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Plagiarism, Cheating and Research Integrity: Case Studies from a Masters Program in Peru

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Abstract Plagiarism is a serious, yet widespread type of research misconduct, and is often neglected in developing countries. Despite its far-reaching implications, plagiarism is poorly acknowledged and discussed in the academic setting, and insufficient evidence exists in Latin America and developing countries to inform the development of preventive strategies. In this context, we present a longitudinal case study of seven instances of plagiarism and cheating arising in four consecutive classes (2011–2014) of an Epidemiology Masters program in Lima, Peru, and

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describes the implementation and outcomes of a multifaceted, "zero-tolerance" policy aimed at introducing research integrity. Two cases involved cheating in graded assignments, and five cases correspond to plagiarism in the thesis protocol. Cases revealed poor awareness of high tolerance to plagiarism, poor academic performance, and widespread writing deficiencies, compensated with patchwriting and copy-pasting. Depending on the events' severity, penalties included course failure (6/7) and separation from the program (3/7). Students at fault did not engage in further plagiarism. Between 2011 and 2013, the Masters program sequentially introduced a preventive policy consisting of: (i) intensified research integrity and scientific writing education, (ii) a stepwise, cumulative writing process; (iii) honor codes; (iv) active search for plagiarism in all academic products; and (v) a "zero-tolerance" policy in response to documented cases. No cases were detected in 2014. In conclusion, plagiarism seems to be widespread in resource-limited settings and a greater response with educational and zero-tolerance components is needed to prevent it.

Keywords Research integrity · Plagiarism · Cheating · Graduate education · Peru

Background

Science aims at expanding knowledge through systematic generation and testing of hypotheses, which can then be used for the benefit of humanity. To achieve this goal, science is guided by several values, including objectivity, honesty and unselfishness (Allchin 1999; Committee on Science Engineering and Public Policy et al. 2009). Disregard to these values can result in research misconduct (Steneck 2006; Committee on Science Engineering and Public Policy et al. 2009), which distorts the scientific record, wastes resources, and undermines the trust of society in science (Steneck 2006). Plagiarism, the misappropriation of other's intellectual contribution, is a serious form of research misconduct, and probably one of the most frequently reported type of research misconduct (Smith 2000). Despite the challenges in ascertaining the true frequency of plagiarism, recent estimates (around 2 %) suggest that it is much more common than previously thought (Pupovac and Fanelli 2015). However, this high frequency compared to other forms of research misconduct may partially result from enhanced detection by electronic methods.

Plagiarism can occur at any point in the career of a researcher, but it is more frequently reported in the early stages (Martinson et al. 2005), and relatively few studies have explored its origins during undergraduate and early post-graduate research (Swazey et al. 1993; Wadja-Johnston et al. 2001; Krstic 2015). Early

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training stages may constitute a critical period to prevent plagiarism, when students begin to actively engage in research. If uncorrected, plagiarism and cheating may continue throughout the researcher's career, and can potentially lead to other misconduct (Lovett-Hopper et al. 2007; Park 2003). During training, plagiarism can become part of a broader set of dishonest behaviors aimed at obtaining undeserved academic advantage (such as copying in an exam, taking credit for another's work, and prohibited collaboration between students), which are collectively termed "cheating" (Park 2003).

