328 similar trend was found for the average length of comprehensive medication reviews.

329 A analysis of the time spent on service provision according to the number of patients
330 included in the service was performed. The final sample of patients was divided into ten
331 deciles (*i.e.* that each part represented 1/10 of the sample population), based on their order

332 of inclusion in the study. There was a significant decrease in the time spent on all the stages
333 of service provision through all the study ($p < 0.001$) (Figure 4).

334 **DISCUSSION**

335 The results of the present case report show innovative results of the implementation
336 process and outcomes of a professional pharmacy service in a community pharmacy setting,
337 based on two different implementation research approaches. The implementation process
338 of a specific professional pharmacy service like MRF has been described conjointly with the
339 assessment of the measurement of implementation outcomes. The need to use models and
340 frameworks to facilitate the implementation of health innovations has been widely
341 recognised ⁷. It has been suggested that the use of theoretical implementation approaches
342 will contribute to reduce the existing gap between evidence and practice in different
343 disciplines like pharmacy. To our knowledge, no research has been undertaken on the
344 implementation processes and outcomes of a professional pharmacy service like MRF. This
345 study provides a novel evidence-based approach for the implementation of professional
346 services in a community pharmacy setting.

347 The implementation process of the professional service evaluated in this case report was
348 complex mostly due to the efforts required in the first two implementation phases,
349 exploration and adoption, and program installation. However, considering their ultimate
350 objective, to perform an analysis of the system and pharmacy environment for the
351 implementation of the service and to prepare the pharmacy and the service provider to
352 deliver the service, they did play a key and critical role in preparing for a successful
353 implementation. The analysis of the exploration and adoption stage and the interventions
354 undertaken in the program installation stage, made it possible to understand the complex
355 needs and supports of the system, to determine what changes were needed to implement

356 the service, to examine the resources available and finally to decide to adopt or reject the
357 further implementation of the service. In this case report, the whole process took into
358 account, using an individualized approach, the context in which the service was
359 implemented and delivered. Implementation in pharmacy is usually an ad hoc process,
360 lacking from an initial analysis, and driven by financial elements. Despite their importance,
361 little attention is paid to the initial pre-implementation phases. The analysis was undertaken
362 taking into account the context in which the service was implemented and used, and
363 importantly, using an individualized approach. Most implementation efforts in pharmacy
364 have traditionally been focused on pharmacist training as a sole strategy, and lack of
365 implementation has been attributed to practitioners ²¹. This strategy, not unsurprisingly, has
366 been proven to be ineffective. This case report provides evidence that with a holistic
367 integrated approach, implementation can be successfully achieved. Factors such as those
368 increasing capacity of the system, pharmacy, and staff to provide the service appear to be
369 essential. The implementation process described in this case report has provided evidence
370 that effective programs can be developed.

371 Implementation outcomes were evaluated at different levels and aimed at comprehensively
372 evaluating different elements of the service implementation. MRF seemed to be well
373 integrated within the pharmacy, with a penetration rate close to 0.7. A penetration rate
374 equal to 1 could have been reached, through either allocating a full time service provider or
375 adding another pharmacist to service provision. These options were discarded as the service
376 was not remunerated and the implementation costs were high. The feasibility of the MRF
377 service was proven, with retention-participation rate close to one with nearly all patients
378 that were initially recruited for the service continued with the full follow-up. The offering-
379 request rate was an interesting trend to observe. Although all patients were recruited
380 through service offering at the beginning of the operation stage, this trend was reversed

381 after eight months of implementation. Patient awareness and perception of the necessity of
382 the service and its benefits appears to be critical. Whether this reverse in trend in the
383 offering-request rate was related to the high acceptability observed among the different
384 stakeholders involved or the increase in their awareness remains unknown, although it
385 appears logical to draw this inference. During the full operation phase, the service appeared
386 to be provided with high fidelity, which is a key moderator and its intended outcomes ²².
387 This could have driven the positive clinical outcomes achieved ¹³. A likely relationship to
388 service outcomes was not assessed in this study. Finally, the implementation efficiency of
389 the service seemed to improve as the number of patients and months of follow-up
390 increased. This trend seems logical, since the service provider becomes more experienced
391 and the service starts to integrate into routine practice. Although this process indicator is
392 rarely reported or measured, it should be considered essential in economic studies where
393 the cost-effectiveness or cost benefit is researched.