Plagiarism is a global problem, yet evidence of its occurrence comes almost exclusively from developed countries (Ana et al. 2013). Studies exploring plagiarism in developing countries are critically needed (Ana et al. 2013), given that cultural and economic factors may affect the perception of and engagement in plagiarism (Davis 2003; Martin 2012). In developing countries, several unique factors may enable plagiarism such as: (i) lack of training in the Responsible Conduct of Research (RCR) (Rodriguez and Lolas 2011; Davis 2003; Vasconcelos et al. 2009; Cameron et al. 2012); (ii) poor development of writing skills (Heitman and Litewka 2011; Vasconcelos et al. 2009; Cameron et al. 2012); (iii) tolerance to misconduct during education and professional activities (Heitman and Litewka 2011; Vasconcelos et al. 2009); (iv) lack of institutional policies and oversight of academic centers and journals (Rodriguez and Lolas 2011; Heitman and Litewka 2011; Vasconcelos et al. 2009); (v) differing perceptions of intellectual property and misconduct (Heitman and Litewka 2011; Davis 2003; Cameron et al. 2012); (vi) the pervasive effect of corruption (Heitman and Litewka 2011); and (vii) cultural differences in values (Rodriguez and Lolas 2011; Heitman and Litewka 2011; Davis 2003; Vasconcelos et al. 2009; Cameron et al. 2012). Discussing plagiarism in Latin America is an important issue, given the dramatic growth of research activities in the region in the last two decades (Van Noorden 2014; Catanzaro et al. 2014). In particular, sporadic reports have highlighted the occurrence of plagiarism in research conducted in Latin America (Vasconcelos et al. 2009; Alfaro-Tolosa et al. 2013), and the reaction of scientific journals (Alfaro-Tolosa et al. 2013; Almeida et al. 2015). In addition, Latin American countries share many cultural features, arising from their common colonial history, that may affect how plagiarism and cheating are perceived (Martin 2012; Salter and Guffey 2001), including collectivism, high uncertainty avoidance, high power distance, high indulgence, and a short-term orientation (Hofstede 2011). Finally, the fact that Latin American countries share a common language (mainly Spanish, but also Portuguese, which are closely related) and culture may facilitate the development of effective control strategies with the potential to reach >10 % of the world's population. Despite its importance, plagiarism has not been systematically studied in Latin America (Vasconcelos et al. 2009; Alfaro-Tolosa et al. 2013), and little evidence exists on its frequency, determinants, and consequences in the Latin American setting. In particular, there is a lack of evidence about the implementation of effective, affordable, and context-specific interventions targeted at preventing plagiarism and promoting research and academic integrity among research students in Latin America (Vasconcelos et al. 2009).

In this article, we present a case study of seven instances of plagiarism and cheating detected between 2011 and 2014 in our Masters program in Epidemiologic

Research in Lima, Peru, that receives students from a broad range of countries in Latin America. We also describe the implementation and outcomes of a feasible, low-cost, "zero tolerance" policy tailored to promote research integrity among postgraduate research students in Latin America.

The Program

The Masters in Epidemiologic Research of Universidad Peruana Cayetano Heredia is a postgraduate program offered annually since 2007 in Peru. The program aims at training epidemiologists capable of designing and executing high-quality research and publishing in top-tier peer-reviewed international journals. It was created jointly by Universidad Peruana Cayetano Heredia (UPCH), the leading university in biomedical research in Peru (SCImago Research Group 2015), and the U.S. Naval Medical Research Unit No. 6 (NAMRU-6), and was created with funding from the Fogarty International Center (grant 2D43 TW007393). The courses are structured in four 10-week terms, and an overall coursework of 10 months. It is coordinated and taught almost entirely by young scientists with international graduate training, many of them doctorates from U.S. and European universities. The core coursework includes three series of courses taught in each of the four terms of the program, progressively advancing into more complex topics: Biostatistics, Epidemiology, and Research Methods. Additional compulsory courses address complementary research topics: Outbreak investigation (Term 1), Epidemiologic surveillance (Term 2), Validation of instruments (Term 2), Health situation analysis (Term 3), Qualitative research (Term 3), Program evaluation (Term 4), and Writing research proposals (Term 4). Topics on career-advancement are discussed as part of the Research Methods I-IV courses. Since 2013, the program is offered by the UPCH School of Public Health and Administration, whereas past editions were offered by the School of Medicine (2007–2009) and the School of Postgraduate Studies (2010–2012). Academic and research misconduct are critically important issues, and lectures addressing RCR, research ethics, and scientific writing have been part of the program since its inception. Students also complete the CITI research ethics course early in the program (Braunschweiger and Goodman 2007; Litewka et al. 2008). Contents on research integrity have evolved in time, expanding the discussion of plagiarism, responsible authorship, and adequate referencing as needed (Table 1). Each class has 20–30 students, usually junior researchers with a biomedical background from local research groups, governmental agencies and clinical/medical centers. Since 2011, the program has received an increasing number of international students from countries in South and Central America and the Caribbean.
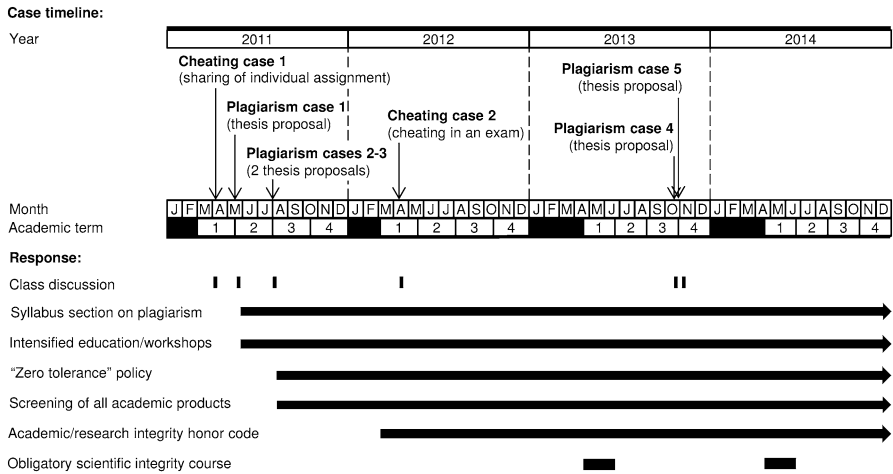
Case Studies

We present here all seven cases of plagiarism and cheating discovered between the fourth (2011) and seventh (2014) classes of the Masters program, although other cases probably remained undetected because of limited surveillance, particularly

Table 1 Summary of RCR and scientific writing contents in the Masters in Epidemiologic Research Program curriculum (2011–2013), Lima, Peru

Term	Core content (2011)	Added content	
		2012	2013–2014
Term I	CITI basic research ethics course (online)	CITI RCR basic course for biomedical researchers (online)	Scientific integrity course (17 h) emphasizing plagiarism
		Principles of scientific writing (1.5 h)	
	Adequate referencing using reference managers (3 h)	Topics on scientific writing: introduction (2 h)	How to write a research protocol (3.5 h)
	Responsible authorship (1.5 h)		Additional writing workshops (six sessions, 1.5 h each)
	Research bioethics: basic principles and history (2 h)		
	Research ethics in practice (1.5 h)		
	Introduction, references and plagiarism (2 h)		
	Writing workshops (five sessions, 1.5 h each)		
Term II	Writing workshops (5 sessions, 1.5 h each)	How to write a research protocol (1.5 h)	Additional writing workshops (seven sessions, 1.5 h each)
		Scientific writing (2 h)	
Term III	Writing a research protocol without plagiarism (2 h)	How to write a research protocol: methods (1.5 h)	Additional writing workshops (six sessions, 1.5 h each)
	Writing workshops (five sessions, 1.5 h each)	Scientific writing (3.5 h)	
Term IV	Writing workshops (five sessions, 1.5 h each)		Additional writing workshops (six sessions, 1.5 h each)
	Publication ethics (2 h)		

CITI Collaborative institutional training initiative (www.citiprogram.org), *IRB* institutional review board

before 2011. The information presented is based on the experiences of faculty directly handling the cases. All conversations with the students at fault took place in private settings, and class discussions about the events preserved their anonymity. All cases are described as male here to further support anonymity. Figure 1 summarizes key information of the cases and the response measures implemented by our program.

Case timeline:

Fig. 1 Timeline of cases of academic misconduct in the Masters in Epidemiologic Research Program (2011–2013), Lima, Peru

Cheating Case 1: Epidemiology I Course, April 2011

During the first term Epidemiology course, students were asked to complete a brief individual take-home assignment consisting of short-answer questions, and e-mail their responses to the teaching assistant (TA). Explicit instructions regarding the individual nature of the assignment were given and no discussion was allowed between students. One hour before the deadline, the TA received an e-mail with a student's homework attached, which had been shared with the rest of the class:

> Hi guys! Continuing with the love chain!!!! Hahahaha. I'm sending Epi's exercise 2, for those of you that are on a tight schedule … please let me know if you find anything wrong!:) ….

The student's behavior violated the standards of conduct by sharing individual work and requesting review of an individual assignment by other students. The event was immediately communicated to the course and program coordinators, and was discussed with the class 3 h later, preserving the anonymity of the student involved in the case. During the discussion, the class tried to minimize the importance of the event, and faculty required substantial effort to explain that the incident constituted severe academic misconduct and would not be tolerated. Coordinators evaluated potential sanctions to both the student who shared the assignment and the whole class, given that no student reported the incident. Finally, the coordinators decided jointly to fail the student on the assignment, and initiate disciplinary probation for the rest of the academic year. Penalty to the class was waived, given the short time students had to report the event (3 h). Additional sessions to discuss plagiarism and research integrity were added to the curricula. Given that the incident occurred early in the academic year, no information exists regarding the student's academic performance prior to the incident. The student completed all the required coursework that year under close supervision and intensive counseling, maintaining

a low academic performance (ranked 18 of 22), without any evidence of further misconduct.