394 Professional pharmacy organisations, governments and consumers at an international level
395 have encouraged the pharmacy profession to change its professional practice and
396 incorporate new health services. There is a focus on the shift from medicines dispensing and
397 supply, towards the provision of services aiming at medicines optimisation use. This change
398 has been supported by an increasing body of evidence on the positive role and value of
399 pharmacists in a variety of conditions ²³, including diabetes ²⁴, hypertension ²⁵, dyslipidaemia
400 ²⁶ or asthma ²⁷. However, this evidence is usually generated through randomised controlled
401 trials that aim to analyse the impact of the specific professional pharmacy services.
402 Therefore, the provision and evaluation of these services is done under controlled
403 environments for a limited period of time. Once the evaluation phase is over, little attention
404 is paid to the implementation of the service, leading to low service implementation rates.
405 Although numerous pharmacist-led medication review services have been assessed at an

406 international level showed positive outcomes ^{2, 28}, their long-term implementation and
407 sustainability is still patchy. The feasibility of their integration in routine practice of
408 community pharmacy, evaluated through implementation outcomes remains unknown,
409 highlighting a gap in the field of pharmacy practice research. Designing and evaluating
410 interventions to improve health, as mentioned constantly in the literature, is only the first
411 step in the process of health services research. Transferring evidence-based services into
412 real world settings is a complex, long-term process that requires dealing effectively with the
413 different stages of service implementation ²⁹. However this important concept is usually
414 missing in a large number of health services and pharmacy research studies.

415 **CONCLUSIONS**

416 According to international vision and policy, the provision of professional services should be
417 a priority for pharmacies and the health care systems. However, the implementation of
418 these innovations has been slower than desirable. This case report can assist individual
419 pharmacists and professional organisations interested in implementing evidence-based
420 services, by offering an example on how to approach the implementation process in a
421 systematic way, applying theoretical model and frameworks in a practical manner. As other
422 health innovations, the implementation of professional pharmacy services is complex and
423 represents an area in which community pharmacy has had limited experience. Having a
424 better understanding of the implementation processes and outcomes should contribute to
425 effective implementation of MRF and other pharmacy services.

426

428 Table 1. Implementation outcomes

Outcome	Operational definition	Assessment	Level of analysis	Implementation stage at which it evaluation took place
Penetration ³⁰	Level of integration of the (MRF) service within the pharmacy and its subsystems.	<ul style="list-style-type: none"> Penetration rate: Number of eligible patients who use the service/number of potential patients eligible for the service. 	Pharmacy	Full operation
Implementation costs	Cost impact of the MRF implementation effort	<ul style="list-style-type: none"> Direct measures of implementation costs, including the cost of the service provider and resources needed for service provision 	Pharmacy	Installation Full operation
Feasibility	The extent to which the MRF service can be successfully used or carried out within the pharmacy	<ul style="list-style-type: none"> Patient recruitment rate Retention-participation rate Service offering by the pharmacy/service request by the patient ratio 	Pharmacy	Full operation
Fidelity	The degree to which the MRF service is implemented and provided as it was described. Domains: <ul style="list-style-type: none"> Adherence: the extent to which MRF service provision is consistent with the service protocol Dose: the amount, 	<ul style="list-style-type: none"> For adherence: Practitioner's self-report data on the MRF service stages completed with each patient For dose: Number of patient's visits to the pharmacy for service 	Service provider Service provider	Full operation

Outcome	Operational definition	Assessment	Level of analysis	Implementation stage at which it evaluation took place
	frequency and duration of MRF service provision	provision and time per patient spent on service provision	Patient	
Acceptability	The perception among implementation stakeholders (patients and GP) that the MRF service is agreeable, palatable, or satisfactory.	Service acceptability by patients: <ul style="list-style-type: none"> • Patient satisfaction questionnaire ³¹ • Acceptability rate of patient-targeted care plans (a patient-targeted care plan was defined as any recommendation given by the pharmacist to the patient to prevent and/or solve a negative outcome associated with a medication). 	Patient	Full operation
		Service acceptability by GPs: <ul style="list-style-type: none"> • Acceptability rate of GPs-targeted care plans (A GP-targeted care plan was defined as any recommendation given by the pharmacist to the GP to prevent and/or solve a negative outcome associated with a medication during multidisciplinary collaboration). 	GP	Full operation
Appropriateness	The extent to which the MRF service is suitable, fitting, or proper for the pharmacy and for the local	Appropriateness for the pharmacy: <ul style="list-style-type: none"> • Alignment of the MRF service with national and international pharmacy guidelines 	External system of the pharmacy	Exploration and adoption