Plagiarism Case 1: Research Methods I Course, May 2011

A student's final assignment (first draft of the thesis proposal) exhibited highly heterogeneous writing, with clear and well-written sections interspersed with less-developed sections and poorly presented arguments. In addition, some of the cited material was unrelated to the sources quoted, and the text included uncommon terminology (e.g. general practitioners were referred as "generalist physicians"). The coordinator searched the suspiciously-written sections in Google®, as described by Rojas-Revoredo et al. (2007). Several paragraphs were found to be unacknowledged verbatim fragments of published articles. The next day, the course and program coordinator met at the student's workplace to discuss the incident with the student in private. After initial denial, the student finally accepted committing plagiarism, and was failed in the course and separated from the program for the rest of the year. The university authorities were informed and a misconduct report was filed in the student's permanent academic record. In addition, the student was warned that consideration of future readmission was conditional on preparing an RCR guide for future students. The incident was discussed with the class at the beginning of the second term and substantial knowledge gaps and ambivalence towards plagiarism were noted. Plagiarism was thoroughly discussed, and five writing workshops were added to each term, at the class' request. The student contacted the program coordinator in 2012 and was readmitted to the program after completing the required material. Prior to the event, the student had poor performance (ranked 29 of 30). After readmission, the student completed all the required courses under close monitoring and intensive counselling, exhibiting average performance (ranked 16 of 30), and without evidence of any further incidents. After this incident, a paragraph describing plagiarism and its potential sanctions (including course failure) was added to the syllabi of all courses.

Plagiarism Cases 2 and 3: Research Methods II Course, July 2011

The final assignment (final draft of the thesis proposal) of two separate students presented evidence highly suggestive of plagiarism. One case exhibited partial use of quotation marks, while the other presented evidence of self-plagiarism. After searching for the suspicious fragments in the web, plagiarism and self-plagiarism were confirmed. Upon confrontation, both students initially denied the events, but eventually one accepted the misconduct, while the student who committed self-plagiarism did not accept having engaged in any misbehavior. Both students were failed in the course, separated from the program for the rest of the year, and the event was notified to the School of Postgraduate Studies. Two weeks later, the student who did not admit fault contacted the university authorities to start legal action. The authorities from the School of Postgraduate Studies discussed the case in depth with the program coordinator and endorsed program's decision. Finally, the student desisted from taking legal action, and contacted the program in early 2013 to

inquire about readmission, but did not complete the re-admission process. Both students had low academic performance in the program (ranked 26 out of 27). The other student was readmitted in 2012 but exhibited poor performance (ranked 26 of 26), and has not completed all the required coursework yet. The event was discussed with the class, and some students argued that throughout their education they repeatedly witnessed and resorted to similar behavior without any indication that it constituted a dishonest practice. One student even mentioned that a mentor in medical residency once said: "all has been written already, (publishing) only requires putting the pieces together", which seemed to be an invitation to plagiarize. Starting the following year, all students were required to sign an integrity agreement accepting to avoid plagiarism, disclose any misconduct cases witnessed (whistle-blowing) and acknowledge that failure to do so would make them accomplices. The document also specified the potential sanctions for such behaviors. Finally, content on RCR, responsible authorship, plagiarism and adequate referencing was thoroughly enhanced in the first term Research Methods course.

Cheating Case 2: Biostatistics I Course, April 2012

On April 2012, during an individual quiz, two students turned in identical solutions, even with the same variable names and Stata® code. The next day, the TA and course coordinator interviewed both students, one of which admitted having requested repeatedly the exam to the other student, whom eventually shared the answers. One day later, the program coordinator received an e-mail from the student apologizing for the misconduct, accepting all the responsibility for the incident, relieving the other student from any liability, and resigning from the program. The e-mail was promptly answered with the indication that resignation from the program was not possible, as the student was going to be expelled from the program. The School of Postgraduate Studies was then notified about this event, and the student was expelled from the program. After extensive discussion among the coordinators, the student that shared the exam was failed in the exam with a grade of zero, and was allowed to continue in the program at the end of the term. As the program had just started, no evidence is available on the academic performance of the two students prior to this event. The student that shared the exam eventually failed the Research Methods IV course, nearly failing the program due to low academic performance (ranked 19 of 20). No evidence exists of involvement in further events. An 8-week Research Integrity course was added to the first term's curriculum the following year, addressing extensively research integrity, RCR, plagiarism and appropriate referencing, among other topics.