Outcome	Operational definition	Assessment	Level of analysis	Implementation stage at which it evaluation took place
	community The perceived fit, relevance, or compatibility of the MRF service for the pharmacy; and the perceived fit of the innovation to address the drug related problems of the local community	and recommendations Appropriateness for the local community and consumers: • Alignment of the MRF service with the needs of the local community attending the pharmacy		
Service implementation efficiency	The degree to which the service provider improves his/her skills and abilities to provide it	• Change in the time spent on the service provision through the implementation program	Local community and consumers Service provider	Full operation

MRF: Medication Review with Follow-up; GP: General Practitioner

429

430

431 Table 2. Implementation costs

Implementation costs for the installation phase			
Item		Euros (€)	
Information technology			
Software		16,000	
Computer		800	
Lab resources			
Siemens DCA Vantage Glycated Hemoglobin Analyzer®		800	
Reflotron Plus®		4,450	
Pharmacy layout		5,500	
Total		27,550	
Implementation costs for the initial implementation and full operation phase			
(1) Time spent on service provision		Time (min)	Euros (€)
Stages of the MRF service	First patient interview	2,288.0	869.44*
	Comprehensive medication review	53,786.6	20,438.90*
	Care plan and follow-up visits	22,668.2	8,613.92*
	Laboratory tests**	16,690.02	6,342.21*
(2) Resources for service provision			
Laboratory material		21,095.20	
Results			
Total cost of service provision (18 months of follow-up) /132 patients		57,359.67	
Annual cost / 132 patients		38,239.78	
Monthly cost / 132 patients		3,186.65	
Cost per patient per year		289.69	
Cost per patient per month		24.14	
MRF: Medication Review with Follow-up			
*Based on the province collective agreement, the cost of the pharmacist's time was estimated to be 0.38€/min. Total costs were calculated multiplying the time by the pharmacist's costs (0.38€/min)			
**This step is only recommended in the service protocol when lab tests are needed to assess a clinical outcome and they are not available from the patient or GP			

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436 Table 3. Elements of the Medication Review with Follow-up service provided per patient

MRF service stage	Number of times undertaken	Average number of times undertaken per patient (SD)	Total time spent (minutes)	Average time spent per patient, minutes (SD)
Service offering/Service explanation	145	1.1	Not assessed	Not assessed
First patient interview	132	1 (0.0)	2288	17.3 (3.7)
Comprehensive medication review	1112	8.4 (3.9)	53786.6	407.5 (263.5)
Care plan and follow-up visits	2213	16.76 (12.5)	22668.2	171.7 (123.7)
Laboratory tests**	831	6.29 (2.2)	16690.0	126.4 (50.2)
MRF: Medication Review with Follow-up; SD: Standard Deviation				
**This step is only recommended in the service protocol when lab tests are needed to assess a clinical outcome and they are not available from the patient or GP				

437 Table 4. Patient satisfaction with the Medication Review with Follow-up service

Item number	Item description	Mean (SD) (n=132)
Through the follow-up of my medication by my pharmacist, I:		
1	Have a better knowledge of the medications I am taking	4.70 (0.46)
2	Know how to use my medications	4.66 (0.52)
3	Have achieved that the medications I am using effectively treat my health problems	4.63 (0.48)
4	Know it is important to adherence to the treatment prescribed by my GP	4.75 (0.45)
5	Know what adverse effects my medicines may cause	4.61 (0.54)
6	Know how to minimise unwanted effects of my medications	4.39 (0.63)
Based on the results achieved:		
7	I would keep on visiting my pharmacist to have my medication managed	4.98 (0.15)
8	I would ask my GP to keep on collaborating with my pharmacist in regards to my medications and health problems	3.36 (0.75)
9	I would recommend my relatives and friends to request this service from my pharmacist	4.80 (0.45)
10	I believe this service should be funded by the national health care system	4.05 (0.60)
11	I am satisfied with the service provided	4.82 (0.39)

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442 None

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