Plagiarism Case 4: Research Methods III Course, October 2013

The introduction section of a thesis proposal contained passages highly suggestive of plagiarism. After searching for these sections in Google®, literal plagiarism from research articles and the web was confirmed. Upon questioning by the course and program coordinator, the student admitted committing plagiarism, albeit without realizing that it constituted misconduct. The student was failed in the course, and the

incident was discussed anonymously with the rest of the class, reiterating the severity of plagiarism and how to avoid it. Also, students were warned that any further plagiarism cases would be expelled from the program. Until the event occurred, the student had very low academic performance (ranked 26 of 26). The student completed the rest of the program's coursework under close monitoring and intensive counseling, with low performance (ranked 25 of 25), and was not involved in other misconduct incidents.

Plagiarism Case 5: Research Methods III Course, October 2013

One week after the class discussion of the previous case of plagiarism, the final assignment of a student (full thesis proposal) had several sections strongly suggestive of literal plagiarism. A Google® search evidenced that these paragraphs were identical to the content of several websites, including Wikipedia®. The program and course coordinator discussed the incident with the student, and after a long explanation of the definition of plagiarism, the student recognized having plagiarized inadvertently. Given the thorough discussion of plagiarism in the Research Integrity course, writing workshops, and the previous plagiarism case a week before, the student was failed in the course and separated from the program for the rest of the year. The event was reported to the university, and a misconduct report was filed in the student's permanent academic record. When given the opportunity to address the class, the student described the case, accepted all responsibility for having plagiarized, and warned the class about the severity and importance of preventing plagiarism. The class recognized the severity of the event, but unanimously asked for a more lenient sanction, arguing that the student may have missed prior warnings. Despite accepting misconduct, the student argued the sanction was too harsh and presented a notarized letter requesting a formal decision. The student's work supervisors contacted the program coordinator in coordination with the student, inquiring about the incident and the program's response, and full details were provided. The university confirmed the sanction imposed by the program and the student recently contacted the program to try to finish the coursework. Prior to the event, the student had a low performance (ranked 24 of 26).

Most of the cases of plagiarism and cheating detected involved students with a record of suboptimal academic performance in the program. Indeed, 20 % of students in the lowest quartile of their class were involved in plagiarism and cheating compared to only 2 % of students in higher grade quartiles (risk ratio = 12.2; 95 % confidence interval: 2.5–60.2, Fisher's exact p value = 0.008). Also, none of the four cases described above who actually completed their coursework later had successfully defended their dissertations. No cases were detected in the 2014 class, which suggests a very strong impact of the policy implemented, despite the fact that the reduction in the incidence of plagiarism and cheating is only marginally significant (Fisher's exact p value = 0.187).

Discussion

In three consecutive annual classes of our Epidemiology Masters in Peru, we detected five cases of plagiarism and two cases of cheating, including literal plagiarism, self-plagiarism, inappropriate sharing of work, and appropriation of other students' work. We believe that these are not isolated events, but rather the manifestation of a widespread and frequent misconduct that has probably gone undetected beyond our program. This is consistent with the high rates of cheating and plagiarism reported worldwide among high school and undergraduate students (McCabe 2005; McCabe et al. 2001), including students of medical and allied health sciences (Rennie and Crosby 2001; Taradi et al. 2010). It is likely that plagiarism and cheating may originate in high school and undergraduate education, and continue to graduate education. Thus, the widespread occurrence of plagiarism at all levels of education suggests that prevention, detection and response to plagiarism should hold a much higher priority in academic institutions in contexts like Peru and Latin America.

Students committing plagiarism and cheating shared several predisposing characteristics, including poor awareness of research integrity and plagiarism, widespread deficiencies in writing and referencing skills, poor academic performance, and a high tolerance to plagiarism. However, a significant portion of the rest of the class also shared a limited awareness of research integrity and tolerance to plagiarism, and many students had difficulty in grasping research integrity concepts. This is consistent with previous reports evidencing insufficient knowledge of RCR and plagiarism in graduate students in the U.S., particularly among international graduates (Heitman et al. 2007; Ryan et al. 2009). These knowledge gaps may be particularly severe in Latin America, where shortcomings in higher education neglect the discussion of plagiarism and academic and research integrity. In addition, lack of development of analytic and writing skills may lead some students to use plagiarism as a maladaptive, compensatory writing strategy. The situation is further complicated by a widespread tolerance to plagiarism throughout the education system in Latin America (Vasconcelos et al. 2009; Heitman and Litewka 2011). In Peru, for example, the National Assembly of Rectors reduced the sanction of two undergraduate law students guilty of literal plagiarism from a semester suspension to a simple reprimand, arguing that "copying without indicating the source is a natural behavior in students" (Tantaleán Odar 2014), and that "teaching consists fundamentally in a constant repetition of external ideas, often omitting the sources for brevity" (Tantaleán Odar 2014). Furthermore, several authors have reported that a large proportion of undergraduate research and approved theses contain plagiarism (Saldana-Gastulo et al. 2010; Huamani et al. 2008). The synergic effect of limited awareness of plagiarism, RCR, and scientific writing, and the widespread tolerance to plagiarism highlights the need to couple intensive anti-plagiarism education with stronger response policies.

Any attempt to expunge plagiarism is unlikely to succeed without institutional commitment with scientific integrity (Whitley and Keith-Spiegel 2001; Park 2004). Institutions should have a transparent, comprehensive and uniformly applied policy

that is embedded in a context of promotion of academic integrity. UPCH has an established institutional policy against academic misconduct, which is supplemented by the regulations of each school (Universidad Peruana Cayetano Heredia 2009). However, such a framework focuses almost exclusively on punitive aspects, neglecting preventive and detection strategies. Additionally, regulations have not been widely disseminated and/or discussed across the university's academic programs, and their application seems inconsistent across programs. Nevertheless, our findings are probably not an isolated case, as lack of comprehensive policies against and widespread tolerance to plagiarism appear to be nearly universal in educational institutions in countries such as Peru. Thus, the institutions' commitment and proactivity to address plagiarism is critical for the implementation of any effective and sustainable intervention against cases of plagiarism in the future. As a program, we are disappointed to see our students falling due to misconduct, but are not embarrassed to admit we had these issues. We believe many other programs face the same challenges and should come forward to admit it openly and therefore create greater awareness and response.

In this complex scenario, we adopted a "zero tolerance" policy against plagiarism (Titus et al. 2008), in which we actively searched for potential research misconduct and all suspected cases are reported, investigated and sanctioned as dictated by the severity of the case. Although there is no current consensus worldwide on the best way to respond to plagiarism findings, we believe that a zero tolerance approach is the most acceptable alternative, as it results in a clear, strong message that plagiarism and other forms of research misconduct are wrong and can never be justified. In low-resource settings, resource constraints and dependence on external funding may discourage investigating apparently "mild" cases to avoid the associated costs and potential damages in reputation. However, the long term adverse consequences of tolerating plagiarism and therefore graduating student with poor RCR knowledge, outweigh any of these short term apparent benefits. None of the students who committed/attempted plagiarism were known to engage in further events during the program and no additional misconduct events have been detected in the 2014 class.

Our "zero tolerance" policy was actively complemented by intensive education on research integrity and scientific writing. Also, policies were reinforced through discussion sessions, written statements describing the policy in all course syllabi, and a modified honor code in the form of a signed agreement to maintain research and academic integrity and report any observed cases. Honor codes constitute a simple, low-cost strategy that has been shown to prevent academic misconduct (McCabe et al. 2001). However, our experience collaborating with several Latin American educational institutions, has led us to believe that honor codes are not frequently used in Latin America. Furthermore, we feel that although many Latin American educational institutions may have codes of conduct, these are probably not discussed with students, faculty and researchers. We feel that signing a short but very clear and explicit honor code may be a more effective alternative for preventing misconduct by directly engaging students and all the academic and scientific community.

Education in the RCR is a critical pillar for maintaining research integrity and preventing plagiarism (Steneck and Bulger 2007; Kalichman 2007), and comprised the medullar aspect of our policy. Seminars on plagiarism and scientific writing were upgraded into an obligatory course on research integrity. Short online research integrity courses were used as additional activities, including both the required CITI basic RCR course for biomedical researchers (Braunschweiger and Goodman 2007; Litewka et al. 2008), as well as the optional, free, online RCR course recently created by UPCH and NAMRU-6 (http://www.cri.andeanquipu.org/index.php/es/). The definition, forms, implications and case studies of plagiarism were thoroughly discussed, and practical advice was given on preventing plagiarism (Roig 2009; Fischer and Zigmond 2011). Frequent maladaptive forms of writing, such as "patchwriting", in which original and borrowed text are intermixed (Cameron et al. 2012), and "copy/paste" were thoroughly discussed, emphasizing their intimate relation to plagiarism. Students were advised to express ideas taken from external sources in their own words, always linking each idea to its original source, and never to copy and paste. Other educative interventions implemented included: (i) breaking down extensive written assignments into multiple, smaller assignments, to allow the incremental development of writing skills (Fischer and Zigmond 2011); (ii) provision of templates, so that students have a clear idea of what is expected for each assignment (Fischer and Zigmond 2011); (iii) review of progress in an increased number of writing workshops, to provide detailed and timely guidance, allow early detection and correction of maladaptive writing strategies (Fischer and Zigmond 2011); and, (iv) requirement of more student-advisor meetings, in order to increase the oversight of the students' work, and promote mentoring, an important strategy for maintaining research integrity (Anderson et al. 2007).

As a complement to educative interventions, we now screen academic products for plagiarism (Barret et al. 2003; McKeever 2006) using widely-available search engines (e.g. Google®) (McKeever 2006). Searching actively for plagiarism allowed close monitoring the policy's efficacy, and early identification and guidance of students with inadequate referencing skills (Barret et al. 2003; McKeever 2006). This measure closely parallels the routine screening of submissions that has been increasingly implemented by scientific journals (Butler 2010). In Peru, NAMRU-6 requires that the final version of all articles reporting research conducted at the institution is checked for plagiarism before being submitted using iThenticate® (Andres G. Lescano personal communication, April 2015). In our program, plagiarism is evaluated on a case-by-case basis, after investigation and discussion among all coordinators and the faculty involved in the case. Penalties were also defined individually, following the program and university's policy, and were complemented with rehabilitative measures (Whitley and Keith-Spiegel 2001), such as intensive counseling by an experienced faculty and remedial educative activities.

The case study approach we adopted does not allow a formal evaluation of the efficacy of our program's policy against plagiarism and cheating, but it may expand the extant literature in Latin America. Our experience delivered several important learning points. First, plagiarism seems to be widespread, likely involving all stages of the educative system. Second, it is possible to implement a "zero tolerance" plagiarism prevention policy with a strong educational component in postgraduate

research programs. We implemented a promising, feasible, low-cost policy tailored for postgraduate research students in Latin America, with the aim to offer educators and researchers practical alternatives to prevent and address plagiarism that they could continue to evaluate in their practice. Third, key features associated with plagiarism in Latin America that should be considered when discussing plagiarism in the classroom include the unawareness of plagiarism and its implications, the pervasiveness of poorly-developed writing skills, and the extensive use of "patchwriting" and "copy/paste". Fourth, students with low academic performance may be at higher risk of committing plagiarism, and implement personalized tutoring and close surveillance to prevent them from plagiarizing. Given that our experience pertains a taught Masters program that receives students from several Latin American countries, we believe that our findings are applicable to postgraduate research students in Latin America. However, we emphasize that our findings may also be useful for educators and postgraduate research programs in other resource-limited, non-English speaking settings after critical assessment and a context-sensitive adaptation. Finally, it is urgent that educative institutions at all levels recognize the frequent occurrence of academic and research misconduct and integrity as an active, institutional duty. Furthermore, as the methods for engaging in dishonesty have expanded in the Internet era, preventive approaches coupled with zero tolerance for plagiarism and cheating will have a major role for controlling academic and research misconduct, even in low resource settings (Grieger 2007).

Conclusion

Plagiarism and cheating appear to be a frequent problem in research training programs in resource-limited settings, such as Peru. These instances of misconduct should be addressed at institutional and programmatic levels through policies that prioritize preventive strategies, instead of purely punitive actions. Educational activities and mentoring should be complemented with strict, active detection and zero tolerance to misconduct.

Compliance with Ethical Standards

Conflict of interest All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: all authors had financial support from the NIH Fogarty International Center for the submitted work; all authors had paid teaching positions at Universidad Peruana Cayetano Heredia in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

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